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THE

ENCYCLOPÆDIA BRITANNICA

A

DICTIONARY

OF

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DEACON (διάκονος, minister, servant), the name given to the lowest order of minister in the Christian church. From the appointment of the seven Hellenic deacons (Acts vi.) we learn that their duty under the apostles was simply to distribute alms from the public fund. In the early church, however, they soon came to discharge higher functions. They assisted the bishop and presbyter in the service of the sanctuary; in the administration of the Eucharist they handed the elements to the people; they instructed the catechumens, and in some cases baptized; and the archdeacons came to exercise in the 6th century the judicial power of the bishop over the inferior clergy.

In the Church of England the form of ordaining deacons declares that it is their office to assist the priest in the distribution of the holy communion; in which, agreeably to the practice of the ancient church, they are confined to the administering of the wine to the communicants. A deacon in England is not capable of holding any benefice, yet he may officiate as a private chaplain, as curate to a beneficed clergyman, or as lecturer in a parish church. He may be ordained at twenty-three years of age, *anno currente;* but it is expressly provided that the bishop shall not ordain the same person a priest and deacon on the same day. In Presbyterian churches, as in apostolic times, the deacons have charge only of the pecuniary affairs of the congregation. In the Roman Catholic Church it is the deacon's office to incense the officiating priest or prelate; to lay the corporal on the altar; to receive the paten or cup from the subdeacon, and present it to the person officiating; to incense the choir; to receive the pix from the officiating prelate, and to carry it to the subdeacon; and at a pontifical mass, when the archbishop gives the blessing, to put the mitre on his head, and to take off the archiepiscopal pall and lay it on the altar.

Deaconess.—This was the title of a ministry to which women were appointed in the early church, whose duty it was to perform certain functions towards female catechumens during the ceremony of baptism by immersion, which could not so well be performed by the deacons. Their age was at first fixed at sixty years, but it was afterwards reduced to forty years, and no married woman was eligible to the office. Abuses gradually became prevalent amongst the deaconesses, which led to the suppression of their ministry in the Latin church in the 6th century. The office was abolished in the Greek church in the 12th century.

DEAD SEA, the largest lake in Palestine, and physically, as well as historically, among the most remarkable in the world. It is called in Scripture *The Salt Sea* (Gen. xiv. 3), *The Sea of the Plain*, or more correctly of the *Arabah* (Deut. iii. 17), and *The East Sea* (Ezek. xlvii. 18). Josephus calls it the *Asphaltic Lake* (*B. J.* iii. 10, 17), a name adopted by classic writers in allusion to the bitumen, or asphaltum, which abounds in its basin. Jerome gave it the name *Dead Sea* because its waters are fatal to animal life, and in the Talmud it is called the *Sea of Sodom.* Its common name among the inhabitants of Palestine is *Baheiret Lût*, "The Sea of Lot."

The sea is 46 miles long, and varies from 5 to 9 in breadth. Its bed is the lowest part of the great valley of the Jordan; and its surface has a depression of no less than 1308 feet beneath the level of the ocean. The Jordan valley itself, for a distance of about 80 miles to the northward and 30 to the southward, is also below the level of the ocean. The general contour of the sea is an elongated oval, with a number of bold promontories and deep bays along the western shore, and a large, low peninsula on the south-east. It is shut in on the east and west by parallel ranges of mountains which rise steeply, and in some places in precipices of naked rock, from the water. The western range is the mountain chain of Judah, and is composed of white limestone intermixed with yellow and reddish strata. Its whole eastern slopes are bare, rugged, and desolate, forming that wilderness in which David found an asylum, in which the Baptist preached, and in which our Lord was tempted. The average height of the cliffs along the shore is about 2000 feet; but they are deeply fissured by torrent beds, which are all dry in summer. There are, however, a few fountains in the glens and near the shore, the most celebrated of which is the Biblical Engedi. At the north-west curve of the sea are extensive salt marshes, and at the south-west is a range of hills of rock salt, 7 miles long and 300 feet high, called *Khashm Usdom*, "The ridge of Sodom." On the south of the sea lies a low marshy plain, partially covered with jungles of reeds, tamarisk, and broom.

The mountain range along the eastern side of the Dead Sea is the sustaining wall of the tableland of Moab, which has an elevation of about 2800 feet, and is therefore 4000 feet above the lake. At the southern end the range is composed of red sandstone, a continuation of the "red" mountains of Edom. At the valley of Kerek the sandstone gives place to limestone; but further north it again appears in thick strata below the limestone. The range is intersected by the deep and wild ravines of Kerak (the *Kir-Moab* of the Bible), Mojeb (the ancient *Arnon*), and Zerka Main (*Maon*). A few miles from the mouth of the latter are the warm springs of Callirrhoe, famous in Jewish and Roman times. A copious stream of warm sulphureous water flows into the lake between stupendous cliffs of sandstone. North of Zerka Main the cliffs along the shore are sandstone, but higher up the limestone overlies the sandstone, while dykes and seams of old trap-rock also occur.

At the mouth of the ravine of Kerak, on the south-east of the sea, is the peninsula of *Lisân*, "The Tongue." Its neck is a strip of bare sand about 3 miles broad. In form the peninsula bears some resemblance to the human foot, the toe projecting northward up the centre of the sea. Its length is about 9 miles. It is a post-tertiary deposit of layers of marl, gypsum, and sandy conglomerate; the surface is white and almost destitute of vegetation.

The Jordan enters the lake at the centre of its northern end, and has on each bank a low alluvial plain, now a desert, and mostly coated with a white nitrous crust. In fact the whole circuit of the lake is wild, dreary, and desolate. Ridges of drift mark the water-line, which rises a few feet in spring, when the Jordan, fed by the melting snows of Hermon, flows in full stream. The drift is composed of broken canes and willow branches, with trunks of palms, poplars, and other trees, half-imbedded in slimy mud, and covered with incrustations of salt. Lying in a deep cavity, shut in by naked white hills, exposed during the long summer to the burning rays of an unclouded sun, nothing could be expected on the shores of the Dead Sea but sterility. Yet here and there on the low plains to the north and south, and on the eastern and western sides, wherever a little fountain springs up, or a mountain streamlet flows, there are thickets of willow, tamarisk, and acacia, among which the birds sing as sweetly as in more genial climes. The Arab also pitches his tent beside them, and sometimes cultivates a few patches of grain and tobacco. The heat causes such excessive evaporation that though the Jordan and other smaller streams fall into the lake the water seems to be gradually decreasing. The marshes along the shore, especially to the north and south, emit pestilential exhalations during summer and autumn which are fatal to strangers, and which make the inhabitants of Jericho, and the few poor tribes who pitch their tents in the surrounding territory, weak and sickly. They are degraded and immoral also, as were their progenitors in the "cities of the plain."

The only ruin of note close to the Dead Sea is the fortress of Masada, on a cliff on the western shore, opposite the peninsula of Lisân. It was the scene of the final struggle between the Jews and the Romans after the destruction of Jerusalem by Titus. At Engedi there are a few ruins; and also at Ain-el-Feshkhah on the north-west, and on a little peninsula near the mouth of the Jordan. The ruins of Sodom and Gomorrah have entirely disappeared. Their site is disputed, for some hold that they stood near the northern end of the lake, while others affirm that they must have been situated at the southern end.

The bed of the Dead Sea is divided into two sections; the northern, extending from the north of the Jordan to the peninsula of Lisân, is 33 miles long, and is a regular basin-shaped cavity, its sides descending steeply and uniformly to a depth of 1308 feet. The southern section is
the greatest depth of the channel between the penin
the western shore being only 13 feet, while no p
lake south of the peninsula is more than 12 feet,
of it only 3 or 4 feet deep.

The water is intensely salt and bitter, and it
is so great that the human body will not sink in
following is an analysis of water lifted by Capta
from a depth of 1110 feet, the specific gravity
was 1·227:—

Chloride of calcium	3·10
Chloride of magnesium	14·88
Chloride of sodium	7·85
Chloride of potassium	0·65
Sulphate of lime	0·07
Bromide of potassium	0·13
Total	26·41

The presence of so much saline matter is acco
by the washings of the salt range of Sodom, the
brackish springs along the shore, and the great eva
The reports of early travellers, however, regarding
Sea were to a great extent fabulous. They repre
as an infernal region, its black and fetid water
emitting a noisome vapour, which being driven
adjoining land destroyed all vegetation; they a
that no birds could fly over it. All this is unt
water is as transparent as that of the Mediterra
a bath in it is both pleasant and refreshing.

The historical notices of the Dead Sea extend ba
4000 years. When Lot looked down from the
Bethel, he "beheld all the plain of the Jordan that i
watered, before the Lord destroyed Sodom, eve
garden of the Lord" (Gen. xiii. 10). The region
described as a "deep valley" (*Emek*, Gen. xiv.
tinguished by "fertile fields" (*Siddim*). The as
is entirely different. There must have been a lak
now; but it was smaller, and had a margin
plain, especially on the southern end, "as thou co
Zoar." In the narration of the capture of the citi
plain by the Eastern kings, it is said that t
situated in the "vale of Siddim," which wa
"bitumen (slime) pits." When the cities were d
"the Lord rained upon Sodom and upon Gomor
stone and fire from the Lord out of heaven;" and
from the mountain ridges "looked toward Sod
toward all the land of the plain, and, lo, the smo
country went up as the smoke of a furnace" (Gen.
28). The sacred writer further asserts regarding
of Siddim that it became the Salt Sea, or was sub
and consequently it now forms part of the bed of

These events entirely changed, as it would seem,
political and physical condition of the whole region.
the plains originally existing round the sea Ge
Jewish records combine in placing the earliest
Phœnician civilization. "The Tyrians," says Just
dwelt by the Syrian lake before they removed to
Sodom and Gomorrah are mentioned as the first
the Canaanites; and when Lot went down fro
"the cities of the plain" formed a nucleus of civi
before any city, except Hebron and perhaps Jerus
sprung up in central Palestine. The great catast
the days of Abraham changed the aspect of the cou
gave a death-blow to its prosperity. With the
of the village of Engedi, and the small town of
the circuit of the Dead Sea appears to have
ever afterwards almost without settled inhabitants.

Recent researches, especially those of M. La
Duc de Luynes, and Canon Tristram, have co
greatly to our knowledge of the physical geograph
Dead Sea basin. It is now shown from the g

structure of the watershed in the valley of the Arabah to the south, and from the direction of the lateral ravines which fall into the great Jordan valley, that the river Jordan could never have run into the Red Sea. The *depression* of the Dead Sea is 1308 feet, while the *elevation* of the watershed is 787 feet; and the action which upheaved the watershed occurred at the same geological period which gave to the whole of Palestine its present form. The formation of the Jordan valley M. Lartet accounts for in this way. At some remote period a fracture took place in the upper strata in this region, extending north and south. In consequence of the unequal strength of the strata the western side of the fracture sank, occasioning the abrupt dip observable in the strata on the western side of the valley, and the great depression of the valley itself; while the eastern side of the fracture remained *in situ*, showing at various places along the eastern shore of the Dead Sea a vertical section through the limestone and sandstone. The basin of the Dead Sea has thus been since its foundation a reservoir for the rainfall; while its saltness originally proceeded from the salt-springs and hills, and gradually increased by evaporation.

Deposits of great depth have accumulated in the whole valley since its formation, composed of beds of gypsum, marl, flint, and alluvium, similar to those now in process of formation at the bottom of the Dead Sea. They show that at one period the whole Jordan valley was under water; while the sides of the valley indicate successive stages in the fall of the wafer from the time when its surface was on the level of the ocean down to the present age. The hill-sides and strips of plain on both the eastern and western banks of the Dead Sea are marked by a series of terraces or shore-lines. The highest has an elevation corresponding to the level of the Mediterranean. About 230 feet above the present level of the lake there is another shore-line, marked by a strip of alluvial marl adhering to the rocks and cliffs, particularly at the north-west angle. The deposit is mixed with shells of existing species, layers of gypsum and gravel. This line would correspond with the general level of the great valley northward, through which the river Jordan has cut a deep channel. There are, besides, in the ravines which descend to the lake, comparatively recent deposits, reaching up their sides in places to a height of 400 feet, and then sloping down in a series of terraces to the present level of the lake, showing the gradual depression of the water. Tristram also remarked at the western shore "no less than eight low gravel terraces, the ledges of comparatively recent beaches, distinctly marked. The highest of them was 44 feet above the present sea-level."

Many traces of volcanic action, both remote and recent, have been observed in the basin of the Dead Sea, such as trap dykes, and hot sulphur and brackish springs. Tristram describes a valley at the northern end of the salt range of Usdom, in which there are

> large masses of bitumen mingled with gravel. These overlie a thick stratum of sulphur, which again overlies a thicker stratum of sand so strongly impregnated with sulphur that it yields powerful fumes on being sprinkled over a hot coal. The bitumen, unlike that which we pick up on the shore, is strongly impregnated with sulphur. Above all, it is calcined, and bears the marks of having been subjected to extreme heat. So far as I can understand this deposit, if there be any physical evidence left of the catastrophe which destroyed Sodom and Gomorrah, or of similar occurrences, we have it here. The whole appearance points to a shower of hot sulphur, and an irruption of bitumen upon it, which would naturally be calcined and impregnated with its fumes; and this at a geological period quite subsequent to all the diluvial and alluvial action of which we have such abundant evidence. The catastrophe must have been since the formation of the valley, and while the water was at its present level,—therefore, probably during the historic period." (*Land of Israel*, pp. 355, *sq.*)

Tristram applies the above-observed facts to the solution of the great historical question about the destruction of the cities of the plain in the following manner:—

> "Setting aside all preconceived notions, and taking the simple record of Genesis xix. as we find it, let us see whether the existing condition of the country throws any light on the Biblical narrative. Certainly we do observe by the lake sulphur and bitumen in abundance. Sulphur springs stud the shores, sulphur is strewn, whether in layers or in fragments, over the desolate plains; and bitumen is ejected in great floating masses from the bottom of the sea, oozes through the fissures of the rocks, is deposited with gravel on the beach, or appears with sulphur to have been precipitated during some convulsion. We know that at the time of earthquakes bitumen seems to be detached from the bottom of the lake. Everything leads to the conclusion that the agency of fire was at work. The kindling of such a mass of combustible material, either by lightning from heaven, or by other electrical agency, combined with an earthquake ejecting other bitumen or sulphur from the lake, would soon spread devastation over the plain, so that the smoke of the country would go up as the smoke of a furnace." (*Land of Israel*, p. 359).

Here we have to do only with physical facts and appearances. A mass of burning sulphurous matter might be ejected from some open crater, as is often the case with Vesuvius; and this, falling upon the cities and the bituminous plain around them, would produce just such a form of conflagration as Abraham is stated to have seen. The valley may then have sunk a few feet, and become submerged. This, it is true, is mere theory; it is a theory, however, suggested, and to a large extent confirmed, by the physical aspect of the country, and the careful observations of travellers around the lake. The subject is not one for vague speculation, and much less for dogmatic assertion. The problems which the Dead Sea present must be solved, if they are ever to be solved, by scientific research.

It is not strange that the Dead Sea has never been navigated to any extent. It seems probable from the statement of Josephus (*Ant.* ix. 1, 2) that the Moabites crossed it to invade Judah; and he tells us the Romans used boats against the fugitive Jews (*B. J.* iv. 7, 6). Costigan was the first in modern times to navigate it, going from the mouth of the Jordan to the peninsula of Lisân in the boat by which he had came from Tiberias. He afterwards died of fatigue and exhaustion. In 1837 Moore and Beck conveyed a little boat from Joppa, and visited some points. Ten years later Lieutenant Molyneux took a boat to the peninsula, and his life was also sacrificed. The expedition of Lynch was far more successful, and he was the first thoroughly to examine the shores, and to determine the depths by soundings. Several of his party took the fever which is so fatal, and one died. Winter is the proper season for such researches. Rain seldom falls; and the air during the depth of winter is fresh, and cold almost unknown.

The following are the leading works which treat of the Dead Sea:—Robinson, *Physical Geography of Palestine*; De Saulcy, *Voyage autour de la Mer Morte*; Lynch, *Official Report to United States Government*; Ritter, *Comparative Geography of Palestine*, vol. iii. appendix i. (J. L. P.)

DEADLY NIGHTSHADE. See Belladonna.

DEAF AND DUMB. It is a not uncommon supposition that deaf mutes are dumb on account of some vocal or organic defect, whereas the dumbness arises, with very rare exceptions, from the deprivation of hearing caused by some natural or accidental disease. Where partial or total dumbness exists with the sense of hearing perfect, it will be generally found to proceed either from great nervous debility or from some mental derangement, and not, as is often supposed, from some defect in the vocal organs, which in the congenitally deaf, with hardly an exception, are in their normal condition. Many children who are enumerated as congenitally deaf have the sense of hearing to a greater or less degree, but not to such an extent as to be of service to them in the acquisition of language. It is remarkable that the defect of hearing is not generally dis covered till an advanced period of childhood, and though the child remains mute the real cause is neither readily acknowledged nor properly attended to. Children who have lost their hearing after the acquisition of the power of speech cannot be included in the class of deaf mutes; the impression which language has made on their minds gives to them a marked superiority over those who are deaf from birth.

Such a calamity as the deprivation of hearing must be productive of great and varied disadvantages, as it totally excludes the mind from an extensive class of ideas and associations. It is then not to be wondered at that this state of social isolation should occasionally give rise to moroseness and despondency, and that external objects should inspire little sense of surprise or admiration. They are simply objects recognized by their form, colour, and texture, and the emotions they raise are different both in character and in intensity from those experienced by hearing children. This physical defect has not, however, any necessary connection with the presence or absence of intellectual capacity, or with the active principles of our nature. There is only the want of one of the natural and most important avenues to intellectual development, with its primary consequence of dumbness, and its secondary one of social isolation. Still, the denial of all such knowledge as can be derived through the medium of the ear is somewhat atoned for by the quickened influence of other senses, especially that of sight. Thus the visible marks of attention the deaf and dumb receive from others,—their caresses, frowns, and smiles,—all make a corresponding impression on their tender minds, and as they grow older they watch the looks and gestures of those near them with a keenness unknown to other children, so that the slightest change of expression does not escape their observation. Their affections are stimulated and their passions excited much in the same way as in other children.

The proportion of children born deaf was formerly supposed to be much smaller than it really is. Cases have come to be known in largely increased numbers since institutions for the deaf and dumb have been established, and such statistical tables as are given in this article suggest the incorrectness of the popular supposition. The institutions which have been founded on their behalf have not only diffused correct information concerning their number, but by the gratifying success of the educational methods adopted have greatly contributed to dissipate prejudicial notions concerning their capacity to receive instruction, and to direct public sympathy towards the claims of this class. The latter office it is still needful that they fulfil, for prejudices yet exist against deaf mutes,—one of these being the general supposition that they are very vicious and hot-tempered. It may be admitted that some of them are so; and it may even be granted that the proportion of mutes with such dispositions is as high as in any other class of afflicted persons, for in the case of the deaf and dumb there are undoubtedly special circumstances of early life which tend in no small degree to such a result. The total inability of parents to deal with their abnormal peculiarities must be included among the causes which prejudicially affect their dispositions, and overshadow attractive features of their character; and the kindly-intended interference of neighbours with the parental management often proves morally injurious to them. Their discernment of right and wrong is equal to that of other children; and hence, when neighbours unwisely seek to screen them from merited punishment, a spirit of insubordination is excited, and sullenness or passionateness is induced. It should therefore be the parents' utmost endeavour, when punishment is to be administered, to treat these children impartially. It is most desirable also that external circumstances should be as favourable to them as possible, and everything calculated to pollute their uncultivated mi
kept from their acute powers of observation.

Causes.—The causes assigned for congenital deafness
consanguineous marriages, hereditary transmission, w
constitutions of parents, scrofula, climate, and the ill-hea
of the mother at a certain period of life. There
necessarily difficulty in ascertaining the real cause of de
ness. That difficulty has its ground in the unwillingn
of parents to admit that their children were born de
Their deafness is often attributed to some infantile dise
though the defect is congenital. On the other hand, wh
they have lost the sense of hearing at an early age, th
may be included among the congenitally deaf. But
institutions for the deaf and dumb contain instances whi
illustrate scientific investigations, and establish the positi
that such causes as those now alluded to tend to indu
and perpetuate the disease of deafness. In all cases
congenital deafness it will be found that there exists so
disorganization of the organ of hearing itself, some obstru
tion in the internal ear or compression of the auditory nerv
whereby the vibrations of the ear are prevented from pr
ducing the required effect upon the internal parts of the e
or from being communicated to the brain.

After-birth or acquired deafness occurs at all ages, a
has its origin in such diseases as small-pox, measles, typhu
convulsions, paralysis, hydrocephalus, and other affectio
of the brain, and "scarlatina, which more frequently th
any other disease leaves the patient deaf, in consequence
the inflammatory state of the throat extending to th
internal ear, causing suppuration and destruction of th
delicate apparatus on which hearing depends; such bei
the case, especial attention should be directed during th
course of the disease to the state of the throat, so as
prevent if possible the inflammation extending." Vaccin
tion has been the means of greatly decreasing the cases
deafness; and doubtless, as sanitary laws become mo
general, the introduction of perfect sewerage, pure wat
and good ventilation, will all tend to lessen the liability
those zymotic diseases upon which deafness superven
Amongst other causes of deafness are cold, and severe blo
or falls upon the head. It has been ascertained that t
proportion is about 60 per cent. congenitally deaf to 40 p
cent. accidentally so; and the census returns for 1871 sh
that of the 1054 inmates of 12 institutions of England a
Wales 63 per cent. were congenitally deaf. Consanguineo
marriages are perhaps the most fertile source of deafne
which fact is established by the numerous cases of d
children who are the offspring of first cousins. It is n
only so in England, but in other countries of Eur
and in America. Dr Buxton says, "In an inquiry wh
I made some time ago, I found that about every te
case of deafness resulted from the marriage of cousin
The Irish Commissioners' Report for 1871 says, "Too cl
consanguinity in the intermarriage of relatives, and a
hereditary predisposition, have long been supposed to
causes of congenital deaf-muteism." The results obtai
by the census of 1871 tend to establish these suppositio

The following table from census returns for Irel
exhibits the amount of deaf-muteism where consanguin
of parents existed :—

	Congenital Deaf Cases.	Acquired Deaf Cases.	Total.
First cousins	80	5	85
Second cousins	60	3	63
Third cousins	31	1	32
Fourth cousins	7	0	7
Fifth and sixth cousins	14	0	14
	192	9	201

Thus we find that, in 201 instances of relationship between the parents of mutes, 85 were in the degree of first cousins, 63 in that of second, 32 in that of third, 7 in that of fourth, and in 14 they were more remotely related.

Dr Boudin, at a meeting of the Academy of Sciences, Paris, noticed the following striking result of such unions :—

> "Two brothers in perfect health, and well constituted men, had married two sisters, their cousins-german. The elder brother has had several children, one of whom is deaf and dumb. The other brother has had six children, the first, third, and fifth of whom can hear, while the second, fourth, and probably the sixth (an infant) are deaf and dumb."

The report of Dr S. M. Bemiss of Louisville, Kentucky, to the American Medical Association on the subject of the influence of marriages of consanguinity on offspring and records the following results of 833 such marriages :—

> Of the 3942 children of those marriages 1134 were defective in one way or another, viz.,—deaf and dumb, 145; blind, 85; idiotic, 308; insane, 38; epileptic, 60; scrofulous, 300; and deformed, 98; 883 died young; and the writer concludes by remarking, "I feel satisfied, however, that my research gave me authority to assume that over 10 per cent. of the deaf and dumb, and over 5 per cent. of the blind, and nearly 15 per cent. of the idiotic, in our State institutions for subjects of those defects, and throughout the country at large, are the offspring of kindred parents, or of parents themselves the descendants of blood intermarriages.'

Another great cause of deafness is hereditary transmission. "It has clearly been ascertained," says Dr Harvey (*On the Ear*), "that the most common cause is a strumous and delicate habit of body, generally hereditary."

The subjoined table from the census returns for Ireland in 1871 proves that deaf-muteism is often transmitted by hereditary taint or family peculiarity. The table is divided into two sections,—the first showing where the disease is transmitted by the father, the second by the mother.

Mute relations on Father's side.

No. of Deaf Mutes in each family.	Great-Grandfather.	Great-Grandmother.	Grandfather.	Grandmother.	Granduncle.	Grandaunt.	Father.	Uncle.	Aunt.	Cousin.	Total.
One......	1	1	...	...	5	2	5	12	8	59	93
Two......	1	...	...	...	...	...	4	4	1	16	26
Three......	...	...	2	...	...	...	1	1	2	10	16
Four......	...	...	1	1	...	...	...	...	...	...	2
Five......	...	...	...		...	...	...	...	...	2	2
											139

Mute relations on Mother's side.

No. of Deaf Mutes in each family	Grandfather.	Granduncle.	Grandaunt.	Mother.	Uncle.	Aunt.	Cousin.	Total.
One...... ...	2	3	2	9	6	12	33	67
Two......	...	3	...	2	2	3	23	33
Three......	...	...	1	...	1	...	7	9
Four......	...	...	...	...	2	1	...	3
Five... ...	...	...	...	2	...	...	...	2
								114

The Commissioners' Report is as follows :—

> "Although it has been shown that muteism is transmitted by hereditary taint, yet it very seldom descends directly from the parent to the offspring, which is manifest from the following results of the inquiry made respecting the marriage state of the congenitally deaf. After a minute investigation of this subject, we find 115 instances, 77 males and 38 females, of the marriages of congenital deaf mutes where either one or both parties were affected. In 81 instances we ascertained that only one of the parties was congenitally deaf, and that 264 children, none of whom were deaf and dumb, resulted from 67 such marriages; in the remaining 14 instances there was no issue. We find four instances of the marriage of a congenital deaf mute with an acquired deaf mute, from three of which 7 children resulted, one of whom was deaf and dumb. There were 13 instances of the intermarriage of persons both of whom were deaf and dumb, and from 12 of these marriages 44 children resulted, of whom only one was deaf and dumb, and another was deaf only. The grand-parents of the former on the mother's side, and a grand-uncle of the father's, were also deaf and dumb. Of 318 children resulting from 87 of the afore-mentioned marriages, only two were deaf and dumb, and one deaf only. In a case of the intermarriage of congenital deaf mutes, although the husband's parents were second cousins and the wife's also related, and her sister deaf and dumb, yet none of the 8 children resulting from the marriage were in any way afflicted.'

The Principal of the New York Institution says, "We can show that it is much the most common for the children of deaf and dumb parents to possess the faculties of which their parents are deprived; still, although the offspring may not be defective, they may likely inherit that peculiar taint of constitution by which the disease will be transmitted to future generations, which is so often the case."

Mr Turner, in a paper on *Hereditary Deafness*, gives the following table :—

Class.	Parents.	No. of Families.	No. of Children Deaf.	No. of Children Hearing.	Total.
1	One hearing and one congenitally deaf	30	15	77	92
2	One incidentally and one congenitally deaf	56	6	120	126
3	Both congenitally deaf.....	24	17	40	57
		110	38	237	275

From this it appears that in 86 families with one parent a congenital deaf mute there were 218 children, of whom 21 were deaf and dumb, or about one-tenth of the whole. In the 24 families with both parents congenital deaf mutes there were 57 children, of whom 17 were deaf and dumb, or about one-third of the whole. The proportion of deaf-mute children of parents both congenitally deaf is thus more than three times greater than of parents only one of whom is congenitally deaf.

The subjoined table shows the proportion of the families, constituted as above, who had deaf-mute children in them :—

Class.	Parents.	Families.	Families
1	One hearing and one congenitally deaf ...	30	One or more deaf and dumb in 5
2	One incidentally and one congenitally deaf	56	" " 4
3	Both congenitally deaf..	24	" " 9

The proportion of families having one congenitally deaf parent, with at least one deaf-mute child, is about one-tenth of the whole, while the proportion of the families having both parents congenitally deaf with a deaf-mute child or children is more than one-third of the whole. The above tables show the amount of deafness transmitted by the marriage of one congenitally deaf with one hearing person. The cases of deafness resulting therefrom are only one-tenth of the whole, whereas those from the intermarriage of deaf mutes are about one-third. Similar results could be obtained from reports of many of the institutions, but from what has already been stated on this cause of deafness, it appears that, while there is sufficient reason to justify the prohibition of the intermarriage of deaf mutes, the exceptional cases of deaf mute offspring as the result of unions of deaf mutes with hearing persons would not justify interference in such marriages.

History of Instruction.—In early times, it was an opinion maintained, even by philosophers, that the education of the deaf and dumb was not possible. It was then believed that language could only be acquired through the medium of the ear. The couplet of Lucretius is well known—

> "To instruct the deaf no art could ever reach,
> No care improve them, and no wisdom teach."

Parents, influenced by this belief, allowed their children to grow up without culture. They were abandoned to themselves, and exiled from the community of rational beings. To such a culpable extent was this prejudice carried, that it has been the practice in some countries to destroy children who remained at three years of age incapable of either hearing or speaking, and by the code of Justinian deaf mutes are declared to be incapable of civil acts. In France, the very birth of such children was accounted a sort of disgrace to the family from which they sprang, and the duties of humanity were deemed to extend no further in their behalf than to the maintenance of their animal existence, while they were carefully secluded from the eyes of the world either within the walls of the cloister or in some hidden asylum in the country. Abandoned thus early to their fate, and regarded as little better than idiots, it is not surprising that their future behaviour should have been such as might seem to justify the erroneous views which had prompted this ungenerous treatment. The progress in the art of instructing the deaf and dumb was in consequence greatly retarded; attempts to instruct them were scarcely known, and no school was established till the middle of the 18th century. In the 4th century, St Augustine, influenced by the *dictum* of Aristotle, expresses his unfavourable opinion respecting their ability to obtain any religious knowledge, remarking, "that deafness from birth makes faith impossible, since he who is born deaf can neither hear the word nor learn to read it." But in this enlightened age it has been fully proved that the neglect and forgetfulness to which these outcasts were formerly consigned were founded on very mistaken notions of their mental capacities.

The first instance of a deaf mute being instructed is mentioned by Bede in 685. No other case is met with till some centuries afterwards. Rodolphus Agricola, of Heidelberg, who was born in 1442, and died in 1485, makes mention in his *De Inventione Dialectica*, of an educated deaf mute; but this instance, and probably others, were discredited on the ground of their impossibility. Jerome Cardan, a native of Pavia, born in 1501, took a more philosophical view of the subject, and says, "Writing is associated with speech, and speech with thought, but written characters and ideas may be connected without the intervention of sounds;" from which he further argues that "the instruction of the deaf is difficult, but it is possible." It was no doubt this enlightened view that gave to the education of the deaf and dumb its first and greatest impulse. A Spanish Benedictine monk of the convent of Sahagun in Spain, named Pedro de Ponce, who was born in Valladolid in 1520 and died in 1584, is the first person who is recorded to have instructed the deaf and dumb and taught them to speak. He was fifty-six years old when Jerome Cardan died, and he had no doubt, from his association with Cardan, imbibed his principles. He has, however, left no work upon the subject, though it is probable that the substance of his method is contained in a book of Bonet, secretary to the constable of Castile, printed at Madrid in 1620 under the title of *Reduccion de las letras y artes para enseñar á hablar á los mudos.* In the time of Bonet the teaching of the deaf and dumb was becoming more general and was entered upon by several persons, both in Italy and in England. Dr John Bulwer, an English physician, and Dr Wallis, professor of mathematics in the university of Oxford, were both engaged in the work in England about the same time, though it is not accurately known to whom the honour of being its prime mover is due. The former published a treatise on the education of the deaf and dumb in 1648, several
years before Dr Wallis's valuable and abie
appeared. In the year 1669, some years after
writings and practice of instructing the deaf
had been known, Dr W. Holder, rector of B
published a work entitled *Elements of Spee*
Appendix concerning Persons Deaf and Dum
George Sibscote issued a *Treatise concerning t*
Born Deaf and Dumb.; and in the year 1
Dalgarno, a native of Aberdeen, published
philosophical work, under the title of *Did*
or the Deaf and Dumb Man's Tutor, which w
some years ago by the Maitland Club. This
work is considered by Professor Porter as "
most remarkable and important productions i
history of the art." To an early work of
Ars Signorum, both Bishop Wilkins and Dr
indebted, but they never mention his name
generous silence unfavourably contrasts wit
frequent commendation of the work. Above
John Conrad Amman, a Swiss physician livin
dam, distinguished himself by his ingenious a
method of teaching the deaf and dumb to
reduced the work to a fixed art or metho
published in his *Surdus Loquens*, 1692,
English translation was afterwards publishe
Foot.

In France the work of teaching the deaf a
late in receiving the attention it deserved, in
of the still prevalent doubt as to its practicabil
many instances of success in other countries w
known. It was not till about the middle
century that the subject was taken up with
Vanin, a Father of the Christian Doctrine,
attempts to alleviate the condition of the dea
but his work was cut short by death. Aft
Ernaud, Rodriguez Pereira, the Abbé Descha
Abbé de l'Épée. In Silesia, at the beginnin
century, W. Kerger established his method on
of John C. Amman; and in 1718 Georg
German, and contemporary with Kerger, p
system he had carried out in the education
mutes in his own family. All this interesti
been accomplished before any public school
and dumb had been established; and it was
that Abbé de l'Épée started the first sch
About the same time Thomas Braidwood op
in Edinburgh; and in 1778 Heinicke in Gern
another at Leipsic under the patronage of
ment, where he pursued the system of arti
lip reading which forms the basis of instru
German schools of the present day. Thom
made himself famous by his remarkable
was visited by Dr Johnson when on his
Hebrides, who expressed himself highly grati
success in what he considered a great philosoph
In 1783 Braidwood left Edinburgh and ope
at Hackney, near London, where he continue
duties till 1806, when he died. Two of his
instructors of the deaf and dumb. A schoo
in Edinburgh by one of them in 1810, a
started a school at Birmingham in 1825.
1792 the first public school in Great Britain
tuitous education of the deaf and dumb w
Bermondsey, London, of which Dr Watson, t
Thomas Braidwood, was for thirty-seven ye
instructor. Since the above date (1792) scho
established in many of the principal towns o
America.

Methods of Instruction.—All the institution
for the education of the deaf and dumb emplo

of the two following methods—(1) that in which the sign language and manual alphabet form the basis of instruction, with articulation and lip reading to a greater or less extent, but, as a rule, only for the semi-mute, semi-deaf, and those of the congenitally deaf of good capacities, and who show an aptitude for it; and (2) that in which articulation and lip reading form the basis of instruction, and the sign language and the manual alphabet are used more or less as a means to the end. The former is the more general, and is carried out in all the schools of the United Kingdom (although in the London Asylum articulation and lip reading are professedly and systematically taught to every pupil), in America, and in some of the Continental schools. The latter is the one chiefly employed in the German and Austrian schools, and is followed in one or two private schools in London.

The signs in use in all schools are of two kinds—the natural, and the conventional or arbitrary. The former are those with which all deaf mutes are familiar before coming to school, and which they use in ordinary intercourse with their friends. The latter are chosen and systematized by the teachers of the several schools, and, in combination with the natural signs, are employed to convey ideas of a complex nature. Every action, the visible part of which can be imitated by gesture, admits easily of being so expressed, as the action of eating by lifting the hand to the mouth followed by the motion of the jaws, and of sleeping by closing the eyes and reclining the head; the expression of different passions, of approbation or disapprobation, of surprise, curiosity, &c., may all be signified very intelligibly by modifications of the countenance. "It is in this simple manner," observes Dr Watson, "that two or more deaf persons are enabled to hold instant converse with each other though brought together from the most distant parts." Thus far these signs may be termed natural, but the naturally deaf do not stop with this language of pantomime. When they are fortunate enough to meet with attentive companions, especially where two or more deaf persons happen to be brought up together, it is astonishing what approaches they will make towards the construction of an artificial language. By an arbitrary sign fixed by common consent, or accidentally hit upon, they will designate a person, place, or thing, and this sign is ever after used by them as a proper name. It is impossible to give a verbal description of those signs, because they are as various as the fancies and circumstances of their inventors. Yet being grafted on the parent stock of natural and universal signs, they may in some measure be regarded as different dialects of the same language. But since it would be impossible by means of natural signs alone to convey to the minds of the deaf and dumb ideas of a complex nature, recourse must be had to that system of signs known as conventional or arbitrary. These signs have been extended and systematized on natural and philosophical principles by the several teachers of the deaf and dumb, and they differ in degree in all schools. It would be impracticable to maintain the same system of signs throughout, even should such be desirable, but it is of the utmost importance that those in use in each school should be so cultivated as to prevent any confusion of ideas by the improper use of them. It is by their aid chiefly that all instruction is carried on, and, as used by missionaries for the deaf and dumb, they are remarkably serviceable, there being always to be found, in an assembly of deaf mutes, many whose minds cannot be reached by any other means. Attempts are often made in the institutions for the deaf and dumb to dispense with signs, and to use the manual alphabet alone after the pupils have acquired a certain proficiency in language. Although this would prove of immense educational advantage, attachment to the natural language of signs is so strong that it has always been found as impracticable to make the change as to substitute articulation and lip reading. Signs to the educated deaf and dumb should be as crutches to the halt—to be used only when occasion requires,—otherwise their constant use will tend to enfeeble rather than strengthen the intellect. In the sixth report of the American Asylum at Hartford, Connecticut, the following is given as an answer of a deaf mute to the question, "Which do you consider preferable—the language of speech or of signs?"—

> "I consider to prefer the language of signs best of it, because the language of signs is capable of to give me elucidation and understanding well. I am fond of talking with the deaf and dumb quickly, without having the troubles of the voice: therefore the language of signs is more still and calm than the language of speech, which is full of falsehood and trouble."

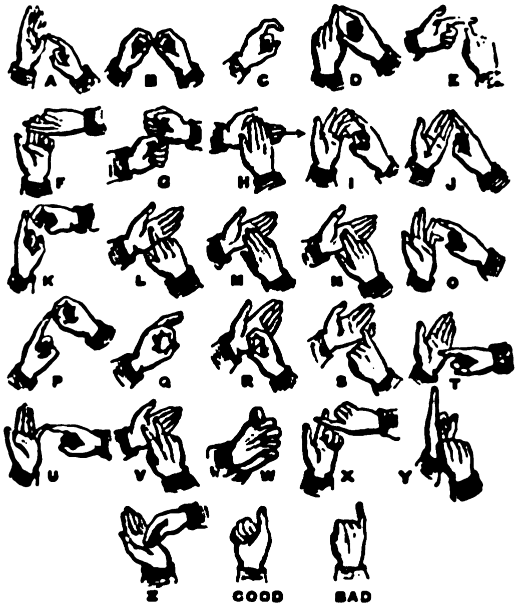
The Abbé de l'Épée, to whom teachers of mutes are greatly indebted for the methodical and ingenious system of signs, altogether mistook their function as a means of educating the deaf and dumb and in consequence his method failed entirely. He gave to each word its peculiar and appropriate gesture in the natural order of the language; and by the intervention of these gestures he succeeded in enabling his pupils to transcribe whole pages of the most abstract disquisitions. The substance and diction of these, however, were not theirs but his own, and, of course, the gestures, which they had mechanically associated with certain characters, conveyed to them no notion of the real signification of those characters. Notwithstanding the radical and glaring defects of De l'Épée's method, which could have had no utility to those who followed it, the ostentatious display he made (which was of a nature particularly calculated to impose upon superficial observers) excited the astonishment and applause of a host of spectators; and, being seconded by the impulse of his religious zeal and beneficent character, it soon raised him to a high degree of reputation. His fame spread all over Europe, and his lectures and exhibitions attracted everywhere crowds of enthusiastic admirers. Some, however, saw through the delusion. At a public exhibition of the pupils of the Abbé Storck, who were taught according to this method at Vienna, Nicolai, an Academician of Berlin, proposed to the Abbé to require one of his pupils to describe in writing the action he was about to perform. The challenge being accepted, the Academician struck his breast with his hand, upon which the deaf and dumb boy wrote the words, "hand, breast." Nicolai withdrew satisfied with this proof of total failure. It was evident that, notwithstanding their apparent knowledge and their quickness in writing down any question together with its answer, both had been equally dictated by their master, in the same language of gesture, but without any corresponding ideas or the exertion of any intellectual faculty, except that of memory. They were utterly incapable of composing a single sentence of their own accord; and it was found, accordingly, that their spontaneous answers to questions were limited to the monosyllables yes and no, of which it is even doubtful whether they fully understood the meaning. The proper method by which the pupils' knowledge of the construction of language can be tested is by dictating the lesson in the sign language in the manner in which deaf mutes themselves use it, without any regard to logical or grammatical distinctions. Most pupils after a few months' instruction will be able to write down a very fair piece of composition if dictated by the method as employed by the Abbés de l'Epée and Storck, but without understanding its meaning. The following instance will at once explain the way in which the sign language is employed by the teachers, and used amongst the deaf and dumb themselves—

Let it be supposed that a girl had been seen by a deaf mute child to drop a cup of milk which she was carrying home. He would relate the incident in the following order of sign words. Saw-I-girl-walk-cup-milk-carry-home-drop. This mode of dictating is the only sure road to the acquisition of language by those who have nothing but the natural language of gesture and feature to assist them.

The value of the language of signs is well expressed by the principal of the Ohio Institution for the Deaf and Dumb, who says :—

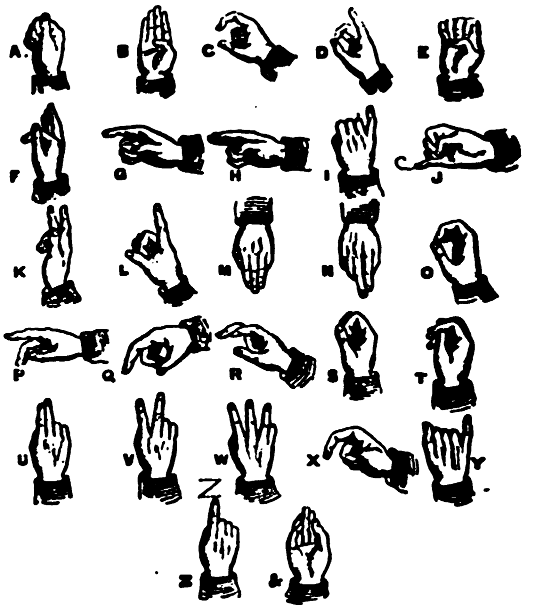
"The use of good scaffolding must attend the erection of every building. As scaffolding in architecture so is the sign language in deaf mute education, and only tyros in architecture or education would dispense with either. The riper the experience the deeper the conviction comes of the necessity and usefulness of the sign language, and in its use we find the corner stone of all deaf mute institutions. The cultivation of it and its effective use is the only peculiar, although not the chief qualification of the teacher. He will teach written language by the sign, laying aside the latter as soon as the ready use of the former has been secured. It is not necessary to descant upon the beauty, the grace, or the power of the sign language. The mute has no other, and the teacher must use and improve it as best he may."

The first lesson in which the pupils are instructed on their entrance into school is the mode of visible communication known as the finger or manual alphabet. There are two kinds of this,—the *doubled-handed* alphabet, where the letters are expressed by the dispositions of the fingers of both hands, and the *single-handed*, in which the letters are formed with the fingers of one hand. It is supposed that the former was derived from a finger-alphabet which appeared in a work by Dalgarno; and the latter is said to have been invented in Spain, and appears to have been published in a work by Bonet to which the Abbé de l'Epée was much indebted.



The Double-handed Alphabet, as in use in most of the schools for the deaf and dumb in England.

Talking with the fingers is an art easily acquired and retained, or recovered if lost, and it furnishes a ready substitute for pen or pencil; but it must not be forgotten by those familiar with it that the extent to which the deaf mute will be able to understand any communication will depend entirely upon the state of his education, or upon his knowledge of language. The deaf and dumb when properly instructed converse with the utmost rapidity by this method; habit enables them to follow with the eye motions which to others would be too rapid for observation. They readily catch at the meaning of a word or question before it is half spelt.



The Single-handed Alphabet, as used in the American and Continental schools, and also in one or two English schools.

Articulation.—Another very important branch of the education of the deaf and dumb is that system by which deaf mutes are taught to speak and to understand the speech of others by merely watching the motion of the vocal organs. This method is by no means novel, as it has long been practised in some of the schools in England, and the earliest attempts to teach the deaf and dumb to speak appear to have been as successful as those in modern times. We learn from the Venerable Bede's *Ecclesiastical History* (quoted by the Abbé Carton in his *Annual of the Deaf and Dumb and Blind*) that a deaf man was taught to pronounce words and sentences by John, bishop of Hagulstadt (Hexham), in the year 685; and from that time we meet with only isolated cases, till the latter part of the 18th century, when Samuel Heinicke established a school where this system formed the basis of instruction.

It would at first sight appear scarcely credible that a person, without the guidance of the sense of hearing, would be able, merely by watching the position and actions of the organs of the voice, to utter articulate sounds, with any tolerable perfection. Experience, however, has shown that this accomplishment, though laborious and tedious of acquisition, is not attended with extreme difficulty. Great patience, perseverance, and kindness are qualifications necessary on the part of the teacher to ensure success in ordinary cases, and the degree of success will greatly depend upon the number of children among whom the teacher has to divide his attention. A wide difference must ever be perceptible between the speech of the deaf and those who hear. This artificial speech is laborious and constrained. It frequently conveys the idea of pain as well as effort, and as it cannot be regulated by the ear of the speaker, it is often too loud, and generally monotonous, harsh, and discordant. It is often from this cause scarcely intelligible except to those who are accustomed to its tones. The system of articulation and lip reading prevails in the German and other Continental schools, where this art has been cultivated with greater success than in England, which must be attributed to the adaptability of the German language to this peculiar mode of acquiring speech; the decision of this question, as far as it concerns any particular individual, must, however, depend in a great measure on peculiar circumstances, such as condition in life and future destination, &c. Children congenitally deaf, of good capacity, with a well-toned voice, can make surprising progress in the hands of private tutors; but the limited success which has attended this method of instruction with numbers has not induced teachers to introduce it generally into large institutions, but rather to restrict it to special cases. Most of the German teachers consider that articulation is necessary for the acquisition of thought, and can be successfully taught to the majority of the deaf and dumb; but most teachers of experience in England hold quite the opposite opinion, and teach it only to the semi-mute and semi-deaf. This subject continues to be much disputed, and the question, whether or not it should form a part of the course of the education of the deaf and dumb, and, if so, to what extent, is still keenly discussed. The American institutions have sent over to Europe from time to time some of their most distinguished instructors to investigate the methods carried on in the English and Continental schools. They made most minute examinations of the different systems, and were somewhat disappointed to find that the German system so-called did not possess such advantages over theirs, or the French system, as they had been led to expect. Mr Gallaudet, in his report to the board of directors of the Columba Institution for the Deaf and Dumb, says:—"Nothing in my foreign investigations has led me to question the character of the foundation on which the system of instruction pursued in our American institutions is based. It is plainly evident, from what is seen in the articulating schools of Europe and from the candid opinions of the best instructors, that oral language cannot, in the fullest sense of the term, be mastered by a majority of deaf mutes." The following is the opinion of the Rev. George Day:— "As a regular part of a system of public instruction, its introduction into our institutions, I am persuaded, would be a serious misfortune." Mr Hawkins (for many years a teacher in the London school), who may be said, in this connection, to represent the consensus of English authorities, says:—"Scarcely more than one in thirty attains anything approaching success."

The experience of Dr Watson, for many years principal of the London Asylum, is decidedly in favour of its utility. In support of his opinion he states the following argument, which must doubtless be allowed to have some weight:—

> "The more numerous are the means of observation, the more perfect will be the recollection, or, in other terms, the more frequent the recurrence of words and their corresponding ideas to the mind. Thus, persons who can hear, speak, read, and write retain a discourse much better, and have far greater facility in expressing themselves, than persons who possess only two of these faculties, that is, illiterate persons, who can hear and speak, but who cannot read or write. Now, as deaf and dumb persons educated without articulation can only have two of the means, viz., the third and the fourth, that is, the impressions made upon the eye by characters and the action of the hand in writing, can it be questioned that we render them an essential service by adding the actions of the organs of speech, a very powerful auxiliary, since by it words become, as it were, a part of ourselves, and more immediately affect us! In learning the pronunciation of letters, a very important operation is going on in the mind of a deaf person, namely, the association and understanding of the figures of written or printed character with certain movements or actions of the organs of speech. The very habit of regarding the one as the representative of the other paves the way for considering combinations of those actions or characters, as the sign of things or ideas—that is, significant words, written or articulate. We who hear consider words chiefly as sound; the deaf who have learned to speak consider them rather as actions proceeding from themselves. And this gives language to them a sort of tangible property, which is of vast importance both as respects its retention in the memory, and one of its most important uses, the excitation of ideas in their own minds. On this account the time, the labour, and attention, necessary to articulate speech by those who are dumb through want of hearing, would be well bestowed, even if their speech were not intelligible to others."

In America oral teaching is now receiving much attention. It has been introduced into several of the existing institutions, and two or three schools have been established in which the German system is exclusively carried out, and in order to facilitate the acquisition of articulate speech, the ingenious method called "Visible Speech," invented by Mr Melville Bell, has been introduced.[1] In England, also, there are several ardent advocates of the oral system.

Time of School Attendance.—After the foregoing sketch and criticism of the different methods which have been adopted for the education of the deaf and dumb, it is natural to inquire what general end in their education is proposed by teachers, and what principal aims in conformity with that end should be regarded. Obviously the fundamental object should be to qualify the pupils to hold ready communication with persons who, having the faculties of hearing and speech, employ the current language of the country for the purposes of mutual intercourse. They must above all things be taught the use of ordinary language, both as an instrument for expressing their own thoughts and for understanding those of others. This qualification, it is evident, is absolutely necessary to their becoming members of that community from which by nature they would have been excluded, and to which it is our chief aim to restore them.[2] Teachers are not agreed as to the age at which the deaf and dumb should commence their education with the greatest benefit, nor yet as to the term required for school attendance. It is the opinion of some that infant schools for the deaf and dumb would prove of immense advantage in compensating for the extra length of time requisite to acquire anything like a perfect knowledge of the English language, but others are strongly opposed to these for social, physical, and intellectual reasons,—socially, as it tends to alienate the children from their parents; physically, as being naturally of delicate constitutions they require the years of childhood to be invigorated, and so to be fitted to undergo the strain of a regular and systematic course of instruction; and intellectually, as it has been found by experience that children of an early age have not that power of comprehension or memory to enable them to advance with satisfaction. Doubtless, they would benefit somewhat by coming to a school for the deaf and dumb for a short time daily; but as the deaf-mute population is so scattered, very few would be able to avail themselves of such a privilege. The only available remedy would be their attendance at ordinary schools for a stated time daily, where they would be disciplined and taught—the girls to sew, knit, and write, and the boys to write and draw. By this suggestion it is not meant to affirm the possibility of educating deaf mutes along with hearing children. The plan has been tried but has not been successful. The constant observation of the deaf mutes of the superiority of others over them tends to dishearten and depress them, and as they are at all times too apt to be discouraged by the consciousness of their own defect, it should be the teacher's duty cheerfully to stimulate and encourage them to advancement.[1]

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[1] Mr Bell has also invented an instrument called a Phonautograph, which he says has been found useful for educational purposes, as was demonstrated by a young deaf and dumb pupil from the Boston institution.

[2] "Most institutions experience some difficulty in securing and then retaining able and efficient teachers, as the sphere of labour in the profession is so circumscribed and the salaries offered are far from being an equivalent remuneration for the sacrifice of brighter prospects and the depressing influence of the work."

An infant school was formed in connection with the Manchester Institution for the deaf and dumb some years ago, but from the report for 1876 it appears that there were only two children under the age of seven, out of a total of 149 pupils, in the two departments. Most of the institutions admit children from seven to nine years of age, and it is the opinion of teachers of experience that at that age it is most suitable to commence instruction. Still, before they are eligible for an institution of the deaf and dumb, much may and ought to be done by the parents for their improvement.

The first and primary aim of the teacher is to get at the minds of the pupils, and for this end it is of immense advantage that they should be brought up together, so that they may acquire and maintain the language of signs. The acquisition enables them to convey to one another much and varied information, which proves of great service in the hands of the teacher in the class-room; and further, through this intercommunion the influence of example operates with due force in stimulating them to intellectual exertions.

The length of time required at school for the education of the deaf and dumb must be determined by the capacities of the pupils, and perhaps even more by their position in life. Of course, they require a much longer time than hearing children to compensate for their deprivation. Still those who have to begin to earn their daily bread by the labour of their hands at about the age of fourteen (if of good capacity) leave the school with a store of varied and useful knowledge. They are able to understand directions given to them, to hold intercourse with others, to express their opinions on ordinary affairs—in short, they are raised from a wretched and forlorn condition to that of intelligent and moral beings, and as such their future progress will be proportional to their own diligence, and will be impeded by no obstacles except those which their own exertions are now competent to remove.

Occupations.—Most of the deaf and dumb soon after leaving school are put to some trade. They will be found to be engaged in all kinds of employment except those to which hearing and speech are indispensable. The deprivation of hearing is no barrier to learning most trades, and the deaf and dumb acquire them with the same facility and show the same expertness as others. As a rule, they are very steady, and apply themselves with assiduity to their work; for while the attention of those who can hear is often distracted in the workshop, they steadily keep to their task, as they well know that talking implies for them cessation from labour. There is at times a little difficulty to get employers for them, as they require more attention to be initiated into their trades.

The following extract from an interesting work on the deaf and dumb by the Rev. S. Smith enumerates many of the trades in which they are engaged :—

> "Deaf and dumb soldiers and policemen are not existent; there is however a rifle volunteer, whose father being an old soldier drilled him well so that he is now able to join in general practice. Amongst the males, besides various labouring employments, the trades of shoemaking and tailoring predominate, but beyond these there is a diversity of occupation. We have bakers, blacks bookbinders, brassworkers, bricklayers, brickmakers, b makers, cabinetmakers, carpenters, carvers on wood and cigar-makers, compositors, coopers, cork-cutters, cutlers gravers on wood and metals, French polishers, gardeners, gi glass writers and stainers, harness makers, saddlers, ha japanners, jewellers, law writers, optical and philoso instrument makers, pattern designers, print and map colo printers both lithographic and letterpress, turners, typefou watch-dial painters, wire drawers, &c. We also find artists— graphic, photographic, heraldic—and some in the highest bra both in oil and water colours; also a sculptor of great abilit produced a beautiful composition in competition for the Welli memorial prize, who also once stood second for a gold meda who has most satisfactorily executed statuettes of Wellington, Raglan, Havelock, &c.[2] There are, besides, two heraldic pai who have studios of their own, and are amongst the best of th in London, with others who are rising in great proficiency. T the artists in oil, although but young and at present students, executed pictures which have been accepted by the British tution, the Suffolk Academy, and in one instance by the Academy. In more intellectual occupations we find several g men in the civil service, respecting one of whom, who has gai superior position in his office, it has been remarked to us by whose duties bring them into contact with him, 'that not standing his affliction they can do business better with him any other clerk in the establishment. There is a young gent making himself noted as an entomologist; some are teachers o deaf and dumb, occasionally even principals of institutions'; a highest instance we know of is a barrister, not a pleader of c but who is eminent as a conveyancer. In the employme females there is not so much variety; some are engaged in dom work, others are artificial florists, bookfolders and sewers, b drawers, cigar makers, corset makers, dress and mantle ma fringe and tassel makers, laundresses, muslin workers, milli sewing machinists, straw bonnet makers, tailoresses, &c. W know one who is a compositor, another a lady's maid, and a who is employed in a telegraph office."

From this it will be seen that to the educated deaf nearly all trades are open, and the reports from their ma to the several institutions are generally most favourab

The census returns for 1871 give the following tab occupations of deaf and dumb in England and Wales Scotland :—

Classes.	England and Wales.	Scotland.
1. Professional	120	26
2. Domestic	376	76
3. Commercial	118	70
4. Agricultural	728	340
5. Industrial	2995	921
6. Indefinite and non-productive	7181	654
Total	11,518	2087

Institutions.—Most of the institutions for the deaf dumb in England have originated in the benevolent terest of a few individuals of the localities in w they are established. They are supported by public nual subscriptions, donations, legacies, and fees of p for board and education. The principals are held sponsible for the educational department and for inte management, while the affairs of the institutions directed by committees selected from the subscri Trades are taught to the boys in some of the schools, w all the pupils have to do some industrial work, and girls are taught household work, sewing, and knit The children are admitted either gratuitously or by paym of fees, varying in amount in the several institutions, of which grant apprentice fees and otherwise assist children on leaving school.

The London Asylum was the first public schoo England for the gratuitous education of the indigent and dumb. It was projected by the Rev. J. Townsend Rev. H. Mason, rector of Bermondsey, London. On 14th November 1792 the school was opened with four pu with Dr Watson as principal. Its existence becoming more generally known, the number of candidates for admission increased so greatly beyond the means of accommodation that a larger and more commodious building was found to be absolutely necessary. An appeal for funds to erect such a building was made and liberally responded to, and an eligible plot of ground was taken in the Old Kent Road, London; and on the 11th of July 1807 the late duke of Gloucester laid the foundation stone of the new building. Since its foundation 4094 children have been admitted. In 1862 a branch was started at Margate, and after twelve years' experience the committee of management were influenced to erect a permanent building for the accommodation of 150 children. It was formally opened by the Prince of Wales on the 19th of July 1876, with Mr R. Elliott as head master. The asylum, with the branch at Margate, is supported by voluntary contributions, legacies, donations, and dividends from stock. The average income is about £12,000 a year. There are at present 317 pupils in attendance, who come from all parts of the kingdom. The ages of admission are 8½ to 11½, and the children are elected by votes of the subscribers; and, with a view to assist that class of the deaf and dumb whose friends are able to pay for their board, the committee receive children upon the payment of £25 per annum. Those children whose parents or guardians are unable to put them to some useful trade on leaving school are apprenticed by the charity. Since 1811 the number of children apprenticed has been 1515, and the total amount of premium £14,632, 16s.

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[1] In one school only, namely, Donaldson's Hospital in Edinburgh, are the deaf and dumb brought up together with hearing children, but even there it has never been thought practicable to instruct them in the same class-room. The benefit derived by the deaf and dumb from such a system is very slight in an educational point of view, but socially it is of great advantage, as it draws them out of that isolation to which they are naturally so prone, and fits them to hold free and ready intercourse with strangers in after life; and besides, the association largely tends to spread the mode of deaf-mute communication throughout the country, as the hearing children learn to communicate freely with them.

[2] Among those who passed the recent Cambridge Local Examina with honours in classics and mathematics was a deaf-mute lad und years of age, named Farrar.

Various institutions for similar objects have been formed on the Continent. The asylum for the deaf and dumb at Paris, which was formerly under the management of the Abbé Sicard, has for its object not only to enable the pupils to communicate their ideas and to form the understanding, but also to qualify them to earn their subsistence. On quitting the asylum they are all capable of following a trade or profession. Their apprenticeship begins on their first entering the institution, and is terminated when their education is finished.

Institutions, formed more or less upon the model of that at Paris, have been established in Portugal, Spain, Italy, Switzerland, Baden, Würtemberg, Bavaria, Austria, Saxony, Hesse-Cassel, Nassau, Hanover, Brunswick, the Free Towns of Germany, Belgium, Holland, Denmark, Sweden, Russia, Poland, the United States of America, Canada, Mexico, and Bengal, to say nothing of those in Great Britain and France. The American annals of 1873 give us 35 American institutions for the education of the deaf and dumb, containing a total of 4253 pupils—namely, 2393 males and 1860 females, 378 of whom are semi-mutes. The latter number includes all the deaf who have acquired language through the ear. In Canada there are 4 institutions with 292 pupils, of whom 220 are males and 72 females. Out of this number 17 are semi-mutes. The first institution for the education of deaf mutes in America was opened on the 15th April 1817. The circumstances which led to its establishment are as follows :—

> A deaf-mute little girl in the family of Dr Cogswell, an eminent physician in Hartford city, attracting some attention, it was soon afterwards found that there were other deaf mutes in the country. It was decided to send some one abroad to acquire the art of educating them; and to establish a school for this purpose funds were raised, and the Rev. F. H. Gallaudet, D.D., was selected for this work. He left the United States, May 15, 1816, to execute this mission intrusted to him. The Institution was incorporated by the Connecticut Legislature in May 1816, under the name of the Connecticut Asylum for the Education of the Deaf and Dumb.

Mr Gallaudet returned to America in August 32 of the same year, accompanied by Mr L. Clerc, a deaf-mute pupil of the Abbé Sicard. They immediately commenced collecting funds to start the school. The enterprize excited general interest, and individuals and churches contributed liberally. The sum of $12,000 was raised in the course of a few months, $5600 having been obtained in Massachusetts, above $2000 of which was collected in the city of Boston. After this school had been founded, the need of other schools was at once felt; and the New York Institution was opened in 1818, that in Pennsylvania in 1822, the one in Kentucky in 1823, Ohio school in 1829; and others followed till the number reached to 35, the last of which, a day school, was opened at Cleveland, Ohio, in 1871.

In America, and in almost every country in Europe except Great Britain and Ireland, the state successfully undertakes the instruction of the deaf and dumb. All the institutions are munificently supported by large annual appropriations from the local legislatures, the state regarding it as a primary duty that the deaf and dumb, the blind, &c., shall not be excluded from those educational privileges accorded to every member of the community.

In a spirit of enlightened liberality, highly creditable to the United States, the Government of that country adopts the deaf and dumb as "wards of the commonwealth," and in the most generous manner acquits itself of its obligation towards them. The following facts have been taken from the official reports of some American institutions :—

> The number of pupils in the Indiana Institution in the year 1870 was 186; for these the State had granted a sum of 50,000 dollars, which is equal to £10,400, or £56 per annum for each pupil. A still further sum of 42,500 dollars, or nearly £9,000 sterling, was given for the erection of some additional buildings which the requirements of the Institution demanded. Every other State in the Union provides for its deaf-mute ward with similar generosity.

It is to be hoped that the day is not far distant when the deaf and dumb in Great Britain and Ireland may be congratulated on the inauguration by the legislature of a humane and beneficent policy on their behalf.

In many of the large towns where institutions are established, associations in aid of the deaf and dumb are springing up and carrying on most important and valuable work. Their first business is to seek out neglected children and to get them placed in some special school. Situations are procured for those on leaving school whose parents are unable to do anything for them, and the education commenced at the institutions is carried on by means of lectures; and as little benefit is to be got by attending the ordinary church services, meetings are held on Sundays, when suitable religious exercises are performed, portions of Scripture explained, and an address given by spelling with the assistance of such signs as may be found necessary. The missionaries connected with these associations call upon them at their homes, in this way making themselves familiar with their condition; the sick are visited and receive consolation; and the distressed, infirm, and aged are assisted. These associations, while rendering assistance to the deserving, endeavour to make them help themselves, and help only at the point where otherwise they would be lost; and it has been made a rule that when one loses his place through any fault of his own, he cannot claim the assistance of the association to find another for him. There seem to be few societies which have a greater claim on public sympathy; and that it deserves recognition is testified by the great good it is doing to this neglected and isolated class of persons, many of whom would otherwise have probably acquired habits of idleness and intemperance.

In the English census returns for 1871 we find that only 529 deaf mutes, out of a total of 11,518, of whom 51 were imbeciles and 26 blind as well as deaf and dumb, were inmates of workhouses in England and Wales. That small proportion affords evidence of the fact that by means of education the deaf and dumb may be transferred from the dependent and burdensome class into the self-supporting class of the community.

STATISTICS.

By the census of 1871, in Great Britain there are returned as deaf and dumb 19,236.

Table I. shows the number of deaf and dumb persons in the United Kingdom in 1871, with the proportion which they bear to the whole population.

Census, 1871.	Number of Deaf and Dumb.	Total Population.	Proportion to Population.
England and Wales	11,518	22,712,266	1 in 1972
Scotland	2,087	3,360,018	1 in 1610
Ireland	5,554	5,402,759	1 in 975
Islands of the British Seas	77	144,638	1 in 1879
Total	19,236	31,619,681	1 in 1644

The above, compared with the returns of the census of 1861, with an increase of population of 2½ millions during that decennial period, will show an absolute decrease of 1075 deaf mutes, viz., 718 persons in England and Wales, 248 in Scotland, 99 in Ireland, and 10 in the islands of the British seas.

Census, 1861.	Number of Deaf and Dumb.	Total Population.	Proportion to Population.
England and Wales	12,236	20,066,224	1 in 1640
Scotland	2,335	3,062,294	1 in 1311
Ireland	5,653	5,798,967	1 in 1026
Islands of the British Seas	87	143,447	1 in 1649
Total	20,311	29,070,932	1 in 1432

These figures afford an indication that causes are at work which are diminishing the extent of deaf-muteism in the country; such as direct sanitary improvements, general attention to the laws of health, and more skilful treatment of the diseases which result in deafness. Of the 11,518 deaf mutes in England and Wales in 1871 (including those described as dumb) 6262 are males and 5256 are females. In Scotland, out of the 2087 deaf mutes, 1133 are males and 954 females, of whom 1016 were ascertained to have been so from birth, while 1071 became so in after life from various causes. The number of deaf and dumb persons in Ireland is 5554, viz., in Leinster, 1318; Munster, 1590; Connaught, 832; and Ulster, 1764.

The instances of persons in the melancholy condition of being deaf and dumb and blind are more numerous than might be supposed; for the congenitally deaf are in a measure predisposed to the organic defect which results in blindness. No less than 111 persons were returned as deaf and dumb and blind; of these 26 were in special asylums and 26 in workhouses. In 1861 only 30 persons were described as blind and deaf and dumb.

As dumbness can only co-exist with deafness from birth or from early life, the number of deaf and dumb, unlike that of the blind, does not increase with age, but is highest immediately after the age when the epidemic diseases of children have been passed through.

Table II. shows concisely the locality, the date of establishment, and approximately the number of pupils in each of the institutions in Great Britain and Ireland.

Locality	Date of establishment.	No. of Pupils
London	1792	317
Margate branch	1862	
Hackney	...	26
Birmingham	1812	112
Manchester	1823	149
Liverpool	1825	[illegible]
Exeter	1827	45
Doncaster	1829	100
Newcastle	1838	73
Brighton	1840	97
Bristol	1841	34
Bath	1842	18
Swansea	1847	26
Llandaff	1862	26
Hull	1870	17
SCOTLAND.		
Edinburgh	1810	48
Donaldson's Hospital	1850	114
Glasgow	1819	114
Aberdeen	1819	30
Dundee	1846	30
IRELAND.		
Dublin, Claremont	1816	56
Roman Catholic	1846	293
Belfast	1831	95
Derry and Raphoe	1846	5
Total		2021

Table III. shows the number of deaf and dumb with their relative proportion to the entire population in the different countries.

Countries.	Date of Enumeration.	Number of Deaf and Dumb.	Population.	Proportion to population.
EUROPE.				
England and Wales	1871	11,518	22,712,266	1 in 1972
Scotland	1871	2,087	3,360,018	1 in 1610
Ireland	1871	5,554	5,402,759	1 in 975
Prussia	1871	24,485	41,058,196	1 in 1677
France	1853	29,512	35,783,170	1 in 1212
Belgium	1835	1,746	3,885,507	1 in 2226
Holland	1833	1,250	2,500,000	1 in 2000
Denmark	1834	630	1,223,807	1 in 1942
Norway	1835	1,091	1,065,825	1 in 977
Sweden	1840	1,990	3,034,726	1 in 1525
Sardinia	1834	4,778	3,675,327	1 in 769
AMERICA.				
United States	1870	16,150	38,558,000	1 in 2388
Nova Scotia	1871	441	387,800	1 in 879
New Brunswick	1871	306	285,594	1 in 933
City of Halifax	1871	27	29,582	1 in 1095
Prince Edward Isle	1861	68	80,857	1 in 1189
Newfoundland	1861	120	122,638	1 in 1022

(A. LA.)

DEAFNESS. See EAR.

DEAK, FRANZ (1803-1876), an Hungarian statesman, was born on October 17, 1803, at Kehida, in the comitat of Szalad. He sprang from an old noble family, of which he was the last descendant. Having studied law at the academy of Raab, he practised as an advocate in Szalad, and soon became a prominent figure at the meetings of the comitat. He represented Szalad in the Diet which met at Presburg in 1832 and lasted till 1836. By his earnestness and practical sagacity he made so deep an impression that he was in a short time recognized as leader of the opposition. The object of his policy was, on the one hand, to resist the encroachments of the central Government at Vienna on the rights of his country, and, on the other, to remove abuses which then made Hungary one of the most backward nations in Europe. He again sat for Szalad in the Diet of 1839-40, and by skilful management effected a temporary reconciliation between the Imperial Government and the Reform party, of which he was the head. He gave deep offence, however, by the vigour with which he denounced the exemption of Hungarian nobles from taxation, as well as other injurious survivals of the Middle Ages; and when elected in 1843 he received such definite instructions from the constituency to vote in a reactionary sense that he declined to accept his seat. At a second election the Liberals exerted themselves so energetically that he was again appointed; but, on the ground that violence had been used in connection with his candidature, he once more refused to enter the Diet. For some years he lived as a private citizen; but he was everywhere regarded as the most influential Hungarian politician, and his party took no important step without consulting him. A project for a penal code which he drew up about this time was admitted in Germany, France, and England to be one of the most enlightened ever conceived. The excitement of 1843 caused the first symptoms of the disease of the heart of which he ultimately died; and during the rest of his life he always suffered more or less from ill health. On this account he could not enter the Diet of 1847; but next year, when revolutionary forces threatened to break up the empire, he was persuaded to take a seat vacated for him by one of the members for Szalad.

The emperor, alarmed by the dangers which surrounded him on every side, conceded in a number of measures, afterwards known as "the laws of 1848," every important demand Deák had ever made. The first independent Hungarian Cabinet, with Count Batthyanyi as president, was formed, and the ministry of justice was intrusted to Deák. In this office, during the few months he held it, he worked indefatigably; and he intended completely to reorganise legal administration. His plans, however, were

d by the agitation of which Kossuth was the centre,
ich aimed at changes of a more extreme character
approved. He desired to maintain the relations of
and Hungary, and exercised his whole influence in
f a good understanding between the two countries.
decided against him, for Kossuth rose to power and
the war in the course of which the Hapsburg
was formally deposed. Deák resigned his
, and appeared in connection with the subsequent
only as one of the deputation which, on the
h of the Austrian army to Buda-Pesth, went to
e with Prince Windischgrätz. When the war was
ák was offered the post of Judex Curiæ; but he
that the laws of 1848 were still in force, and would
hing to do with any system of government in which
e ignored. On the other hand, he discountenanced
proposals, urging that the legal rights of the land
secured only by legal means

ary suffered deeply from the reaction which
the revolutionary period, and it was clear that
awaited a favourable opportunity to throw off the
yoke. The disasters sustained by Austria in the
war of 1859 suggested to the emperor the necessity
nge of policy; and the result was that in 1861 the
in met. This time Deák appeared as member for
which henceforth returned him at every election till
h. The Moderate party rallied round him, and
ch discussion the address to the emperor drawn up
was adopted. In this the Diet took its stand on
of 1848, and demanded the appointment of a
ian ministry; but at Vienna they were not prepared
way so far. The imperial rescript was very hostile
and the Diet was speedily dissolved. In 1865
gotiations were begun, and they were powerfully
d by a series of letters in the *Pesti Napló*, setting
ák's ideas as to the proper bases of reconciliation.
the end of 1865 the Diet was opened by the
in person. About six months afterwards it was
closed because of the approaching war between
and Prussia; but it reassembled on November 19,
hen Austria had been utterly defeated and seemed
rink of ruin. The Radical party wished to take
ge of the general confusion by exacting terms to
he Austrian Government would never before have
ed; but Deák maintained his former position,
no more than that the system which he considered
legal one should been forced. His influence over
t and the nation prevailed; and he had the satis-
of seeing Count Andrassy appointed president of an
ian cabinet and the emperor and empress crowned
and queen of Hungary. The establishment of the
tem, which enabled the Austro-Hungarian monarchy
upon a new career after terrible humiliations and
was due to the efforts of Deák more than to any
use, and the fact was gratefully acknowledged both
mass of his countrymen and by the emperor.

ome years the Deák party continued the most
l in the Diet; but the state of his health rendered
ssible for him to do much more than deliver an
al speech on subjects of unusual interest. His last
in the summer of 1873, was on the relations of
and state; and he proclaimed himself in favour of
erican system—"a free church in a free state."
is death his party lost its hold over the nation;
1875 Tisza, a man of more advanced opinions, was
o the head of the Government. Deák died on
29, 1876, at Buda-Pesth, after a long and painful
His death was regarded as a national calamity,
was buried at the cost of the state amid mani-
s of universal grief.

Hungary has produced no other statesman of equal distinction. He approached closely to the type which is supposed to be peculiarly English, holding fast vital principles, but always ready to accede to a compromise on matters of secondary moment. Intensely opposed to revolution, he was absolutely fearless when sure that he was standing on lawful ground, and pursued the political ideal he had formed with a persistence which has been rarely equalled. In youth his style as an orator was passionate and florid; but he ultimately became calm and deliberate, carrying conviction by command of facts, logical arrangement of ideas, and lucid statement. At all periods of his career he conveyed the impression of absolute sincerity and devotion to high and unselfish aims. He was of a genial disposition, remarkably fond of children, and with a gift of ready humour which made him as great a favourite in society as in parliament. (J. SI.)

DEAL, a municipal and parliamentary borough and market town of England, in the county of Kent, eight miles N.N.E. of Dover and five miles by rail S.S.E. of Sandwich. It consists of three divisions:—Lower Deal, which is the most important, on the coast; Middle Deal; and, about a mile inland, Upper Deal. Though largely frequented as a sea-bathing place, the town derives its importance mainly from its vicinity to the Downs, a fine anchorage about eight miles long and six miles wide between the shore and the Goodwin Sands, in which large fleets of wind-bound vessels may lie in safety. The trade consequently consists largely in the supply of provisions and naval stores; though boat-building and a few other industries are carried on. The Deal pilots, limited by statute to the number of 56, are famous for their skill and daring. Among the public buildings in the town the most remarkable are St Leonard's Church in Upper Deal, which dates from the Norman period; the Baptist chapel in Lower Deal, founded by Captain Taverner, governor of Deal Castle, in 1663; the Deal and Walmer Institute, established in 1864; the military and naval hospital; and the barracks, which date from 1795. The site of the old navy yard is now occupied by villas; and the esplanade has been improved by the construction of a promenade pier. At the south end of the town is Deal Castle, erected by Henry VIII.; and about a mile to the east is Sandoun Castle, which owes its origin to the same monarch, and is of interest as the prison in which Colonel Hutchinson died in 1664. Walmer Castle, the official residence of the warden of the Cinque-Ports, is about a mile to the south. It has become intimately associated with the memory of the duke of Wellington, who died within its walls in 1852. Deal was possibly the site of a Roman station, but it has not received any definite identification. In the 13th century it was regarded as a subordinate member of the Cinque-Port guild; but even as late as the time of Henry VIII. it was still but a small village. Perkin Warbeck landed at this point in 1495. The castle was vainly besieged by the royalists in 1648; and in 1652 the Downs were the scene of Blake's victory over Van Tromp. Mrs Elizabeth Carter was a native of Deal. The population of the borough, which unites with Sandwich and Walmer in sending one member to Parliament, was, in 1871, 8009. The area is 1124 acres.

DEAN, Latin *decanus*, is derived from the Greek δέκα, ten; and whether the term was first used among the secular clergy to signify the priest who had a charge of inspection and superintendence over ten parishes, or among the regular clergy to signify the monk who in a monastery had authority over ten other monks, appears doubtful. "Decurius" may be found in early writers used to signify the same thing as "decanus," which shows that the word and the idea signified by it were originally borrowed from the old Roman military system.

The earliest mention which occurs of an "archipresbyter" seems to be in the 4th epistle of St Jerome to Rusticus, in which he says that a cathedral church should possess one bishop, one archipresbyter, and one archdeacon. Liberatus also (*Breviar.* c. xiv.) speaks of the office of archipresbyter in a manner which, as Bingham says, enables one to understand what the nature of his duties and position was. And he thinks that those are right who hold that the archipresbyters were the same as the deans of our cathedral churches. Stillingfleet (*Irenic.* part ii. c. 7) says of the archipresbyters that "the memory of them is preserved still in cathedral churches, in the chapters there, where the dean was nothing else but the archipresbyter; and both dean and prebendaries were to be assistant to the bishop in the regulating the church affairs belonging to the city, while the churches were contained therein." Bingham, however, following Liberatus, describes the office of the archipresbyter to have been next to that of the bishop, the head of the presbyteral college, and the functions to have consisted in administering all matters pertaining to the church in the absence of the bishop. But this does not describe accurately the office of dean in an English cathedral church. The dean is indeed second to the bishop in rank and dignity, and he is the head of the presbyteral college or chapter; but his functions in no wise consist in administering any affairs in the absence of the bishop. There may be some matters connected with the ordering of the internal arrangements of our cathedral churches, respecting which it may be considered a doubtful point whether the authority of the bishop or that of the dean is supreme. But the consideration of any such question leads at once to the due theoretical distinction between the two. With regard to matters spiritual, properly and strictly so called, the bishop is supreme in the cathedral as far as—and no farther than—he is supreme in his diocese generally. With regard to matters material and temporal, as concerning the fabric of the cathedral, the arrangement and conduct of the services, and the management of the property of the chapter, &c., the dean (not excluding the due authority of the other members of the chapter, but speaking with reference to the bishop) is supreme. And the cases in which a doubt might arise on the point are those in which the material arrangements of the fabric or of the services may be thought to involve doctrinal considerations.

The Roman Catholic writers on the subject say that there are two sorts of deans in the church—the deans of cathedral churches, and the rural deans—as has continued to be the case in the English Church. And the probability would seem to be that the former were the successors and representatives of the monastic decurions, the latter of the inspectors of "ten" parishes in the primitive secular church. It is thought by some that the rural dean is the lineal successor of the *chorepiscopus*, who in the early church was the assistant of the bishop, discharging most, if not all, episcopal functions in the rural districts of the diocese. But upon the whole the probability is otherwise. Beveridge, Cave, Bingham, and Basnage all hold that the *chorepiscopi* were true bishops, though Romanist theologians for the most part have maintained that they were simple priests. But if the *chorepiscopus* has any representative in the church of the present day, it seems more likely that the archdeacon is such rather than the dean.

The ordinary use of the term dean, as regards secular bodies of persons, would lead to the belief that the oldest member of a chapter had, as a matter of right, or at least of usage, become the dean thereof. But Bingham (lib. ii. ch. 18) very conclusively shows that such was at no time the case; as is also further indicated by the maxim to the effect that the dean must be selected from the body of the chapter—"*Unus de gremio tantum potest eligi et promoveri ad decanatus dignitatem.*" The duties of the dean in a Roman Catholic cathedral are to preside over the chapter, to declare the decisions to which the chapter may have in its debates arrived by plurality of voices, to exercise inspection over the choir, over the conduct of the capitular body, and over the discipline and regulations of the church; and to celebrate divine service on occasion of the greater festivals of the church in the absence, or inability, of the bishop. With the exception of the last clause the same statement may be made as to the duties and functions of the deans of our cathedral churches.

Deans had also a place in the judicial system of the Lombard kings in the 8th, 9th, and 10th centuries. But the office indicated by that term, so used, seems to have been a very subordinate one; and the name was in all probability adopted with immediate reference to the etymological meaning of the word,—a person having authority over ten (in this case apparently) families. Muratori, in his *Italian Antiquities*, speaks of the resemblance between the *saltarii* or *sylvani* and the *decani*, and shows that the former had authority in the rural districts, and the latter in towns, or at least in places where the population was sufficiently close for them to have authority over ten families. Nevertheless, a document cited by Muratori from the archives of the canons of Modena, and dated in the year 813, recites the names of several "deaneries" (*decania*), and thus shows that the authority of the dean extended over a certain circumscription of territory.

In the case of the "dean of the sacred college," the connection between the application of the term and the etymology of it is not so evident as in the foregoing instances of its use; nor is it by any means clear how and when the idea of seniority was first attached to the word. This office is held by the oldest cardinal—*i.e.*, he who has been longest in the enjoyment of the purple, not he who is oldest in years—who is usually, but not necessarily or always, the bishop of Ostia and Velletri. Perhaps the use of the word "dean," as signifying simply the eldest member of any corporation or body of men, may have been first adopted from its application to that high dignitary. The dean of the sacred college is in the ecclesiastical hierarchy second to the Pope alone. His privileges and special functions are very many; a compendious account of the principal of them may be found in the work of Moroni, vol. xix. p. 168.

There are four sorts of deans of whom the law of England takes notice. 1. The dean and chapter are a council subordinate to the bishop, assistant to him in matters spiritual relating to religion, and in matters temporal relating to the temporalities of the bishopric. The dean and chapter are a corporation, and the dean himself is a corporation sole. Deans are said to be either of the old or of the new foundation—the latter being those created and regulated after the dissolution of the monasteries by Henry VIII. The deans of the old foundation before 3 and 4 Vict. c. 113 were elected by the chapter on the king's *congé d'élire*; and the deans of the new foundation (and, since the Act, of the old foundation also) are appointed by the king's letters patent. It was at one time held that a layman might be dean; but by 13 and 14 Charles II. c. 4, priest's orders are a necessary qualification. Deaneries are sinecures in the old sense, *i.e.*, they are without cure of souls. The chapter formerly consisted of canons and prebendaries, the dean being the head and an integral part of the corporation. By 3 and 4 Vict. c. 113, it is enacted that "all the members of the chapter except the dean, in every collegiate and cathedral church in England, and in the cathedral churches of St David and Llandaff, shall be styled canons." By the same Act the dean is required to be in residence eight months, and the canons three months, in every year. The bishop is visitor of the dean and chapter. 2. The dean of peculiars "hath no chapter, yet is presentative, and hath cure of souls; he hath a *peculiar*, and is not subject to the visitation of the bishop." 3. The third dean "hath no cure of souls, but hath a court and a *peculiar*, in which he holdeth plea and jurisdiction of all such ecclesiastical matters as come within his peculiar. Such is the Dean of the Arches, who is the judge of the court of the arches, the chief court and consistory of the archbishop of Canterbury, so called of Bow Church, where this court was ever wont to be held." The parish of Bow and twelve others are within the peculiar jurisdiction of the archbishop in spiritual causes, and exempted out of the bishop of London's jurisdiction. 4. Rural deans are clergymen whose duty is described as being "to execute the bishop's processes and to inspect the lives and manners of the clergy and people within their jurisdiction" (see Phillimore's *Ecclesiastical Law*).

In the colleges of the English universities one of the fellows usually holds the office of "dean," and is specially charged with the discipline, as distinguished from the teaching functions of the tutors.

DEBENTURE, a deed by which certain property is charged with the repayment of money lent at a fixed interest. It is commonly adopted by companies of a public nature as a means of raising money for carrying on their undertakings. The creation of debenture stock in such companies is regulated in England by the Companies Clauses Act, 1863, part iii., which makes debenture stock a prior charge on the undertaking, and gives the interest thereon priority of payment over all dividends or interest on any shares or stock of the company, whether ordinary or preference or guaranteed. Payment of arrears may be enforced by appointment of a receiver, or (in Scotland) of a judicial factor.

DEBRECZYN, or Debretzin, a royal free city of Hungary, the chief town of the comitat of Hadju, and one of the largest in the kingdom, is situated in the midst of a slightly elevated sandy plain 114 miles east of Pesth, with which it is connected by rail. It is a meanly-built, straggling town, with irregular suburbs stretching out into the plain; its wide roadways are only paved with wood down the centre and along the sides; its houses are with few exceptions only one story high, and the courtyards or gardens with which they are usually furnished give the whole place the appearance of an overgrown village, in spite of the number of its public buildings. The most prominent of these is the principal Protestant church, which ranks as the largest in the country, but has no great architectural pretensions. In its immediate neighbourhood is the Protestant Collegium, a large and flourishing institution founded in 1792, and possessed of an extensive library. The town-house, the Franciscan church, the Piarist monastery and college, and the theatre are worthy of mention; there are also hospitals, two gymnasiums, and an agricultural academy. The industries of the town are pretty various, but none of them are of importance enough to give it the character of a manufacturing centre. Its tobacco-pipes, of the genuine national style, its sausages, and its soap are widely known; and the first of the three are imported to England and France. Flour and beet-root sugar are also manufactured. Every three months the neighbouring plain is covered with the booths and bustle of a great fair; but since the opening of the railway there is hardly so extensive a concourse as before. Between 300 and 400 square miles of territory belong to the municipality, which derives a large annual revenue from the woods, pastures, &c. The inhabitants are, with very few exceptions, of Magyar origin and Calvinistic creed, and are in bad repute for their alleged selfishness and inhospitality. The town is of considerable antiquity, but owes its development to the refugees who flocked from the villages plundered by the Turks in the 15th century. In 1552 it adopted the Protestant faith. and it had to suffer in consequence, especially when it was captured in 1686 by the imperial forces. In 1693 it was made a royal free city. In 1848–9 it formed a refuge for the National Government and Legislature when Buda-Pesth fell into the hands of the Austrians; and it was in the great Calvinist church that Kossuth read the proclamation that declared the house of Hapsburg to have forfeited the crown of Stephen. On the 3d of July the town was captured by the Russians. Population in 1869, 46,111.

DEBT is a sum certain due by one person to another. It may be created by contract, by statute, or by judgment. By the Judicature Act, 1873, any absolute assignment of any debt or other legal chose in action, of which express notice in writing shall have been given to the debtor, trustee, or other person from whom the assignor would have been entitled to receive or claim such debt, shall be effectual in law. If the debtor receives notice that such assignment is disputed by the assignor, or any one claiming under him, he may call upon the parties to interplead concerning the same, or he may pay the money into court in conformity with the Acts for the Relief of Trustees. Order xlv. of the Rules of Court under the same Act contains the provisions under which the debts due to a person against whom a judgment has passed for the payment of money may be attached by the judgment creditor. See Bankruptcy.

DECALOGUE (in patristic Greek, *ἡ δεκάλογος, sc, βίβλος* or *νομοθεσία*) is another name for the *ten commandments*, in Hebrew the *ten words* (Deut. iv. 13, x. 4; Exod. xxxiv. 28), written on the two tables of stone, the so-called *tables of the revelation* (E. V., tables of testimony—Ex. xxxiv. 29, comp. ch. xxv. 21), or *tables of the covenant* (Deut. ix. 9). In Deuteronomy the inscription on these tables, which is briefly called *the covenant* (iv. 13), is expressly identified with the words spoken by Jehovah out of the midst of the fire at Mount Sinai in the ears of the whole people on the "day of the assembly," and rehearsed in ch. v. 6–21. In the narrative of Exodus the relation of the "ten words" of ch. xxxiv. to the words spoken from Sinai, ch. xx. 2–17, is not so clearly indicated—a circumstance which has given rise to speculations as to the possible existence of a second decalogue. Before entering on this question, however, we must examine the decalogue as usually understood and embodied in the parallel passages in Exod. xx. and Deut. v.

1. *The variations in the parallel texts*, so far as they are important for the criticism of the decalogue, are mainly two. (*a*) The reason assigned for the institution of the Sabbath in Exodus is drawn from the creation, and agrees with Gen. ii. 3. In Deuteronomy the command is based on the duty of humanity to servants and the memory of Egyptian bondage. (*b*) In the tenth commandment, as given in Exodus, "house" means house and household, including all the particulars which are enumerated in ver. 17. In Deuteronomy, "Thou shalt not covet thy neighbour's *wife*" comes first, and "house" following in association with field is to be taken in the literal restricted sense.

2. *The construction of the Hebrew text* of the second commandment is disputed, but the most natural sense seems to be, "Thou shalt not make unto thee a graven image; [and] to no visible shape in heaven, &c., shalt thou bow down, &c." The third commandment might be better rendered, "Thou shalt not utter the name of the Lord thy God vainly."

3. *Divisions of the Decalogue.*— in

England and Scotland, and generally among the Reformed (Calvinistic) churches and in the Greek Church, is known as the Philonic division (Philo *de Decalogo*, § 12). It is sometimes called by the name of Origen, who adopts it in his *Homilies on Exodus*. On this scheme the preface, Exod. xx. 2, has been usually taken as part of the first commandment. The Church of Rome and the Lutherans adopt the Augustinian division (Aug., *Quæst. super Exod.*, lxxi.), combining into one the first and second commandments of Philo, and splitting his tenth commandment into two. To gain a clear distinction between the ninth and tenth commandments on this scheme it has usually been felt to be necessary to follow the Deuteronomic text, and make the ninth commandment, Thou shalt not covet they neighbour's wife.[1] As scarcely any scholar will now claim priority for the text of Deuteronomy, this division may be viewed as exploded. But there is a third scheme (the Talmudic) still current among the Jews, and not unknown to early Christian writers, which is still a rival of the Philonic view. The preface, Exod. xx. 2, is taken as the first word, and the second embraces verses 3–6. Among recent Christian writers who have adopted this view are Knobel (in his *Com. on Exodus*) and Kuenen (*Godsdienst van Israël*, i. 278 *ff.*). The decision between Philo and the Talmud must turn on two questions. Can we take the preface as a separate word? And can we regard the prohibition of polytheism and the prohibition of idolatry as one commandment? Now, though the Hebrew certainly speaks of ten "words," not of ten "precepts," it is most unlikely that the first word can be different in character from those that follow. But the statement "I am the Lord thy God," is either no precept at all, or only enjoins by implication what is expressly commanded in the words "Thou shalt have no other gods before me." Thus to take the preface as a distinct word is not reasonable unless there are cogent grounds for uniting the commandments against polytheism and idolatry. But that is far from being the case. The first precept of the Philonic scheme enjoins monolatry, the second expresses God's spiritual and transcendental nature. Accordingly Kuenen does not deny that the prohibition of images contains an element additional to the precept of monolatry, but, following De Goeje, regards the words from "thou shalt not make unto thyself" down to "the waters under the earth" as a later insertion in the original decalogue. Unless this can be made out—of which below—the Philonic scheme is clearly best, and as such it is now accepted by most scholars.

How were the ten words disposed on the two tables? The natural arrangement (which is assumed by Philo and Josephus) would be five and five. And this, as Philo recognized, is a division appropriate to the sense of the precepts; for antiquity did not look on piety towards parents as a mere precept of probity, part of one's duty towards one's neighbour. The authority of parents and rulers is viewed in the Old Testament as a delegated divine authority, and the violation of it is akin to blasphemy (comp. Ex. xxi. 17, Lev. xx. 9, with Lev. xxiv. 15, 16, and note the formula of treason, 1 Kings xxi. 13).

We have thus five precepts of piety on the first table, and five of probity on the second, an arrangement which is accepted by the best recent writers. But the current view of the Western Church since Augustine has been that the precept to honour parents heads the second table. The only argument of weight in favour of this view is that it makes the amount of writing on the two tables less unequal, while we know that the second table as well as
the first was written on both sides (Ex. xxxii. 15). I
we shall presently see that there may be another way c
of this difficulty.

4. *Critical questions.*—That the decalogue not only co
tains Mosaic ideas, but is as old as Moses in its form a
system of "ten words," is admitted by critics of almost eve
school.[2] But it is much disputed what the original comp
of the decalogue was. Did the whole text of Exod. :
2–17 stand on the tables of stone? The answer to t
question must start from the reason annexed to the fou
commandment, which is different in Deuteronomy. I
the express words "and he added no more," in Deut.
22, show that there is no conscious omission by t
Deuteronomic speaker of part of the original decalog
which cannot therefore have included the reason annex
in Exodus. On the other hand the reason annexed
Deuteronomy is rather a parenetic addition than an origi
element dropped in Exodus. Thus the original fou
commandment was simply "Remember the Sabbath day
keep it holy."[3] When this is granted it must appear i
improbable that the elucidations of other commandme
may not have stood on the tables. Thus in the seco
commandment, "Thou shalt not bow down to any visi
form," &c., is a sort of explanatory addition to the prec
"Thou shalt not make unto thee a graven image." A
so the promise attached to the fifth commandment v
probably not on the tables, and the tenth commandme
may have simply been, "Thou shalt not covet thy neighbou
house," which includes all that is expressed in the followi
clauses. Such a view gets over the difficulty arising fr
the unequal length of the two halves of the decalogue. T
elucidations (unless in the case of the fourth comma
ment) may very well be as old as Moses (comp. Ewa
Geschichte, ii. 229). It is quite another question wheth
there is any idea in the decalogue which cannot be as c
as Moses. It is urged by many critics that Moses cann
have prohibited the worship of Jehovah by images; for t
subsequent history shows us a descendant of Moses
priest in the idolatrous sanctuary of Dan. There were te
phim in David's house, and the worship of Jehovah und
the image of a calf was the state religion of the kingdo
of Ephraim. It is argued from these facts that ima
worship went on unchallenged, and that this would n
have been possible had Moses forbidden it. This argume
does not appear to have all the force that Kuenen a
others attach to it, for it must be remembered how larg
section of Christendom, in times much more advanced th
those of the Old Testament, has accepted the decalog
and yet has worshipped images. And on the other si
we have the much more cogent arguments that the numb
of ten words, which no one doubts to be primitive, cann
be naturally made out if the law against images is droppe
and that the existence of this law is necessary to expla
the fact that the unquestionably Mosaic sanctuary of t
ark, which is just the sanctuary of the revelation of the t
words, embodies the principle of the worship of Jehov
without images in a distinct and practical form. It m
be added that the prohibition of images of hewn ston
which is the primitive sense of the word "graven-image
can hardly be less ancient than the conception that t
stones of an altar were defiled by the touch of the chi
(Exod. xx. 24). And this is a conception which cann
be viewed as a later refinement on Mosaic ideas.

5. *The Decalogue of Exodus xxxiv.*—In the book
Exodus the words written on the tables of stone are n
where expressly identified with the ten commandments

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[1] So, for example, Augustine, *l. c.* Thomas, *Summa* (*Prima Secundæ*, qu. c. art. 4), and recently Sonntag and Kurtz. Purely arbitrary is the idea of Lutheran writers (Gerhard, *Loc.* xiii. § 46) that the ninth commandment forbids *concupiscentia actualis*, the tenth *conc. originalis*.

[2] Exceptions to this consensus are Vatke (*Biblische Theologie*,
202) and Noldeke (*Untersuchungen*, p. 51).

[3] It is generally assumed that the addition in Exodus is from t
hand that wrote Gen i.–ii. 4.

chap. xx. In xxv. 16 xxxi. 18, xxxii. 15, we simply read of "the revelation" inscribed on the tables, and it seems to be assumed that the contents of this revelation must be already known to the reader. The expression "ten words" first occurs in xxxiv. 28, in a passage which relates the restoration of the tables after they had been broken. But these "ten words" are called "the words of the covenant," and so can hardly be different from the words mentioned in the preceding verse as those in accordance wherewith the covenant was made with Israel. And again, the words of verse 27 are necessarily the commandments which immediately precede in verses 12–26. Accordingly many recent critics, following Hitzig,[1] who seems to have formed his view without reference to a previous suggestion of Goethe's, have sought to show that Exod. xxxiv. 12–26 contains just ten precepts forming a second decalogue. In point of detail it is disputed whether the narrator of Exod. xxxiv. regards this decalogue as precisely identical with that which stood on the first tables (which seems to follow from xxxiv. 1) or as a modification of the original words (so Ewald). It does not seem possible to deny the connection of verses 27, 28 with one another and with the previous context as the text now stands. Hengstenberg (*Beiträge*, ii. 387 *ff.*) and Bertheau (*Sieben Gruppen Mosaischer Gesetze*, p. 97) seek to distinguish the words of verse 28, as written by God himself, from those which, in verse 27, Moses is commanded to write. But no such distinction lies in the text, and it is not probable that the narrator felt any contradiction between God's promise to write the words in verse 1 and the use of human instrumentality as implied in verse 28. On the other hand, the hypothesis of a second decalogue has serious if not insuperable difficulties. The number of ten precepts in Exod. xxxiv. is by no means clearly made out, and the individual precepts are variously assigned by different critics; while the most recent supporter of the theory admits that the original number of ten is now concealed by additions.[2] This supposed decalogue contains no precepts of social morality, but forms a sort of unsystematic abstract of the oldest laws about points of religious observance. If such a system of precepts was ever viewed as the basis of the covenant with Israel, it must belong to a far earlier stage of religious development than that of Exod. xx. This is recognized by Wellhausen, who says that our decalogue stands to that of Exod. xxxiv. as Amos stood to his contemporaries, whose whole religion lay in the observance of sacred feasts. But the idea that the ethical teaching of the prophets had no basis in the original document of the Mosaic covenant is so revolutionary that few will venture to accept "Goethe's decalogue" with such inferences. The difficulty is presumably due to the interweaving of several distinct narratives, which perplexes the sequence of many parts of Exodus. It is more probable that xxxiv. 10–27—a summary of the religious precepts of the Mosaic covenant—originally stood in a different connection than that there ever were two opinions as to what stood on the tables.

6. *The Decalogue in Christian Theology.*—Following the New Testament, in which the "commandments" summed up in the law of love are identified with the precepts of the decalogue (Mark x. 19: Rom. xiii. 9; *cf.* Mark xii. 28 *ff.*), the ancient church emphasized the permanent obligation of the ten commandments as a summary of *natural* in contradistinction to *ceremonial* precepts, though the observance of the Sabbath was to be taken in a spiritual sense (Augustine, *De Spiritu et Litera*, xiv.; Jerome, *De Celebratione Paschæ*). The mediæval theologians followed in the same line, recognizing all the precepts of the decalogue as moral precepts *de lege naturæ*, though the law of the Sabbath is not of the law of nature, in so far as it prescribes a determinate day of rest (Thomas, *Summa*, I^{ma} $\mathrm{II}^{\mathrm{dæ}}$, qu. c. art. 3; Duns, *Super Sententias*, lib. iii. dist. 37). The most important mediæval exposition of the decalogue is that of Nicolaus de Lyra; and the 15th century, in which the decalogue acquired special importance in the confessional, was prolific in treatises on the subject (Antoninus of Florence, Gerson, &c.).

Important theological controversies on the decalogue begin with the Reformation. The question between the Lutheran (Augustinian) and Reformed (Philonic) division of the ten commandments was mixed up with controversy as to the legitimacy of sacred images not designed to be worshipped. The Reformed theologians took the stricter view. The identity of the decalogue with the eternal law of nature was maintained in both churches, but it was an open question whether the decalogue, as such (that is, as a law given by Moses to the Israelites), is of perpetual obligation. The Socinians, on the other hand, regarded the decalogue as abrogated by the more perfect law of Christ; and this view, especially in the shape that the decalogue is a civil and not a moral law (J. D. Michaelis), was the current one in the period of rationalism in last century. The distinction of a permanent and a transitory element in the law of the Sabbath is found, not only in Luther and Melanchthon, but in Calvin and other theologians of the Reformed church. The main controversy which arose on the basis of this distinction was whether the prescription of one day in seven is of permanent obligation. It was admitted that such obligation must be not natural but positive; but it was argued by the stricter Calvinistic divines that the proportion of one in seven is agreeable to nature, based on the order of creation in six days, and in no way specially connected with anything Jewish. Hence it was regarded as a *universal positive* law of God. But those who maintained the opposite view were not excluded from the number of the orthodox. The laxer conception found a place in the Coccejan school.

Literature.—Geffcken, *Ueber die verschiedenen Eintheilungen des Dekalog's und den Einfluss derselben auf den Cultus:* Ewald's *History of Israel*, vol. ii.; Schultz's and especially Oehler's *Old Testament Theology;* Oehler's article "Dekalog" in Herzog's *Encyclopädie;* commentaries on Exodus, especially that of Knobel in German, and in English of Kalisch; Kuenen's *Godsdienst van Israel*, Hfdst. v. Kurtz, *Geschichte des Alten Bundes*, Bd. ii.; other literature cited by Oehler and by Koehler, *Biblische Geschichte*, i. 287. For guidance in the theological controversies about the Decalogue the student may consult Walch and Baumgarten. (W. R. S.)

DECAMPS, Alexandre Gabriel (1803–1860), one of the foremost painters of the modern French school, was born in Paris on the 3d March 1803. He received his artistic training from Abel de Pujol, but set himself free at an early period of his career from academic trammels. He asserted his originality in his choice of subjects as well as in his style of treatment. In his youth he travelled in the East, and reproduced Oriental life and scenery with a bold fidelity to nature that made his works the puzzle of conventional critics. His powers, however, soon came to be recognized, and he was ranked along with Delacroix and Vernet as one of the leaders of the French school. At the Paris Exhibition of 1855 he received the grand or council medal. Most of his life was passed in the neighbourhood of Paris. He was passionately fond of animals, especially dogs, and indulged in all kinds of field sports. He died on the 22d August 1860 in consequence of being thrown from a vicious horse while hunting at Fontainebleau. The style of Decamps was characteristically and intensely French. It was marked by vivid dramatic conception, by a manipulation bold and rapid, sometimes even to roughness, and especially by original and startling use of decided contrasts of colour and of light and shade. His subjects embraced an unusually wide range. He availed himself of his travels in the East in dealing with scenes from scripture history, which he was probably the first of European painters to represent with their true and natural local background. Of this class were his Joseph sold by his Brethren, Moses taken from the Nile, and his scenes from the life of Samson, nine vigorous sketches in charcoal and white. Perhaps the most impressive of his historical pictures is his Defeat of the Cimbri, representing with wonderful skill the conflict between a horde of barbarians and a disciplined army. Decamps produced a number of genre pictures, chiefly of scenes from French and Algerine domestic life, the most marked feature of which is humour. The same characteristic attaches to most of his numerous animal paintings. He painted dogs, horses, &c., with great fidelity and sympathy; but his favourite subject was monkeys, which he depicted in various studies and sketches with a grotesque humour that could scarcely be surpassed. Probably the best known of all his works is The Monkey Connoisseurs, a clever satire of the jury of the French Academy of Painting, which had rejected several of his earlier works on account of their divergence from any known standard. The pictures and sketches of Decamps were first made familiar to the English public through the lithographs of Eugene la Roux. See Moreau's *Decamps et son Œuvre* (Paris, 1869).

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[1] *Ostern und Pfingsten im zweiten Dekalog*, Heidelberg, 1838.

[2] Wellhausen in *Jahrbb. f. D. Theol.*, 1876, p. 554.

DE CANDOLLE, Augustin Pyramus (1778–1841), a celebrated botanist, was born at Geneva, February 4, 1778. He was descended from one of the most ancient families of Provence, and his ancestors had been expatriated for their religion in the middle of the 16th century. His father was a famous printer, and syndic of the university and republic. Though a weakly boy he showed great aptitude for study, and distinguished himself at school by his rapid attainments in classical and general literature, and specially by a faculty for writing elegant verse, which led Florian to anticipate that he might become famous as a poet. He showed remarkable powers of memory, which proved of the greatest service to him in the science to which he ultimately devoted himself. His interest in plants was first roused while he was residing with his mother at a remote country village during the siege of Geneva in 1792. He began his scientific studies at the college of Geneva, by attending the courses of Saussure and Vaucher, the latter of whom first inspired him with the determination to make botanical science the chief pursuit of his life. In 1796 he removed to Paris, where he resided with Dolomieu, attended various courses of lectures on natural science, and gained the friendship of [illegible] Desfontaines. His first productions, *Historia* [illegible] (4 vols., 1799) and *Astragalogia* [illegible] him to the notice of Cuvier (whose chair [illegible] France he supplied in 1802), Humboldt, [illegible], who afterwards confided to him the [illegible] of the third edition of the *Flore Française* [illegible]. The introduction to this work contained the [illegible] of his principle of classification according to the [illegible] to the Linnean or artificial method. [illegible] elected (1804) doctor of medicine by the [illegible] Paris, he wrote, as an inaugural work, the [illegible] *des propriétés médicales des plantes* [illegible] At the [illegible] of the French [illegible] the following [illegible] transferred to the newly [illegible] chair of botany of the faculty of sciences in the same university. He was an admirable lecturer, and the gardens under his charge were much improved during his occupancy of the chair. From Montpellier he removed to Geneva in 1816, having been invited by the now independent republic to fill the newly created chair of natural history. The rest of his life was spent in an attempt to elaborate and complete his "natural" system of botanical classification. The results of his labours in this department are to be found in his *Regni vegetabilis systema naturale*, of which two volumes only were completed (1821) when he found that it would be impossible for him to execute the whole work on so extensive a scale. He accordingly commenced in 1824 a less extensive work in the same direction—his *Prodromus systematis regni vegetabilis*,—but even of this he was able to finish only seven volumes, or two-thirds of the whole. It was carried on after his death by his son Alphonse, who in 1834 had succeeded him in his professorship. He had been for several years in delicate health when he died on the 9th September 1841 at Turin, whither he had gone to attend a scientific reunion. De Candolle received diplomas or the honour of membership from most of the learned societies of Europe, and was a very frequent contributor to their Transactions. Louis Philippe decorated him with the cross of the Legion of Honour. He was highly esteemed in his native city, where he was for a long period rector of the academy and a member of the legislature. For an estimate of his place as a botanist see Botany, vol. iv. p. 80.

See Flourens's *Éloge de Candolle* (1842), and De la Rive's *Candolle, sa Vie et ses Travaux* (1851).

DECAPOLIS, a district of Palestine, or perhaps rather a confederation of districts, situated, with the exception of a small portion, on the eastern side of the Upper Jordan and the Sea of Tiberias. Its boundaries are not accurately known, and probably were never precisely defined. It evidently takes its name from the fact that it included ten cities (δέκα πόλεις), but the ancient geographers do not agree as to which these ten cities were. This difference of statement may be explained by the supposition that, like the Cinque Ports of England, Decapolis preserved its original designation after new members were received into the confederation, and perhaps some of the old members had lost their connection. Pliny recognizes the uncertainty, but gives the following list:—Damascus, Philadelphia, Raphana, Scythopolis (on the west side of the Jordan), Gadara, Hippo, Dion, Pella, Galasa (Gerasa), and Canatha. Damascus is the only one that retains its importance; Scythopolis, or Beth Shean, which seems to have been anciently the next in size, is represented by the village of Beisan; and Gerasa, Canatha or Kenath, and Pella are of interest only for their ruins. Decapolis was placed by the Romans under the jurisdiction of the Syrian governor, and seems to have enjoyed special privileges. Regarding the rise and decay of the confederation we have no precise information, but it was at the height of its prosperity in the time of Christ.

DECATUR, a flourishing city of the United States, capital of Macon county, Illinois, situated in the midst of a rich agricultural district to the right of the Sangamon river, at a railway junction about [illegible] miles east of Springfield. It is well built, and has 15 churches and 24 public schools, but none of its edifices are [illegible] remarkable. [illegible] a large rolling mill. Population in 1870, [illegible].

DECCAN ([illegible], the Country of the South), in [illegible] according to Hindu geographers, the whole of the territories situated to the south of the [illegible]. In its more restricted acceptation, however, it is sometimes understood as comprising only the

lying between that river and the Krishna,
r having for a long period formed the southern
r of the Mahometan empire of Delhi. Assign-
he more extended of these limits, it compre-
e whole of the Indian peninsula, and in this view
ntainous system, consisting of the Eastern and
Gháts, constitutes the most striking feature of
an. These two mountain ranges unite at their
extremities with the Vindhya chain of mountains,
is formed a vast triangle supporting at a consider-
ation the expanse of table-land which stretches
e Comorin to the valley of the Nerbudda. The
f this table-land slopes from west to east as
by the direction of the drainage of the country,—
t rivers the Cauvery, Godavery, Krishna, and
though deriving their sources from the base of the
Gháts, all finding their way into the Bay of
hrough fissures in the Eastern Gháts.
ly times this country embraced that possessed by
Hindu princes of Telingana, Maharashta, the Tamul
Orissa, and Carnata or Bijáyanagar. It was first
by the Mahometans in 1294, who stormed Deogiri,
al of Maharashta, and abandoned the city to
In the year 1325 the Mahometans made further
in its conquest; and having extirpated the Hindu
, they annexed the provinces as far south as the
to the empire of Delhi. The imperial sway was,
of brief duration. Telingana and Carnata speedily
to their former masters; and this defection on the
he Hindu states was followed by a general revolt,
in the establishment in 1347 of the independent
an dynasty of Bahmani, and the consequent with-
f the power of Delhi from the territory south of
udda. In the struggles which ensued, the Hindu
of Telingana fell to the Mussulmans, who at a later
rmed a league against the remaining Hindu prince,
the battle of Talikota in 1565 destroyed the
y of Bijáyanagar or Carnata. On the dissolution
hmani empire, its dominions were distributed into
Mahometan states of Golconda, Bijápur, Ahmed-
eder, and Berar. Of these the larger succeeded
rting those of less importance; and in 1630, during
of Sháh Jahán of Delhi, the greater proportion of
can had been absorbed by the kingdoms of
, Ahmednagar, and Bijápur. During the reign
gzebe (in the latter half of the 17th century)
states were reduced, and the Deccan was again
to the empire of Delhi. In the subsequent reigns,
great empire of Aurungzebe fell into decay, the
hrew off his alliegiance and fixed his court at
ad. At the same time the Mahrattas, emerging
scurity, established a powerful monarchy, which
rped by the Peshwa. The remainder of the
possessions in the peninsula were held by chieftains
dging the supremacy of one or other of these
ntates. In the sequel, Mysore became the prize
Mahometan usurper Hyder Ali. During the
for power which ensued about the middle of the
ury between the native chiefs, the French and the
took opposite sides. After a brief course of
the interests of France declined, and a new
India was established by the British. Mysore
one of their earliest conquests in the Deccan.
and the Carnatic were shortly after annexed to
ninions. In 1818 the forfeited possessions of the
added to their extent; and these acquisitions, with
hich have more recently fallen to the paramount
y cession, conquest, or failure of heirs, form a
us territory stretching from the Nerbudda to Cape
. Its length is upwards of 1000 miles, and its
extreme breadth exceeds 800. This vast tract comprehends the chief provinces now distributed between the presidencies of Madras and Bombay, together with the native states of Hyderabad and Mysore, and those of Kolápur, Sawantwári, Travancore, Cochin, and the petty possessions of France and Portugal.

DECEMBER, the last month of the year. In the Roman calendar, traditionally ascribed to Romulus, the year was divided into ten months, the last of which was called December, or the *tenth* month, and this name, though etymologically incorrect, was retained for the last or twelfth month of the year as now divided. In the Romulian calendar December had thirty days; Numa reduced the number to twenty-nine; Julius Cæsar added two days to this, giving the month its present length. The *Saturnalia* occurred in December, which is therefore styled "acceptus geniis" by Ovid (*Fasti*, iii. 58); and this also explains the phrase of Horace "libertate Decembri utere" (*Sat.* ii. 7). Martial applies to the month the epithet *canus* (hoary), and Ovid styles it *gelidus* (frosty) and *fumosus* (smoky). The Saxons called it *winter-monat*, or winter month, and *heligh-monat*, or holy month, from the fact that Christmas fell within it. The 22d December is the date of the winter solstice, when the sun reaches the tropic of Capricorn.

DECEMVIRI (*i.e.*, the ten men), ten magistrates of absolute authority among the Romans. Their appointment, according to Roman tradition, was due to plebeian dissatisfaction with the capricious administration of justice by the patricians, who had no written law to direct them. On the representation to the senate of the popular grievances by the tribunes, commissioners were sent to Greece to collect the laws of Solon and of the other celebrated legislators of Greece. On the return of these commissioners it was agreed, after much discussion, that ten new magistrates, called decemviri, should be elected from the senate to draw up a body of laws. Their election involved the abdication of all other magistrates; they were invested with supreme power, and presided over the city with regal authority. They were, each in turn, clothed with the badges of the consulship, and the one so distinguished had the power of assembling the senate and confirming its decrees. The first decemvirs were chosen in the year 302 A.U.C. (451 B.C.) They arranged the laws by which their government was to be regulated in ten divisions, submitted them to the senate and comitia for their approbation, and, after the code was recognized as constitutional, administered it with so much moderation and efficiency that the continuance of the decemviral office for another year was unanimously voted. The second body of decemvirs included one member of the first—Appius Claudius—and, according to Niebuhr, five plebeians. The new magistrates added to the laws which had already been enacted, and thus completed the celebrated *leges duodecim tabularum*, on which all Roman law, in future ages, was founded. Their administration, however, was as unpopular as that of their predecessors had been the reverse; and, by its partiality and injustice, which reached a climax in the flagitious pursuit of Virginia by Appius Claudius, it so roused the popular fury that the abolition of the office was effected. But, as Sir G. Cornewall Lewis has shown in his work on the *Credibility of Early Roman History*, it is difficult to write with scientific accuracy about this episode in Roman history. There were other magistrates in Rome, called decemvirs, in regard to whose appointment and jurisdiction information is scanty. Scholars differ concerning the date of their institution, and the special functions of their office. There is evidence, however, that such a court existed during the empire; but it is uncertain whether the jurisdiction of the later coincided with that of the earlier magistrates bearing the same name, and connected by some scholars, not only with the republic, but with the kings. There were also the *Decemviri Sacrorum*, who were custodians of the Sibylline books. Their number, which originally consisted of two, and afterwards of ten, at last reached fifteen. It devolved on these functionaries not only to guard the Sibylline books, and to consult them on all emergencies of state, but also to take a prominent part in the celebration of the games of Apollo.

DECIMAL COINAGE. It has often been proposed to substitute for our quarto-duodecimo-vicesimal system of reckoning money one entirely decimal, and therefore in harmony with the system, employed in all civilized countries, of reckoning numbers both integral and fractional. In the case of numbers, there is no difficulty in regard to the standard by which to reckon; it is unity, and all integral numbers are either so many units, tens of units, hundreds of units, &c., or combinations of these, and all fractional numbers either so many tenths of a unit, hundredths of a unit, &c., or combinations of these. In the case of money, however, the selection of the standard of value, or the unit by which to reckon, constitutes the main, if not the sole, theoretical difficulty to be overcome, previous to the introduction of a decimal coinage. Practical difficulties would arise from the unwillingness of people to make the changes in thinking and speaking that would be necessitated by new coins, or the altered values of old ones.

Of all the schemes proposed in England, that which advocates the retention of the sovereign, or pound sterling, as the unit of value seems to have met with most favour. According to this scheme, the pound would be divided into 10 florins, the florin into 10 cents, and the cent into 10 mils. The name florin, as well as the coin, is in use already; the names cent and mil would mark the relation of the corresponding coins to the pound. The cent, being the $\frac{1}{100}$th part of the pound, would represent $2\frac{2}{5}$d., or nearly $2\frac{1}{2}$d.; the mil, being the $\frac{1}{1000}$th part, would be worth a little less than a farthing, which is the $\frac{1}{960}$th. The coins which it would be found necessary to issue would probably be—in copper, the mil = $\frac{6}{25}$d., the 2-mil piece = $\frac{12}{25}$d., rather less than a halfpenny, and the 5-mil piece = $1\frac{1}{5}$d., rather less than a penny farthing; in silver, the cent = $2\frac{2}{5}$d., the 2-cent piece = $4\frac{4}{5}$d., the 5-cent piece, or shilling, and the 10-cent piece, or florin; in gold, the half-sovereign, and the sovereign. In addition to the preceding, perhaps a double florin = 4s., in silver. and a crown = 5s., in gold, might be found convenient.

The chief disadvantage of this system is that it would abolish the copper farthing, halfpenny, and penny, and the silver coins representing 3d., 4d., 6d. Since 6d. = 25 mils is the lowest number of pence which could be paid exactly in mils, inconvenience would thus be caused to the poorer classes, whose unit of value may be said to be the penny; and difficulties would also arise in cases where fixed imposts of a penny and a halfpenny are levied, such as penny and halfpenny tolls, postages, &c.

A second scheme advocates the adoption of the farthing as the unit of value, and its coins of account would be the farthing, the cent or doit = 10 farthings, the florin = 10 cents or doits, the pound = 10 florins. The coins required for circulation would probably be—in copper, the farthing, the halfpenny, the penny; in silver, the cent or doit = $2\frac{1}{2}$d., the 2-cent piece or groat = 5d., the shilling = $12\frac{1}{2}$d., and the florin = 25d.; in gold, the half-sovereign = 10s. 5d., and the sovereign = 20s. 10d. Here also a silver double florin = 4s. 2d., and a gold crown = 5s. $2\frac{1}{2}$d., might be found convenient.

The chief disadvantages of this system would be the abolition of the present pound sterling, the unit of value in national finance, in banks, insurance and all great commercial offices, and the trouble that would thereby be caused in comparing values expressed in the old coinage with those of the new. Among its advantages may be reckoned the fact that, during the transition to the new state of things, the old coins would still be serviceable, for any sum of money expressed in the new coinage could be paid by means of them. The alterations on small imposts, requisite under the first scheme, would here be unnecessary; and inconvenience would be saved to those classes of the population who receive weekly wages, which are generally fixed at so many pence per hour. The reduction of sums expressed in the old coinage to their equivalents in the new would, however, be slightly more difficult than under the first system.

A third scheme proposes as the unit the half-sovereign, a coin almost as familiar as the sovereign, with the view [illegible] having only three instead of four coins of account. The half-sovereign would be divided into 10 shillings as [illegible] present, and the shilling into 10 pence, each of which would therefore be equivalent to $1\frac{1}{5}$d., or 20 per cent. more than the present penny. As a penny is of more value than the metal of which it is made, the present copper coinage could be made to serve under the new system. This scheme, from its alteration of the value of the penny, is open to most of the objections that can be brought against the first; and, in comparing accounts expressed in the old and the new coinages, it would necessitate—a very slight inconvenience certainly—multiplication or division by 2.

A fourth scheme proposes that the penny be made the unit of value, and that all accounts should be kept in tenpences and pence. All the present coins, though only one of them would be a coin of account, could still remain in circulation; and only two new coins would be required, the tenpence and its half, fivepence.

It has also been proposed that there should be only two coins of account, the higher equivalent to 100 of the lower, such as florins and cents, the cent in this scheme being the mil of the first. Centesimal coinage similar to this exists in several foreign countries, &c.; but it is probable that, should a change be made, the practice of other nations will be imitated only where it is found to conduce to national convenience.

The preceding are the most important of the schemes that have been suggested to replace the present system, and the adoption of the first of them has been recommended by a committee of the House of Commons. But since 1855 public opinion on the question does not appear to have advanced much. The arguments for and against a change are numerous, and to detail them would be to fill a moderate volume. The principal reason for making the change is that calculation would be enormously simplified, for reduction from one denomination of money into another could always be performed at sight; and the compound rules, as far as money is concerned, would be virtually abolished. The greatest objections to the change, apart from the difficulty of getting people to make it, which is doubtless much exaggerated, are that a decimal system does not admit to a sufficient extent of binary subdivision, and that it does not admit of ternary subdivision at all. The third part, for instance, of a pound, of a florin, of a cent, being $333\frac{1}{3}$, $33\frac{1}{3}$, $3\frac{1}{3}$ mils respectively, could not be exactly paid in decimal currency, while there is no difficulty in paying the third part of a pound, or of a shilling by our present coinage. Again, the $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ of the pound, the $\frac{1}{2}$, $\frac{1}{4}$ of the florin, and the $\frac{1}{2}$ of the cent are the only binary subdivisions possible with the decimal coins of account; the $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, $\frac{1}{32}$, $\frac{1}{64}$ of the pound, and the $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ of the shilling are possible at present. Notwithstanding these drawbacks, the advantages of a decimal system seem considerably to preponderate, and the introduction of it to be merely a question of time.

The coinage of the United States, which was made decimal in 1786, consists of the eagle = 10 dollars, the dollar = 10 dimes, the dime = 10 cents, but of these denominations dollars and cents are the only ones commonly used. In France, shortly after the great Revolution, a decimal system not only of money, but also of weights and measures, was introduced. The standard of value is the franc = 100 centimes; but though the only coins are francs, centimes, and multiples of these, the word sou, a term belonging to the superseded coinage, is often used to denote the 20th part of the franc, or 5 centimes. The Belgian and the Swiss monetary systems were assimilated to that of France in 1833 and 1851; and in 1865 France, Italy, Belgium, and Switzerland, became parties to a treaty for the maintenance of a common system. Germany, within the last few years, has effected a reform of her currency, the mark, which corresponds closely to our shilling, being = 10 groschen = 100 pfennige. A decimal coinage exists also in Russia, where the ruble = 100 kopecks; in Holland, where the guilder = 10 dubbeltjes = 100 cents; and in Portugal, where the milrei = 1000 reis.

See *Observations on the Expediency and Practicability of Simplifying and Improving the Measures, Weights, and Money, &c.*, by General Sir Charles Pasley, 8vo, 1834; the Report of the Select Committee on a Decimal System of Coinage, August 1853; and the publications of the "Decimal Association." (J. S. M.)

DECIUS MUS. See Mus.

DECLARATION in an action at law was the first step in pleading—the formal statement of the matter in respect of which the defendant sued. It was divided into counts, in each of which a specific cause of action was alleged, but the language used was cautious and general, and the same matter might be the subject of several counts. By the simpler form of pleading established by the Judicature Act, 1873, the declaration is replaced by a statement of claim setting forth the simple facts on which the plaintiff replies.

Statutory declaration.—By 5 and 6 Will. IV. c. 62 (which was an Act to make provisions for the abolition of unnecessary oaths, and to repeal a previous Act of the same session on the same subject) various cases are specified in which a declaration shall be substituted for an affidavit on oath. There is a general clause empowering any justice of the peace, notary public, or other officer now by law authorized to administer an oath, to take and receive the declaration of any person voluntarily making the same before him in the form in the schedule to the Act annexed; and if any declaration so made shall be false or untrue in any material particular, the person wilfully making such false declaration shall be deemed guilty of a misdemeanour.

DECLARATION OF PARIS, a diplomatic instrument or protocol signed by the representatives of all the powers present at the Congress of Paris in 1856, and subsequently accepted as a binding engagement of public law by all the other powers (except the United States of America, Spain, and Mexico), for the purpose of settling and defining certain rules of maritime law, in time of war, on points of great moment to belligerent and neutral states—points, it must be added, upon which the ancient law of nations had gradually undergone some change, and on which great differences of opinion and practice prevailed. The four propositions agreed to by the plenipotentiaries were embodied in the following terms:—

1. Privateering is and remains abolished.
2. The neutral flag covers enemy's goods, with the exception of contraband of war.
3. Neutral goods, with the exception of contraband of war, are not liable to capture under an enemy's flag.
4. Blockades, in order to be binding, must be effective,—that is to say, maintained by a force sufficient readily to prevent access to the coast of the enemy.

By most of the modern writers on international law these principles are regarded as a distinct gain to the cause of civilization, international justice, commerce, and peace. But a feeble and ineffectual attempt has been made to repudiate these new rules of maritime law, though they received the tacit assent of Parliament, and have been acted upon by all nations in the six wars which have occurred since 1856, including the American civil war, although the United States had not concurred in the Declaration. The American Government withheld its assent, not because it objected to these principles, but because it held that they did not go far enough, and that they ought to be extended to secure from capture all private property at sea. It is argued by the opponents of the Declaration that the British envoy at Paris exceeded his powers; that the form of the instrument itself is declaratory, but not binding either as a contract or a legislative act; that it is not competent to a congress to change the rights of belligerents founded on ancient law and usage; and that Great Britain committed a fatal error in renouncing the right to seize enemy's goods in neutral ships and to equip privateers.

To these arguments it is said in reply that the British envoy at Paris had full powers to pledge the faith of the Crown, with the concurrence of the Cabinet, and that if Parliament disapproved his conduct, it ought to have been pressed to a division at the time, and not when Great Britain has enjoyed the benefit of the Declaration, as a neutral, for twenty years. It is a part of the prerogative of the Crown to fix our international relations, and to determine the conditions of maritime warfare. The most fitting and binding expression of international law (which cannot assume the form of positive law by sovereign enactment) is to be found in instruments recording in solemn form the consent of all civilized nations. On the ground of expediency, it is contended by the supporters of the Declaration of Paris, that Great Britain is, of all countries in the world, that which has most to gain by it, because she is not only the greatest naval power, but the power which has the largest number of merchant vessels and the largest amount of property afloat on the seas, and liable to attack.

The primary advantage of the Declaration no doubt accrues to neutrals, as it secures to them a larger carrying trade in time of war, and exempts them from the seizure of enemy's goods in neutral ships. Hence, if a belligerent were now to violate the rules of the Declaration, he would have to encounter the opposition of all neutral states, and would speedily find them arrayed on the side of the enemy. But in the event of war, Great Britain is the state most exposed, by reason of the magnitude of her maritime trade, to the depredations of hostile cruisers; the injury done is to be measured by the amount of the shipping and property exposed to it; and a single cruiser of a small state may cause enormous losses to the commerce of a great power, as was seen in the American civil war. Since the establishment of a general system of railroads, the greater part of the trade of all the states of continental Europe can be carried on by land, either by direct communication or through neutral ports. The power of a naval state to inflict serious injury on an enemy by the interruption of her trade is therefore by the nature of things greatly diminished, and the same remark applies to commercial blockades. To England all foreign commodities must be brought by sea, and England is more dependent than any other country on foreign trade for the raw material of her manufactures, and even for the food of her inhabitants. It is therefore the paramount interest of England to keep open all the channels of trade, as much as possible, both in peace and war; and injuries done to the trade of an enemy are often equally prejudicial to the state which inflicts them. These are some of the leading arguments which have been advanced in defence of the Declaration of Paris, and which no doubt actuated the authors of it.

A full account of the controversy will be found in the third volume of Sir Robert Phillimore's *Commentaries on International Law*, where the learned author supports and advocates the old traditions of the Court of Admiralty, and also in Hall's *Rights and Duties of Neutrals* (1874). The principles on which the Declaration of Paris is based are explained and defended in an article in the *Edinburgh Review*, No. 296. (H. R.)

DECLARATOR, in Scotch law, is a form of action by which some right of property, or of servitude, or of status, or some inferior right or interest, is sought to be judicially declared (see Bell's *Dictionary and Digest of the Law of Scotland*.)

DECREE, DECREET, the judgment of a court of justice, and, in English law, more particularly the judgment of a court of equity. A decree *nisi* is the conditional order for a dissolution of marriage made by the court for divorce and matrimonial causes, which will be made absolute after six months, in the absence of sufficient cause shown to the contrary.

DECRETALS, in canon law, are the answers sent by the Pope to applications made to him as head of the church, chiefly by bishops, but also by synods, and even private individuals, for guidance in cases involving points of doctrine or discipline. In the early days of the church these replies came to be circulated throughout the various dioceses, and furnished precedents to be observed in analogous circumstances. From the 4th century onwards they formed the most prolific source of canon law. Decretals (*decreta constituta decretalia*, *epistolæ decretales*, or shortly *decretalia*, or *decretales*) ought, properly speaking, to be distinguished, on the one hand from constitutions (*constitutiones pontificiæ*), or general laws enacted by the Pope *sua sponte* without reference to any particular case, and on the other hand from rescripts (*rescripta*), which apply only to special circumstances or individuals, and constitute no general precedent. But this nomenclature is not strictly observed.

For futher information see art. CANON LAW, in which will also be found an account of the *Pseudo-Isidorian* or *False Decretals*.

DECURIO, an officer in the Roman cavalry, commanding a decuria, which was a body consisting of ten men. There were certain provincial magistrates called *decuriones municipales*, who had the same position and powers in free and corporate towns as the senate had in Rome. As the name implies, they consisted at first of ten, but in later times the number was often as many as a hundred; their duty was to watch over the interests of their fellow-citizens, and to increase the revenues of the commonwealth. Their court was called *curia decurionum*, and *minor senatus*; and their decrees, called *decreta decurionum*, were marked with D. D. at the top. They generally styled themselves *civitatum patres curiales*, and *honorati municipiorum senatores*. They were elected with the same ceremonies as the Roman senators, and they required to be at least twenty-five years of age, and to be possessed of a certain fixed income. The election took place on the kalends of March.

DEE, JOHN (1527–1608), a mathematician and astrologer, was born in July 1527, in London, where his father was a wealthy vintner. In 1542 he was sent to St John's College, Cambridge. After five years' close application to mathematical studies, particularly astronomy, he went to Holland, in order to visit several eminent Continental mathematicians. Having remained abroad nearly a year, he returned to Cambridge, and was elected a fellow of Trinity College, then first erected by King Henry VIII. In 1548 he took the degree of master of arts; but in the same year he found it necessary to leave England on account of the suspicions entertained of his being a conjuror, which were first excited by a piece of machinery, in the *Irene* of Aristophanes, he exhibited to the university, representing the scarabæus flying up to Jupiter, with a man and a basket of victuals on its back. On leaving England he went first to the university of Louvain, where he resided about two years, and then to the college of Rheims, where he read lectures on Euclid's *Elements* with great applause. On his return to England in 1551 King Edward assigned him a pension of 100 crowns, which he afterwards exchanged for the rectory of Upton-upon-Severn. Soon after the accession of Mary, he was accused of using enchantments against the queen's life; but after a tedious confinement, he obtained his liberty in 1555, by an order of council.

When Elizabeth ascended the throne, Dee was asked by Lord Dudley to name a propitious day for the coronation. On this occasion he was introduced to the queen, who took lessons in the mystical interpretation of his writings, and made him great promises, which, however, were never fulfilled. In 1564 he again visited the Continent, in order to present a book which he had dedicated to the Emperor Maximilian. He returned to England in the same year; but in 1571 we find him in Lorraine, whither two physicians were sent by the queen to his relief in a dangerous illness. Having once more returned to his native country, he settled at Mortlake, in Surrey, where he continued his studies with unremitting ardour, and made a collection of curious books and manuscripts, and a variety of instruments, most of which were destroyed by the mob during his absence, on account of his supposed familiarity with the devil. In 1578 Dee was sent abroad to consult with German physicians and astrologers in regard to the illness of the queen. On his return to England, he was employed in investigating the title of the Crown to the countries recently discovered by British subjects, and in furnishing geographical descriptions. Two large rolls containing the desired information, which he presented to the queen, are still preserved in the Cottonian Library. A learned treatise on the reformation of the calendar, written by him about the same time, is still preserved in the Ashmolean Library at Oxford.

From this period the philosophical researches of Dee were concerned entirely with the pseudo-science of necromancy. In 1581 he became acquainted with Edward Kelly, an apothecary who professed to have discovered the philosopher's stone, and by whose assistance he performed various incantations, and maintained a frequent imaginary intercourse with spirits. Shortly after, Kelly and Dee were introduced to a Polish nobleman, Albert Laski, palatine of Siradia (Sieradz), devoted to the same pursuits, who persuaded the two friends to accompany him to his native country. They embarked for Holland in September 1583, and arrived at Laski's place of residence in February following. They lived for some years in Poland and Bohemia in alternate wealth and poverty, according to the credulity or scepticism of those before whom they exhibited. They professed to raise spirits by incantation. Kelly dictated their utterances to Dee, who wrote them down and interpreted them.

Dee, having at length quarrelled with his companion, quitted Bohemia and returned to England, where he was made chancellor of St Paul's Cathedral in 1594, and warden of Manchester College in 1595. He afterwards returned to his house at Mortlake, where he died in 1608, at the age of eighty-one.

His principal works are—*Propædeumata Aphoristica*, Lond. 1558; *Monas Hieroglyphica*, Antwerp, 1564; *Epistola ad Fredericum Commandinum*, Pesaro, 1570; *Preface Mathematical to the English Euclid*, 1570; *Divers Annotations and Inventions added after the tenth book of English Euclid*, 1570; *Epistola præfixa Ephemeridibus Joannis Feldi*, a 1557; *Parallaticæ Commentationis Praxeo-*

que *Nucleus quidam*, London. 1573. The catalogue of his printed and published works is to be found in his *Compendious Rehearsal*, as well as in his letter to Archbishop Whitgift, to which the reader is referred. A manuscript of Dee's, relating what passed for many years between him and some spirits, was edited by Meric Casaubon and published in 1659. *The Private Diary of Dr John Dee, and the Catalogue of his Library of Manuscripts*, edited by J. O. Halliwell, was published by the Camden Society in 1842.

DEED is a contract in writing, sealed and delivered by the party bound to the party benefited. Contracts or obligations under seal are called in English law *specialties*, and down to a recent date they took precedence in payment over *simple* contracts, whether written or not. Writing, sealing, and delivery are all essential to a deed. The signature of the party charged is not material, and the deed is not void for want of a date. Delivery, it is held, may be complete without the actual handing over of the deed; it is sufficient if the act of sealing were accompanied by words or acts signifying that the deed was intended to be presently binding; and delivery to a third person for the use of the party benefited will be sufficient. On the other hand, the deed may be handed over to a third person as an *escrow* (*écrit*), in which case it will not take effect as a deed until certain conditions are performed. Such conditional delivery may be inferred from the circumstances attending the transaction, although the conditions be not expressed in words. A deed indented, or indenture (so called because written in counterparts on the same sheet of parchment, separated by cutting a wavy line between them), is between two or more parties who contract mutually. The actual indentation is not now necessary to an indenture. A *deed-poll* (without indentation) is a deed in which one party binds himself without reference to any corresponding obligations undertaken by another party. See CONTRACT.

DEER (*Cervidæ*), a family of Ruminant Artiodactyle Mammals, distinguished by the possession of deciduous branching horns or antlers, and by the presence of spots on the young. The antlers are borne by the frontal bone, and generally begin to appear towards the end of spring. At that season there is a marked determination of blood to the head, the vessels surrounding the frontal eminences become temporarily enlarged, and the budding horn grows with marvellous rapidity, the antlers of a full-grown stag being produced in ten weeks. At first the horns are soft, vascular, and highly sensitive, and are covered with a delicate hairy integument known as the "velvet," amply provided with blood-vessels. On attaining their full growth the "burr," consisting of a ring of osseous tubercles at the base of the horn, is formed, and this by pressing upon, gradually cuts off the blood-vessels which supply nutriment to the antlers. The velvety covering then begins to shrivel and to peel off, its disappearance being hastened by the deer rubbing its antlers against trees and rocks; while the grooves, which are seen to furrow the now exposed surface, mark the place of the former blood-vessels. With the single exception of the reindeer, antlers are confined to the male sex, and are fully developed at the commencement of the rutting season, when they are brought into use as offensive weapons in the sanguinary fights between the males for possession of the females. When the season of love is over they are shed, reappearing, however, in the following spring, and continuing to grow larger and heavier until the deer attains its full growth. Whether the deer inhabiting the warmer regions of the earth shed their antlers every year has been a matter of considerable dispute, but in a recent work (*Highlands of Central India*) Forsyth states that he has convinced himself, from repeated observations, that in Indian deer this operation does not take place annually. In castrated animals the antlers either cease to appear or are merely rudimentary, while any influence whatever which disturbs the general system seems detrimental to their growth, as was observed in a case quoted by Darwin, where the antlers of a Wapiti deer, formed during a voyage from America, were singularly stunted, although the same individual afterwards, when living under normal conditions, produced perfect horns. Spots are common to the young of so many species of deer that their presence may fairly be regarded as a family character. These spots persist through life in such forms as the Axis, or Spotted Deer (*Axis maculata*), but in the majority of species they altogether disappear in the adult form. Darwin considers that in all such cases the old have had their colour changed in the course of time, while the young have remained but little altered, and this he holds has been effected "through the principle of inheritance at corresponding ages." The lachrymal sinus, or "tearpit," is present in most species of deer. This consists of a cavity beneath each eye, capable of being opened at pleasure, in which a waxy substance of a disagreeable odour is secreted, the purpose of which is not yet clearly ascertained. "The big round tears" which the contemplative Jacques watched, as they

> "Coursed one another down his innocent nose
> In piteous chase,"

is Shakespeare's interpretation of the appearance presented by the motion of the glistening edges of the tearpits in the stag. The deer family comprises 8 genera and 52 species, distributed over all the great regions of the earth except the Ethiopian, and living under the most diverse climatic conditions. Their total absence from Africa south of the Sahara may be due, as A. R. Wallace (*Geographical Distribution of Animals*) contends, to the presence in the past, as now, of a great belt of dry and desert country effectually preventing the immigration from Europe into Africa of such a forest-frequenting group as the deer, while favouring the introduction of antelopes, which attain their greatest development in that region. They are also absent from Australia, although present in the Austro-Malayan region. The following are some of the more remarkable species.

The Red Deer or Stag (*Cervus elaphus*), the largest of the British deer, is a native of the temperate regions of Europe and Northern Asia, inhabiting dense forests, or frequenting moors and barren hill-sides as in Scotland. In England, where in feudal times it was protected by forest laws, which set greater value on the life of a stag than on that of a man, it was formerly abundant in all the royal forests. It is now almost extinct in that country, as well as in Ireland, in the wild state. In Scotland considerable herds are still to be found in the Highlands, and in several of the Western Isles, although, owing probably to the diminished extent of their feeding grounds, to the breeding in and in which takes place, and to the anxiety of deer-stalkers to secure the finest heads, the species is believed to be degenerating. The finest specimens in this country are found in the deer forests of Sutherlandshire, but these are inferior in size to those still obtained in the east of Europe. The antlers of the Stag are rounded, and bear three "tines," or branches, and a crown consisting of three or more points. The points increase in number with the age of the creature, and when 12 are present it is known in Scotland as a "royal stag." This number, however, is sometimes exceeded, as in the case of a pair of antlers, weighing 74 ℔, from a stag killed in Transylvania, which had 45 points. The antlers during the second year consist of a simple unbranched stem, to which a tine or branch is added in each succeeding year, until the normal development is attained, after which their growth is somewhat irregular. The Red Deer is gregarious, the females and calves herding together apart from the males except at the rutting season, which begins about the end of September and lasts for three weeks. During this time the males go in search of the females, and are exceedingly fierce and dangerous. The period of gestation extends a few days beyond eight months, and the hind usually produces a single calf. The stag is remarkably shy and wary, and its sense of smell is exceedingly acute. In former times it was hunted with horse, hound, and horn, and such is still the practice in Devonshire and in Ireland, but in Scotland the old method has been superseded by "stalking." A full grown stag stands about 4 feet high at the shoulders; its fur in summer is of a reddish-brown colour with a yellowish-white patch on the buttocks, in winter the fur is much thicker and of a grayish brown.

The Wapiti Deer (*Cervus canadensis*) may be regarded as the representative of the stag in North America. It stands, however, a foot higher, and bears correspondingly heavier antlers. It occurs chiefly in Canada, where it feeds on grass and the young shoots of the willow and poplar. It has gained the reputation of being the most stupid of the cervine family, but this may have partly arisen from the peculiar noise it makes, corresponding to the "belling" of the stag, but in its case resembling very much the braying of an ass. Its flesh is coarse, and is held in little estimation by the Indians, owing to the excessive hardness of the fat. It thrives well in Britain, and would probably have been introduced had its venison been better.

The Fallow Deer (*Dama vulgaris*), a species semi-domesticated in Britain, where it forms a principal ornament in parks, still occurs wild in Western Asia, North Africa, and Sardinia, and in prehistoric times appears to have abounded throughout Northern and Central Europe. It stands 3 feet high at the shoulders, and its antlers, which are cylindrical at the base, become palmated towards the extremity, the palmation showing itself in the third year, and the antlers reaching their full growth in the sixth. The fur is of a yellowish-brown colour (whence the name "fallow"), marked with white spots; there is, however, a uniformly brown variety found in Britain, and said to have been brought by James I. from Norway on account of its hardiness. The two varieties are said by Darwin to have been long kept together in the Forest of Dean, but have never been known to mingle. The bucks and does live apart except during the pairing season, and the doe produces one or two, and sometimes three fawns at a birth. They are exceedingly fond of music, and a herd of twenty bucks were, it is said, brought from Yorkshire to Hampton Court, led by music from a bagpipe and violin. They feed on herbage, and are particularly fond of horse chestnuts, which the males endeavour to procure by striking at the branches with their antlers.

The Roe Deer (*Capreolus capra*) is the smallest of the British *Cervidæ*, a full-grown buck standing not more than 26 inches high at the shoulders. The antlers are short upright, and deeply furrowed, and differ from those of the preceding species in the absence of a basal "tine." The horns, in this, as well as in the other members of the deer family, are largely employed in the manufacture of handles for cutlery, and the parings from these were formerly used in the preparation of ammonia, hence the name hartshorn still applied to that substance. The Roe Deer inhabits southern and temperate Europe as far east as Syria, where it frequents woods, preferring such as have a large growth of underwood, and are in the neighbourhood of cultivated ground. This it visits in the evening in search of food, and where roes are numerous, the damage done to growing crops is considerable. In going to and from their feeding grounds they invariably follow the same track and the sportsman takes advantage of this habit to waylay them. In hunting the roe the woods are driven by beaters, and they are shot down, as they speed along the accustomed paths, by the ambushed hunter. The species was until recently supposed to be monogamous, pairing in December, and the period of gestation only extending over five months. This supposition arose from the fact that the fœtus in the doe was never found till January, and that then it was but slightly developed, although the sexes were known to seek the society of each other in July and August. From the investigations of Professor Bischoff of Giessen it appears that the true rutting season of the Roe Deer is in July and August; but that the ovum lies dormant until December, when it begins to develop in the normal way; the period of gestation is thus extended to nearly nine months. It was formerly abundant in all the wooded parts of Great Britain, but was gradually driven out, until in Pennant's time it did not occur south of Perthshire. Since then the increase of plantations has led to its partial restoration in the south of Scotland and north of England. It takes readily to the water, and has been known to swim across lochs more than half a mile in breadth.

The Elk or Moose Deer (*Alces malchis*) is the largest of living *Cervidæ*, its shoulders being higher than those of the horse. Its head measures 2 feet in length, and its antlers, which are broadly palmated, often weigh from 50 to 60 ℔; the neck is consequently short and stout. It is covered with a thick coarse fur of a brownish colour, longest on the neck and throat. Its legs are long, and it is thus unable to feed close to the ground—for which reason it browses on the tops of low plants, the leaves of trees, and the tender shoots of the willow and birch. Its antlers attain their full length by the fifth year, but in after years they increase in breadth and in the number of branches, until fourteen of these are produced. Although spending a large part of their lives in forests they do not appear to suffer much inconvenience from the great expanse of their antlers. In making their way among trees, the horns are carried horizontally to prevent entanglement with the branches, and so skilful is the elk that "he will not break or touch a dead twig when walking quietly." His usual pace, according to Lloyd (*Field Sports*), is a shambling trot; but when frightened he goes at a tremendous gallop. The elk is a shy and timorous creature, fleeing at the sight of man. This timidity, however, forsakes the male at the rutting season, and he will then attack whatever animal comes in his way. The antlers and hoofs are his principal weapons, and with a single blow from the latter he has been known to kill a wolf. In North America the moose is tormented in the hot season by mosquitoes, and it is when rendered furious by the attacks of those insects that it can be most readily approached. The female seldom gives birth to more than two fawns, and with these she retires into the deepest recesses of the forest, the young remaining with her till their third year. The elk ranges over the whole of Northern Europe and Asia, as far south as East Prussia, the Caucasus, and North China, and over North America from the New England States westward to British Columbia. It was formerly common in the forests of Germany and France, and is still found in some parts of Sweden and Norway, where it is strictly protected. The elk, according to Lloyd, is easily domesticated, and was at one time employed in Sweden in drawing sledges. During winter it is frequently seen alone, but in summer and autumn it may be met with in small herds. In summer also it frequents morasses and low grounds, and takes readily to the water; in winter it retires to the shelter of the forests, where alone it can find suitable sustenance. Its flesh is considered excellent, and its tongue and nose are regarded as delicacies.

The Reindeer (*Tarandus rangifer*), the only domesticated species of deer, has a range somewhat similar to the elk, extending over the entire boreal region of both hemispheres, from Greenland and Spitzbergen in the north to New

Brunswick in the south. There are several well-marked varieties differing greatly in size, and in the form of the antlers—the largest forms occurring furthest north; while by many writers the American reindeer, which has never been domesticated, is regarded as a distinct species. The antlers, which are long and branching, and considerably palmated, are present in both sexes, although in the female they are more slender and less branched than in the males. In the latter they appear at a much earlier age than in any other species of deer, and Darwin conjectures that in this circumstance a key to their exceptional appearance in the female may be found. The reindeer has long been domesticated in Scandinavia, and is of indispensable importance to the Lapland race, to whom it serves at once as a substitute for the horse, cow, sheep, and goat. As a beast of burden it is capable of drawing a weight of 300 ℔, while its fleetness and endurance are still more remarkable. Harnessed to a sledge it will travel without difficulty 100 miles a day over the frozen snow, its broad and deeply cleft hoofs being admirably adapted for travelling over such a surface. During summer the Lapland reindeer feeds chiefly on the young shoots of the willow and birch; and as at this season migration to the coast seems necessary to the well-being of the species, the Laplander, with his family and herds, sojourns for several months in the neighbourhood of the sea. In winter its food consists chiefly of the reindeer moss and other lichens, which it makes use of its hoofs in seeking for beneath the snow. The wild reindeer grows to a much greater size than the tame breed, but in Northern Europe the former are being gradually reduced through the natives entrapping and domesticating them. The tame breed found in Northern Asia is much larger than the Lapland form, and is there used to ride on. There are two distinct varieties of the American reindeer—the Barren Ground Caribou, and the Woodland Caribou. The former, which is the larger and more widely distributed of the two, frequents in summer the shores of the Arctic Sea, retiring to the woods in autumn to feed on the tree and other lichens. The latter occupies a very limited tract of woodland country, and, unlike the Barren Ground form, migrates southward in spring. The American reindeers travel in great herds, and being both unsuspicious and curious they fall ready victims to the bow and arrow or the cunning snare of the Indian, to whom their carcases form the chief source of food, clothing, tents, and tools. Remains of the reindeer are found in caves and other Post-Pliocene deposits as far south as the south of France, this boreal species having been enabled to spread over Southern Europe, owing to the access of cold during the glacial period. It appears to have continued to exist in Scotland down even to the 12th century.

The Muntjac (*Cervulus vaginalis*) has its two pronged horns placed on permanent bony pedestals 3 inches in length, and the male is further furnished with long canines in the upper jaw. It is a native of Java, where it may occasionally be seen in the inclosures of Europeans, but, according to Dr Horsfield, it is impatient of confinement, and not fit for the same degree of domestication as the stag. Its flesh forms excellent venison. There are four species of muntjacs inhabiting the forest districts from India to China, and southward to Java and the Philippine Islands.

The Musk Deer (*Moschus moschiferus*) differs from the true deer in the absence of horns, and in the presence of the musk-bag, and is now usually regarded as the type of a distinct family—*Moschidæ*. The young, however, are spotted as in the *Cervidæ*, and it is doubtful whether the differences already mentioned are sufficient to warrant its separation from the other deer. Canine teeth are present in the upper and lower jaws of both sexes, those in the upper jaw of the male being longest. It is a native of the highlands of Central Asia from the Himalayas to Peking, being found at an elevation of 8000 feet, and in its habit resembling such mountain species as the chamois. It is exceedingly shy and difficult of approach, and is hunted solely for its musk—an unctuous brown secretion, possessing a most penetrating and enduring odour, extremely disagreeable when present in large quantities, but forming a pleasant perfume when used sparingly. The substance is contained in a bag, almost the size of a hen's egg, situated on the abdomen, and secreted in greatest quantity during the rutting season. The hunters cut off the bag, and close the opening, and after drying, it is ready for sale.

Fossil Deer.—Remains of many extinct species of deer belonging to existing genera have been found in Post-Pliocene and other recent deposits; while the remains of extinct genera occur in both hemispheres, but do not extend further back than the Upper Miocene. The deer family, so far as yet discovered, is thus of comparatively recent origin, and is probably, as Mr Wallace suggests, an Old World group, which during the Miocene period passed to North America and subsequently to the southern continent. The best preserved species of fossil deer is the gigantic Irish Elk (*Cervus megaceros*). It is not a true elk, but is intermediate between the fallow deer and reindeer, and is found in great abundance and perfection in the lake deposits of Ireland. It occurs also in the Isle of Man, in Scotland, and in some of the English caverns. The antlers of a specimen of this species in Dublin weigh about 80 ℔, and their span is twice that of the living elk. It appears to have been contemporaneous with the extinct mammoth and rhinoceros, but it is still doubtful whether it co-existed with man. In Kent's Hole, near Torquay, the base of an antler, partly gnawed, was found; and this, according to Owen, probably belonged to the most gigantic of our English cervine animals. (J. GI.)

DEFAMATION, saying or writing something of another, calculated to injure his reputation or expose him to public hatred, contempt, and ridicule. See LIBEL and SLANDER.

DEFENDER OF THE FAITH (*Fidei Defensor*), a peculiar title belonging to the sovereign of England, in the same way that *Catholicus* belongs to the king of Spain, and *Christianissimus* to the king of France. Although certain charters have been appealed to in proof of an earlier use of the title, it appears to have been first conferred by Leo. X. on Henry VIII. in 1521 for writing against Luther. It was afterwards confirmed by Clement VII. When Henry suppressed the religious houses at the time of the Reformation, the Pope not only deprived him of this designation, but also deposed him; in the thirty-fifth year of his reign, however, the title of "Defender of the Faith" was confirmed by Parliament, and has continued to be used by all his successors on the English throne.

DEFFAND, MARIA DE VICHY-CHAMROND, MARQUISE DU (1697–1780), a celebrated leader in the fashionable literary society of Paris during the greater part of the 18th century, was born in Burgundy of a noble family in 1697. Educated at a convent in Paris, she there displayed, along with great intelligence, the sceptical and cynical turn of mind which so well suited the part she was afterwards to fill in the philosophical circles of Paris. Her parents, alarmed at the freedom of her views, arranged that Massillon should visit and reason with her, but this seems to have had little effect. They married her at twenty-one years of age to the Marquis du Deffand without consulting her inclination. The union proved an unhappy one, and resulted in a speedy separation. Madame du Deffand, young and beautiful, did not, according to the common belief, succeed in keeping herself uncontaminated by the abounding vice of the age, and it is said that she was for a time the mistress of the regent. She was afterwards reconciled to her husband, but it proved impossible for them to live together, and a second and final separation took place. Without heart and without enthusiasm, Madame du Deffand was incapable of any strong attachment, but her intelligence, her cynicism, and her *esprit* made her the centre of attraction to a circle which included nearly all the famous philosophers and literary men in Paris, besides not a few distinguished visitors from abroad. In 1753 she became blind, and soon afterwards she took up her abode in apartments in the convent of St Joseph in the Rue St Dominique, which had a separate entrance from the street. This became the frequent resort of such men as Choiseul, Boufflers, Montesquieu, Voltaire, D'Alembert, David Hume, and Horace Walpole. In 1764 the society was split into two parties by the defection of her companion Mademoiselle de L'Espinasse, who took with her D'Alembert and several others. Madame du Deffand had most affinity of nature with Horace Walpole, who paid several visits to Paris expressly for the purpose of enjoying her society, and who maintained a close and most interesting correspondence with her for fifteen years. She died on the 24th September 1780. Of her innumerable witty sayings probably the best, and certainly the best known, is her remark on the Cardinal de Polignac's account of St Denis's miraculous walk of two miles with his head in his hands,—"Il n'y a que le premier pas qui coûte."

The correspondence of Madame du Deffand with D'Alembert, Henault, Montesquieu, and others was published at Paris in 1809. Her letters to Horace Walpole, edited, with a biographical sketch, by Miss Berry, were published at London from the originals in Strawberry Hill in 1810.

DEFOE, Daniel (1661-1731), was born in London in the year 1661, in the parish of St Giles, Cripplegate. Neither the exact date nor place of his birth is known, nor is his baptism recorded, probably because he was of a nonconformist family. Hardly anything is known of his ancestors; his grandfather, Daniel Foe, is said to have been a squire or wealthy yeoman at Elton, in Huntingdonshire (not Northamptonshire, as more generally stated), and to have kept a pack of hounds; but the authority for the former statement seems to be mainly traditional, and for the latter we have merely an anecdote in one of Defoe's newspaper articles, which is at least as likely to have been fiction as fact. Attempts have been made, but merely fancifully, to trace the name to Vaux, Fawkes, or even Devereux. As to the variation Defoe or Foe it is to be noticed that its owner signed either indifferently till a late period of his life, and that his initials where they occur are sometimes D. F. and sometimes D. D. F. Mr Lee's conjecture, that the later form originated in his being called Mr D. Foe to distinguish him from his father, seems not unlikely. It may be added that three autograph letters of his are extant, all addressed in 1705 to the same person, and signed respectively D. Foe, de Foe, and Daniel Defoe.

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James Foe, the father of the author of *Robinson Crusoe*, was a butcher and a citizen of London. Of his mother nothing is known. Daniel was chiefly educated at a famous dissenting academy, Mr Morton's of Stoke Newington, where many of the celebrated nonconformists of the time were brought up. It is noteworthy that one of his schoolfellows suggested the unusual name of Crusoe. In after life Defoe frequently asserted the sufficiency of his education and the excellence of the methods observed by his teacher. Judging from his writings his stock of general information must have been far larger than that of most regularly educated men of his day; but it is probable that his attainments were in no particular line very exquisite or profound. With very few exceptions all the known events of Defoe's life are connected with authorship. In the older catalogues of his works two pamphlets, *Speculum Crapegownorum* (a satire on the clergy) and *A Treatise against the Turks*, are attributed to him before the accession of James II., but there seems to be no publication of his which is certainly genuine before *The Character of Dr Annesley*, the family minister, published in 1697. He had, however, before this (if we may trust tradition) played an active part in public affairs. He had taken up arms in Monmouth's expedition, and is supposed to have owed his lucky escape from the clutches of the king's troops and the law, into which not a few of his school-fellows fell, to the fact of his being a Londoner, and therefore a stranger in the west country. On January 26, 1688, he was admitted a liveryman of the city of London, having claimed his freedom by birth. Since his western escapade he had taken to the business of wholesale hosiery. At the entry of William and Mary into London he is said to have served as a volunteer trooper "gallantly mounted and richly accoutred." In these days he lived at Tooting, and was instrumental in forming a dissenting congregation at that place. His business operations at this period appear to have been extensive and various. He would seem both now and later to have been a sort of commission merchant, especially in Spanish and Portuguese goods, and at some time or other he visited Spain on business. Later we hear him spoken of as "a civet-cat merchant," but as he can hardly have kept a menagerie of these animals it is odd that no one has supposed that the civet-cat was the sign of his place of business (it was a very usual one) rather than the staple of his trade. In 1692 his mercantile operations came to a disastrous close, and he failed for £17,000. By his own account the disaster would seem to have arisen from relying too much on credit. His misfortunes made him write both feelingly and forcibly on the bankruptcy laws; and although his creditors accepted a composition, he afterwards honourably paid them in full, a fact attested by independent and not very friendly witnesses. Subsequently, he undertook first the secretaryship and then the managership and chief ownership of some tile-works at Tilbury, but here also he was unfortunate, and his imprisonment (of which more hereafter) in 1703 brought the works to a stand-still, and thereby lost him £3000. From this time forward we hear of no settled business in which he engaged. He evidently, however, continued to undertake commissions, and made his political visits to Scotland an occasion for opening connections of this kind with that country. In the last thirty years of his life business played but a subordinate part, though he seems to have derived more profit from it than from his earlier ventures. It was probably at the time of his troubles in 1692 that he had occasion to visit Bristol, where—according to a local tradition—he lay *perdu* for fear of bailiffs all the week, but emerged in gorgeous raiment on Sunday, whence he was known by the nickname of "the Sunday gentleman."

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It was not as a business man that Defoe was to make his mark, though his business experiences coloured to some extent the literary productions to which he owes his fame. The course of his life was determined about the middle of the reign of William III. by his introduction (we know not how) to William himself and to other influential persons. He frequently boasts of his personal intimacy with the "glorious and immortal" king (epithets, by the way, to the invention of which he has considerable claim), and in 1695 he was appointed accountant to the commissioners of the glass duty, which office he held for four years. During this time he produced (January 1698) his *Essay on Projects*, one of the first and not the least noteworthy of his works. This essay contains suggestions on banks, road-management, friendly and insurance societies of various kinds, idiot asylums, bankruptcy, academies (in the French sense), military colleges, high schools for women, &c. It displays Defoe's lively and lucid style in full vigour, and abounds with ingenious thoughts and apt illustrations, though it illustrates also the unsystematic character of his mind. In the same year Defoe wrote the first of a long series of pamphlets on the then burning question of occasional conformity. In this, for the first time, he showed the unlucky independence which, in so many other instances, united all parties against him. On the one hand he pointed out to the dissenters the scandalous inconsistency of their playing fast and loose with sacred things, and on the other he denounced the impropriety of requiring tests at all. In direct support of the Government he published, towards the close of the reign, a *Defence of Standing Armies*, against Trenchard, and a set of pamphlets on the Partition Treaty Thus in political matters he had the same fate as in ecclesiastical; for the Whigs were no more prepared than the Tories to support William through thick and thin. He also dealt with the questions of stock-jobbing and of electioneering corruption. But his most remarkable publication at this time—the publication, indeed, as the author of which he became famous—was *The True-Born Englishman*, a satire in rough but extremely vigorous verse on the national objection to William as a foreigner, and on the claim of purity of blood for a nation which Defoe chooses to represent as crossed and dashed with all the strains and races in Europe. He also took a prominent part in the proceedings which followed the famous Kentish petition, and was the author, and some say the presenter, of the equally famous *Legion Memorial*, which asserted in the strongest terms the supremacy of the electors over the elected, and of which even an irate House of Commons did not dare to take any great notice. The theory of the indefeasible supremacy of the freeholders of England, whose delegates merely (according to this theory) the Commons were, was one of Defoe's favourite political tenets, and he returned to it in a most powerfully written tract entitled *The Original Power of the Collective Body of the People of England examined and asserted*. At the same time he was occupied in a controversy on the conformity question with the well-known John How (usually spelt Howe at present), and wrote several minor political tracts.

The death of William was a great misfortune to Defoe, and he soon felt the power of his adversaries. After publishing *The Mock Mourners*, intended to satirize and rebuke the outbreak of Jacobite joy at the king's death, he turned his attention once more to ecclesiastical subjects, and, in an evil hour for himself, wrote the famous *Shortest Way with the Dissenters*. The traditional criticism of this remarkable pamphlet is a most curious example of the way in which thoroughly inappropriate descriptions of books pass from mouth to mouth. Every commentator (with the single exception of Mr Chadwick) has dilated upon its "exquisite irony." Now, the fact of the matter is, that in *The Shortest Way* there is no irony at all, and, as Defoe's adversaries acutely remarked, irony would never have been pleaded had not the author got into trouble, when of course it suited him *faire flèche de tout bois*. The pamphlet is simply an exposition in the plainest and most forcible terms of the extreme "high-flying" position, and every line of it might have been endorsed, and was endorsed, by consistent high-churchmen. The author's object clearly was by this naked presentation to awaken the dissenters to a sense of their danger, and to startle moderate churchmen by showing them to what end their favourite doctrines necessarily led. For neither of these purposes was irony necessary, and irony, we repeat, there is none. If any lingering doubt from the consensus of authority on the other side remain, let the student read *The Shortest Way* and then turn to Swift's *Modest Proposal* or his *Reasons against Abolishing the Church of England*. He will soon see the difference. Ironical or not, however, it was unlikely that the high-churchmen and their leader Nottingham (the Don Dismal of Swift) would let such a performance pass unnoticed. The author was soon discovered; and, as he absconded, an advertisement was issued offering a reward for his apprehension, and giving us the only personal description we possess of him, as "a middle-sized spare man about forty years old, of a brown complexion and dark brown-coloured hair, but wears a wig; a hooked nose, a sharp chin, grey eyes, and a large mole near his mouth." In this conjuncture Defoe had really no friends, for the dissenters were as much alarmed at his book as the high-flyers were irritated. He surrendered, and his defence appears to have been injudiciously conducted; at any rate he was fined 200 marks, and condemned to be pilloried three times, to be imprisoned indefinitely, and to find sureties for his good behaviour during seven years. His sojourn in the pillory, however, was rather a triumph than a punishment, for the populace took his side; and his *Hymn to the Pillory*, which he soon after published, is one of the best of his poetical works. Unluckily for him his condemnation had the indirect effect of destroying his business. He remained in prison until August 1704, and then owed his release to the intercession of Harley, who represented his case to the queen, and obtained for him not only liberty but pecuniary relief and employment, which, of one kind or another, lasted until the termination of Anne's reign. Defoe was uniformly grateful to the minister, and his language respecting him is in curious variance with that generally used. There can be little doubt that, independently of gratitude, Harley's moderation in a time of the extremest party-insanity was no little recommendation to Defoe. During his imprisonment the latter was by no means idle. A spurious edition of his works having been issued, he himself produced a collection of twenty-two treatises, to which some time afterwards he added a second group of eighteen more. He also wrote in prison many short pamphlets, chiefly controversial, published a curious work on the famous storm of November 26, 1703, and started perhaps the most remarkable of all his projects, *The Review*. This was a paper which was issued during the greater part of its life three times a week. It was entirely written by Defoe, and extends to eight complete volumes and some few score numbers of a second issue. He did not confine himself to news, but threw his writing into the form of something very like finished essays on questions of policy, trade, and domestic concerns; while he also introduced a so-called "Scandal Club," in which minor questions of manners and morals were treated in a way which undoubtedly suggested the *Tatlers* and *Spectators* which followed. It is probable that if the five points of bulk, rapidity of production, variety of matter, originality of design, and excellence of style are taken together, hardly any author can show a work of equal magnitude. It is unlucky that only one complete copy of the work is known to exist, and that is in a private library. After his release he went to Bury St Edmunds for change of air, though he did not interrupt either his *Review* or his occasional pamphlets. One of these, *Giving Alms no Charity, and Employing the Poor a Grievance to the Nation*, is for the time an extraordinarily far-sighted performance. It denounces on the one hand indiscriminate alms-giving, and on the other the folly of national work-shops, the institution of which on a parochial system had been proposed by Sir Humphrey Mackworth.

Government employments.

In 1705 appeared *The Consolidator, or Memoirs of Sundry Transactions from the World in the Moon*, a political satire which is supposed to have given some hints for *Gulliver*; and at the end of the year Defoe performed a secret mission (the first of several of the kind) for Harley.

While on one of these in the west of England he was molested, though with no serious result, by the zealous country justices. In 1705 also appeared the famous *Mrs Veal*. As is well known, this admirable fiction is said to have been composed for a bookseller, to help off an unsaleable translation of *Drelincourt on Death*. Mr Lee, however, has thrown some doubts on this story. Defoe's next considerable work was *Jure Divino*, a poetical argument in some 10,000 terribly bad verses; and soon afterwards (1706) he began to be largely employed in promoting the union with Scotland. Not only did he write pamphlets as usual on the project, and vigorously recommend it in *The Review*, but in October 1706 he was sent on a political mission to Scotland by Godolphin, to whom Harley had recommended him. He resided in Edinburgh for nearly sixteen months, and his services to the Government were rewarded by a regular salary. He seems to have devoted himself to commercial and literary as well as to political matters, and prepared at this time his elaborate *History of the Union*, which appeared in 1709. In this latter year occurred the famous Sacheverel sermon, and Defoe wrote several tracts on the occasion. In 1710 Harley returned to power, and Defoe was placed in a somewhat awkward position. To Harley himself he was bound by gratitude and by a substantial agreement in principle, but with the rest of the Tory ministry he had no sympathy. He seems, in fact, to have agreed with the foreign policy of the Tories and with the home policy of the Whigs, and naturally incurred the reproach of time-serving and the hearty abuse of both parties. At the end of 1710 he again visited Scotland. In the negotiations concerning the Peace of Utrecht, Defoe strongly supported the ministerial side, to the intense wrath of the Whigs, and this wrath was displayed in an attempted prosecution against some pamphlets of his on the all-important question of the succession, but the influence of Harley saved him. He continued, however, to take the side of the dissenters in the questions affecting religious liberty, which played such a prominent part towards the close of Anne's reign. He naturally shared Harley's downfall; and, though the loss of his salary might seem a poor reward for his constant support of the Hanoverian claim, it was little more than his ambiguous, not to say trimming, position must have led him to expect. He was violently attacked on all sides, and at last published in 1715 an apologia entitled *An Appeal to Honour and Justice*, in which he defends his political conduct, and which furnishes us with the main authority for the details of his life. With this publication his political work was formerly supposed to have ended; but in 1864 six letters were discovered in the Record Office from Defoe to a Government official, Mr Delafaye, which established the fact that in 1718 at least Defoe was doing not only political work, but political work of a somewhat equivocal kind—that he was, in fact, sub-editing the Jacobite *Mist's Journal*, under a secret agreement with the Government that he should tone down the sentiments and omit objectionable items. He seems to have performed the same not very honourable office in the case of two other journals—*Dormer's Letter* and the *Mercurius Politicus*; and, if we may trust Mr Lee, he wrote in these and other papers till nearly the end of his life.

vels.

However this may be, the interest of Defoe's life from this time forward is very far from political. He was now a man of fifty-five years of age; he had, up to this period, written nothing but what may be called occasional literature, and, except the *History of the Union* and *Jure Divino*, nothing of any great length. In 1715 appeared the first volume of *The Family Instructor*, which was subsequently continued, and which was very popular during the last century. Three years afterwards came forth the first volume of *Robinson Crusoe*. The first edition of this was published on the 25th of April 1719. It ran through four editions in as many months, and then in August appeared the second part. Twelve months afterwards the third part, or *Serious Reflections*, appeared. This last part is now hardly ever reprinted. Its connection, indeed, with the two former is little more than nominal, Crusoe being simply made the mouth-piece of Defoe's sentiments on various points of morals and religion. Meanwhile the first two parts were reprinted as a *feuilleton* in *Heathcote's Intelligencer*, perhaps the earliest instance of the appearance of such a work in such a form. *Crusoe* was immediately popular, and various wild stories were set afloat of its having been written by Lord Oxford in the Tower, and of its being simply a piratical utilization of Alexander Selkirk's papers. It is sufficient to say that all such stories are not only intrinsically of the wildest improbability, but also possess not a tittle of evidence in their favour. A curious idea, recently revived by the late Mr H. Kingsley, is that the adventures of Robinson are allegorical and relate to Defoe's own life. This idea was certainly entertained to some extent at the time, and derives some colour of justification from words of Defoe's, but there seems to be no serious foundation for it. The book was almost immediately imitated; of such imitations *Philip Quarll* is the only one now known even by name. Contemporaneously with the later parts of *Crusoe* appeared *The Dumb Philosopher, or Dickory Cronke*. It is a short and rather dull book, of something the same type as the *Serious Reflections*.

In 1720 came forth *The Life and Adventures of Mr Duncan Campbell*. This, unlike the two former, was not entirely a work of imagination, inasmuch as its hero, the fortune-teller, was a real person. There are amusing passages in the story, but it is too desultory to rank with Defoe's best. In the same prolific year appeared two wholly or partially fictitious histories, each of which might have made a reputation for any man. The first was the famous *Memoirs of a Cavalier*, which, as has been often repeated, Lord Chatham believed to be true history, and which Mr Lee believes to be the embodiment at least of authentic private memoirs. It is more probable, however, that Defoe, with his extensive acquaintance with recent English history, and his astonishing power of working up details, was fully equal to the task of its unassisted composition. As a model of historical work of a certain kind it is hardly surpassable, and many separate passages—accounts of battles and skirmishes—have never been equalled except by Mr Carlyle. *Captain Singleton*, the last work of the year, has been unjustly depreciated by most of the commentators. The record of the journey across Africa, with its surprising anticipations of recent discoveries (anticipations which were commented on by Dr Birdwood in a paper read before the Bombay Branch of the Royal Asiatic Society in 1863, and which are probably due to Defoe's intercourse with Portugal) yields in interest to no work of the kind known to us; and the semi-piratical Quaker who accompanies Singleton in his buccaneering expeditions is a character thoroughly deserving of life. It may be mentioned that there is also a Quaker who plays a very creditable part in *Roxana*, and that Defoe seems to have been well affected to the Friends. In estimating this wonderful productiveness on the part of a man sixty years old, it should be remembered that it was a habit of Defoe's to keep his works in manuscript sometimes for long periods.

In 1721 nothing of importance was produced, but in the next twelvemonth three capital works appeared. These were *The Fortunes and Misfortunes of Moll Flanders*, *The Journal of the Plague Year*, and *The History of Colonel Jack*. *Moll Flanders* (as a whole) may be placed next to *Robinson Crusoe* in order of merit, or bracketted for that position with the somewhat similar *Roxana*. Both are triumphs of novel-writing. Both have subjects of a rather more than questionable character, but both display the remarkable art with which Defoe handles such subjects. It is not true, as is sometimes said, that the difference of the two is the difference between gross and polished vice. The real difference is much more one of morals than of manners. Moll is by no means of the lowest class. Notwithstanding the greater degradation into which she falls, and her originally dependent position, she has been well educated, and has consorted with persons of gentle birth. She displays throughout much greater real refinement of feeling than the more high-flying Roxana, and is at any rate flesh and blood, if the flesh be somewhat frail and the blood somewhat hot. Neither of the two heroines has any but the rudiments of a moral sense; but Roxana, both in her original transgression and in her subsequent conduct, is actuated merely by avarice and selfishness—vices which are peculiarly offensive in connection with her other failing, and which make her thoroughly repulsive. The art of both stories is great, and as regards the episode in *Roxana* of the daughter Susannah is consummate; but the transitions of the later plot are less natural than those in *Moll Flanders*. It is only fair to notice that while the latter, according to Defoe's more usual practice, is allowed to repent and end happily, Roxana is brought to complete misery; Defoe's morality, therefore, required more repulsiveness in one case than in the other. *The Journal of the Plague Year*, more usually called, from the title of the second edition, *A History of the Plague*, has perhaps lacked less of its due meed of admiration than any of its author's minor works. Here also the accuracy and apparent veracity of the details is so great that many persons have taken it for an authentic record, while others have contended for the existence of such a record as its basis. But it appears that here too the genius of Mrs Veal's creator must, in the absence of all evidence to the contrary, be allowed sufficient for the task. *The History of Colonel Jack* is an unequal book. There is hardly in *Robinson Crusoe* a scene equal, and there is consequently not in English literature a scene superior, to that praised by Lamb, and extracted in Knight's *Half Hours with the Best Authors*,—the scene where the youthful pickpocket first exercises his trade, and then for a time loses his ill-gotten (though for his part he knows not the meaning of the word ill-gotten) gains. But great part of the book, and especially the latter portion, is dull; and in fact it may be generally remarked of Defoe that the conclusions of his tales are not equal to the beginning, perhaps from the restless indefatigability with which he undertook one work almost before finishing another. *Roxana, or the Fortunate Mistress*, already commented on, appeared in 1724; and in the same year came forth the first volume of *A Tour through the whole Island of Great Britain*, which was completed in the two following years. Much of the information in this was derived from personal experience, for Defoe claims to have made many more tours and visits about England than those of which we have record; but the major part must necessarily have been dexterous compilation. In 1725 appeared *A New Voyage round the World*, apparently entirely due to the author's own fertile imagination and extensive reading. It is full of his peculiar verisimilitude, and has all the interest of Anson's or Dampier's voyages, together with a charm of style superior even to that of the latter, and far beyond anything which the *soi-disant* chaplain of the "Centurion" could attain to. The journey by land across South America is of especial interest, and forms an admirable pendant to the African travels in *Singleton*. In the same year Defoe wrote a curious little pamphlet entitled *Everybody's Business is Nobody's Business, or Private Abuses Public Grievances, exemplified in the Pride, Insolence, and Exorbitant Wages of our Women-Servants, Footmen, &c.* This subject was a very favourite one with Defoe, and in the pamphlet he showed the immaturity of his political views by advocating legislative interference in these matters. Like all his work of this sort, however, it is extremely amusing reading. Towards the end of this same year *The Complete English Tradesman*, which may be supposed to sum up the experience of his business life, appeared, and its second volume followed two years afterwards. This book has been variously judged. It is generally and traditionally praised, but those who have read it will be more disposed to agree with Charles Lamb, who considers it "of a vile and debasing tendency," and thinks it "almost impossible to suppose the author in earnest." It is certainly clear to those who know it what our foreign critics mean by the reproach of "shop-keeping;" and the intolerable meanness advocated for the sake of the paltriest gains, the entire ignoring of any pursuit in life except money-getting, and the representation of the whole duty of man as consisting first in the attainment of a competent fortune, and next, when that fortune has been attained, in spending not more than half of it, are certainly repulsive enough. But there are no reasons for thinking the performance ironical or insincere, and it cannot be doubted that Defoe would have been honestly unable even to understand Lamb's indignation. In 1706 came forth *The Political History of the Devil*. This is a curious book, partly explanatory of Defoe's ideas on morality, and partly belonging to a series of demonological works which he wrote, and of which the chief others are *A System of Magic*, and *An Essay on the History of Apparitions*. In all these works his treatment is on the whole rational and sensible; but in *The History of the Devil* he is somewhat hampered by an insufficiently worked-out theory as to the nature and personal existence of his hero, and the manner in which he handles the subject is an odd and not altogether satisfactory mixture of irony and earnestness. There are many very amusing things in the book, but to speak of its "extraordinary brilliancy and wit" (as Mr H. Kingsley has done) is certainly inappropriate. The works which have just been mentioned, together with *A Plan of English Commerce*, containing very enlightened views on export trade, appeared in 1727–8. During the whole of the years from 1715 to 1728 Defoe had issued pamphlets and minor works far too numerous to mention. The only one of them perhaps which requires special notice is *Religious Courtship* (1722), a curious series of dialogues displaying Defoe's unaffected religiosity, and at the same time the rather meddling intrusiveness with which he applied his religious notions. This latter point was more flagrantly illustrated in one of his latest works, *The Treatise concerning the Use and Abuse of the Marriage Bed* (1727). This, which was originally issued with a much more offensive name, has been called "an excellent book with an improper title." It might more properly be called an ill-judged work, with a title which gives fair warning of its contents. *The Memoirs of Captain Carleton* (1728) have been long attributed to Defoe. There is, however, a well-known anecdote of Johnson which makes this extremely unlikely; it is now known that an actual officer of the name did exist and serve; and the internal evidence is, we think, strongly against Defoe's authorship. These *Memoirs* have been also attributed to Swift, with greater probability as far as style is concerned. *The Life of Mother Ross*, reprinted in Bohn's edition of Defoe, has no claim whatever to be considered his.

Circumstances and death.

There is little to be said of Defoe's private life during this period. He must in some way or other have obtained a considerable income. In 1724 he had built himself a large house at Stoke Newington (only pulled down about ten years ago), which had stables and grounds of considerable size. From the negotiations for the marriage of his daughter Sophia it appears that he had landed property in more than one place, and he had obtained on lease in 1722 a considerable estate from the corporation of Colchester. It was formerly thought that he soon got rid of this lease, but from documents in Mr Lee's possession it seems that he only effected a mortgage upon it (afterwards paid off), and that it was settled on his unmarried daughter at his death. Other property was similarly allotted to his widow and remaining children, though some difficulty seems to have arisen from the misconduct of his son, to whom, for some purpose, the property was assigned during his father's lifetime, and who refused to pay what was due. There is a good deal of mystery about the end of Defoe's life; it used to be said that he died insolvent, and that he had been in jail shortly before his death. As a matter of fact, after great suffering, from gout and stone, he died of a lethargy in Ropemaker's Alley, Moorfields, on Monday the 6th of April 1731, and was buried in the well-known ground of Bunhill Fields. He left no will, all his property having been previously assigned, and letters of administration were taken out by a creditor. How his affairs fell into this condition, why he did not die in his own house, and why in the previous summer he had been in hiding, as we know he was from a letter still extant, are points apparently not to be cleared up.

Family. Defoe was twice married, and his second wife Susannah outlived him a few months. He had seven children, one of whom, Martha, died in 1707—the others survived him. The eldest, Daniel, emigrated to Carolina. The second, Bernard or Benjamin Norton, has, like his father, a scandalous niche in the *Dunciad*. Three of the daughters, Maria, Henrietta, and Sophia, married well—the husband of the last-named being a Mr Henry Baker, of some repute in natural science. In April 1877 public attention was called to the existence, in some distress, of three maiden ladies, directly descended from Defoe, and bearing his name; and a crown pension of £75 a year was bestowed on each of them. There are several portraits of Defoe, the principal one being engraved by Vandergucht.

Repute. We have said that in his life-time Defoe, as not belonging to either of the great parties at a time of the bitterest party strife, was subjected to obloquy on both sides. The great Whig writers leave him unnoticed. Swift and Gay speak slightingly of him,—the former, it is true, at a time when he was only known as a party pamphleteer. Pope, with less excuse, put him in the *Dunciad* towards the end of his life, but he confessed to Spence in private that Defoe had written many things and none bad. At a later period he was unjustly described as "a scurrilous party writer," which he certainly was not; but, on the other hand, Johnson spoke of his writing "so variously and so well," and put *Robinson Crusoe* among the only three books that readers wish longer. From Scott downwards the tendency to judge literary work on its own merits has to a great extent restored Defoe to his proper place, or, to speak more correctly, has set him there for the first time. Lord Macaulay's description of *Roxana*, *Moll Flanders*, and *Colonel Jack* as "utterly nauseous and wretched" must be set aside as a freak of criticism.

Characteristics. The grounds upon which the last-mentioned writer bases his depreciation of others of Defoe's minor works are curious. "He had undoubtedly a knack of making fiction look like truth, but is such a knack much to be desired? Is it not of the same sort as the knack of a painter who takes in the birds with his fruit?" And De Quincey regards the literary skill of writers of this class as comparatively inferior because of the close resemblance of their writings to the current speech and manner of their day. But nothing is really a greater triumph of art than this similarity, and Macaulay has certainly made a mistake in confounding the requirements of painting and of writing. Scott justly observed that Defoe's style "is the last which should be attempted by a writer of inferior genius; for though it be possible to disguise mediocrity by fine writing, it appears in all its naked inanity when it assumes the garb of simplicity." The methods by which Defoe attains his result are not difficult to disengage. They are the presentment of all his ideas and scenes in the plainest and most direct language, the frequent employment of colloquial forms of speech, the constant insertion of little material details and illustrations, often of a more or less digressive form, and, in his historico-fictitious works, as well as in his novels, the most rigid attention to vivacity and consistency of character. Plot he disregards, and he is fond of throwing his dialogues into regular dramatic form, with bye-play prescribed and stage directions interspersed. A particular trick of his is also to divide his arguments after the manner of the preachers of his day into heads and subheads, with actual numerical signs affixed to them. These mannerisms undoubtedly help and emphasize the extraordinary faithfulness to nature of his fictions, but it would be a great mistake to suppose that they fully explain their charm. Defoe possessed genius, and his secret is at the last as impalpable as the secret of genius always is.

The character of Defoe, both mental and moral, is very clearly indicated in his works. He, the satirist of the true-born Englishman, was himself a model, with some notable variations and improvements, of the Englishman of his period. He saw a great many things, and what he did see he saw clearly. But there were also a great many things which he did not see, and there was often no logical connection whatever between his vision and his blindness. The most curious example of this inconsistency, or rather of this indifference to general principle, occurs in his *Essay on Projects*. He there speaks very briefly and slightingly of life-insurance, probably because it was then regarded as impious by religionists of his complexion. But on either side of this refusal are to be found elaborate projects of friendly societies and widows' funds, which practically cover, in a clumsy and roundabout manner, the whole ground of life-insurance. In morals it is evident that he was, according to his lights, a strictly honest and honourable man. But sentiment of any high-flying description (to use the cant word of his time) was quite incomprehensible to him, or rather never presented itself as a thing to be comprehended. He tells us with honest and simple pride that when his patron Harley fell out, and Godolphin came in, he for three years held no communication with the former, and seems quite incapable of comprehending the delicacy which would have obliged him to follow Harley's fallen fortunes. His very anomalous position in regard to Mist is also indicative of a rather blunt moral perception. One of the most affecting things in his novels is the heroic constancy and fidelity of the maid Amy to her exemplary mistress Roxana. But Amy, scarcely by her own fault, is drawn into certain breaches of certain definite moral laws which Defoe did understand, and she is therefore condemned, with hardly a word of pity, to a miserable end. Nothing heroic or romantic was within Defoe's view; he could not understand passionate love, ideal loyalty, æsthetic admiration, or anything of the kind; and it is probable that many of the little sordid touches which delight us by their apparent satire were, as designed, not satire at all, but merely a faithful representation of the feelings and ideas of the classes of which he himself was a unit. We have noticed Charles Lamb's difficulty as to *The Complete Tradesman*, and we think that the explanation we have preferred will extend to a great deal more of his work.

Some peculiarities of that work follow as a natural corollary from those considerations. His political and economical pamphlets are almost unmatched as clear presentations of the views of their writer. For driving the nail home no one but Swift excels him, and Swift perhaps only in *The Drapier's Letters*. There is often a great deal to be said against the view presented in those pamphlets, but Defoe sees nothing of it. He was perfectly fair but perfectly one-sided, being generally happily ignorant of everything which told against his own view.

The same characteristics are curiously illustrated in his moral works. The morality of these is almost amusing in its downright positive character. With all the Puritan eagerness to push a clear, uncompromising, Scripture-based distinction of right and wrong into the affairs of every-day life, he has a thoroughly English horror of casuistry, and his clumsy canons consequently make wild work with the infinite intricacies of human nature. We have noticed, in remarking on *The Use and Abuse*, the worst instance of this blundering morality. Another, though very different instance, is his amusingly feminine indignation at the increased wages and embellished dress of servants. He is, in fact, an incarnate instance of the tendency, which has so often been remarked by other nations in the English, to drag in moral distinctions at every turn, and to confound everything which is novel to the experience, unpleasant to the taste, and incomprehensible to the understanding, under the general epithets of wrong, wicked, and shocking. His works of this class therefore are now the least valuable, though not the least curious, of his books. His periodical publications necessarily fall to some extent under the two foregoing heads, and only deserve separate notice because of the novelty and importance of their conception. His poetry, as poetry, is altogether beneath criticism. It is sometimes vigorous, but its vigour is merely that of prose. Of his novels we have already spoken in detail, excepting, as universally known, *Robinson Crusoe*.

The earliest regular life and estimate of Defoe is that of Dr Towers in the *Biographia Britannica*. Chalmers's *Life*, however (1786), added very considerable information. In 1838 Mr Walter Wilson wrote the book which is the standard on the subject. It is coloured by political prejudice; it does not display any critical power of a high order; and it is in many parts rather a history of England with some relation to Defoe than a life of the latter; but it is a model of painstaking care, and by its abundant citations from works both of Defoe and of others, which are practically inaccessible to the general reader, is invaluable. In 1859 appeared a life of Defoe by Mr William Chadwick, an extraordinary rhapsody in a style which is half Cobbett and half Carlyle, but amusing, and by no means devoid of acuteness. In 1864 the discovery of the six letters stirred up Mr William Lee to a new investigation, and the results of this were published (London, 1869) in three large volumes. The first of these (well illustrated) contains a new life and particulars of the author's discoveries. The second and third contain fugitive writings assigned by Mr Lee to Defoe for the first time. For most of these, however, we have no authority but Mr Lee's own impressions of style, &c.; and consequently, though qualified judges will in most cases agree that Defoe may have written them, it cannot positively be stated that he did. Mr Lee is equally chary of his reasons for attributing and denying many larger works to his author. His work, though full of research and in many ways useful in correcting and enlarging previous accounts of Defoe, has therefore to be used with some caution. Besides these publications devoted exclusively to Defoe, there are others of the essay kind which may be consulted respecting him. Such articles have been written by Scott, Hazlitt, Forster, a writer in *The Retrospective Review*, Mr Leslie Stephen, and others. No criticisms can, however, compare with three short pieces by Charles Lamb, two of which were written for Wilson's book, and the third for *The Reflector*.

It has been a frequent and well-grounded complaint that no complete edition of Defoe's works has ever been published. There is, as may be gathered from what has already been said, considerable uncertainty about many of them; and even if all contested works be excluded, the number is still enormous. Besides the list in Bohn's *Lowndes*, which is somewhat of an *omnium gatherum*, three lists drawn with more or less care have been compiled in the last half century. Wilson's contains 210 distinct works, three or four only of which are marked as doubtful; Hazlitt's enumerates 183 "genuine" and 52 "attributed" pieces, with notes on most of them; Mr Lee's extends to 254, of which 64 claim to be new additions. Of these large numbers many are in the original editions, extremely scarce, if not unique. Only one perfect copy of the *Review* is known to exist, and this, as well as the partially printed but never published *Complete Gentleman*, is in the hands of Mr James Crossley of Manchester, whose Defoe collection is nearest to completeness. Of reprints only one has ever aspired to be exhaustive. This was edited for the "Pulteney Library" by Hazlitt in 1840–43. It contains a good and full life mainly derived from Wilson, the whole of the novels (including the *Serious Reflections* now hardly ever published with *Robinson Crusoe*), *Jure Divino*, *The Use and Abuse of Marriage*, and many of the more important tracts and smaller works. The introductions are not written on a very uniform principle, but it is otherwise an excellent edition, and had it been continued (it stopped abruptly after the third volume had been completed and a few parts of a fourth issued) would have been satisfactory enough. It is still far the best, but is unfortunately scarce and expensive. There is also an edition, often called Scott's, but really edited by Sir G. C. Lewis, in twenty volumes (London, 1841). This contains the *Complete Tradesman*, *Religious Courtship*, *The Consolidator*, and other works not comprised in Hazlitt's, but is correspondingly deficient. It also is somewhat expensive in a complete state, and the editions chosen for reprinting are not always the best. Scott had previously in 1809 edited for Ballantyne some of the novels, in 12 vols. Bohn's libraries contain an edition which through want of support was stopped at the seventh volume. It includes the novels (except the third part of *Robinson Crusoe*), *The History of the Devil*, *The Storm*, and a few political pamphlets, also the undoubtedly spurious *Mother Ross*. In 1870 Mr Nimmo of Edinburgh published in one volume an admirable selection from Defoe. It contains Chalmers's *Life*, annotated and completed from Wilson and Lee, *Robinson Crusoe*, pts. i. and ii., *Colonel Jack*, *The Cavalier*, *Duncan Campbell*, *The Plague*, *Everybody's Business*, *Mrs Veal*, *The Shortest Way with Dissenters*, *Giving Alms no Charity*, *The True-born Englishman*, *Hymn to the Pillory*, and very copious extracts from *The Complete English Tradesman*. Had the space occupied by *Robinson Crusoe*, which in one form or another every one possesses, been devoted to a further selection from the minor works, this book would have gone far to supply a very fair idea of Defoe to all but professed students of literature. If we turn to separate works, the bibliography of Defoe is practically confined (except as far as original editions are concerned) to *Robinson Crusoe*. *Mrs Veal* has been to some extent popularized by the work which it helped to sell; *Religious Courtship* and *The Family Instructor* had a vogue among the middle class until well into this century, and *The History of the Union* was republished in 1786. But the reprints and editions of *Crusoe* have been innumerable; it has been often translated; and the eulogy pronounced on it by Rousseau gave it special currency in France, where imitations (or rather adaptations) have also been common. (G. SA.)

DE GÉRANDO, Marie Joseph (1772–1842), one of the most distinguished ethical and metaphysical philosophers of France, was born at Lyons, February 29, 1772. When that city was besieged in 1793 by the armies of the republic, the young De Gérando took up arms in defence of his native place, was made prisoner, and with difficulty escaped with his life. He first took refuge in Switzerland, whence he afterwards fled to Naples. In 1796, after an exile of three years, the establishment of the Directory allowed him to return to France. Finding himself, at the age of twenty-five, without a profession, he resolved to embrace the career of arms, and enlisted as a private in a cavalry regiment. About this time the Institute had proposed as a subject for an essay this question,—"What is the influence of symbols on the faculty of thought?" De Gérando gained the prize, and heard of his success after the battle of Zurich, in which he had distinguished himself. This literary triumph was the first step in his upward career. In 1799 he was attached to the ministry of the interior by Lucien Bonaparte; in 1804 he became general secretary under Champagny; in 1805 he accompanied Napoleon into Italy; in 1808 he was nominated master of requests; in 1811 he received the title of councillor of state; and in the following year he was appointed governor of Catalonia. On the overthrow of the empire, De Gérando was allowed to retain this office; but having been sent during the hundred days into the department of the Moselle to organize the defence of that district, he was punished at the second Restoration by a few months of neglect. He was soon after, however, readmitted into the council of state, where he distinguished himself by the prudence and conciliatory tendency of his views. In 1819 he opened at the law-school of Paris a class of public and administrative law, which in 1822 was suppressed by Government, but was re-opened six years later under the Martignac ministry. In 1837 the Government acknowledged the long and important services which De Gérando had rendered to his country by raising him to the peerage. He died in Paris, November 9, 1842, at the age of seventy.

De Gérando's works are very numerous. That by which he is best known now, and which constitutes his chief title to posthumous fame, is his *Histoire Comparée des Systèmes de Philosophie rélativement aux principes des Connaissances Humaines*, of which the first edition appeared at Paris in 1804, in 3 vols. 8vo. The germ of this work had already appeared in the author's *Mémoire de la Génération des Connaissances Humaines*, crowned by the Academy of Berlin, and published at Berlin in 1802. In this work De Gérando, after a rapid review of ancient and modern speculations on the origin of our ideas, singles out the theory of primary ideas, which he endeavours to combat under all its forms. The latter half of the work, devoted to the analysis of the intellectual faculties, is intended to show how all human knowledge is the result of experience; and reflection is assumed as the source of our ideas of substance, of unity, and of identity.

De Gérando's great work is divided into two parts, the first of which is purely historical, and devoted to an exposition of various philosophical systems; in the second, which comprises fourteen chapters of the entire work, the distinctive characters and value of these systems are compared and discussed. Great fault has been found with this plan, and justly, as it is impossible to separate advantageously the history and critical examination of any doctrine in the arbitrary manner which De Gérando has chosen for himself. Despite this disadvantage, however, the work has great merits. It brought back the minds of men to a due veneration for the great names in philosophical science,—a point which had been utterly neglected by Condillac and his school. In correctness of detail and comprehensiveness of view it was greatly superior to every work of the same kind that had hitherto appeared in France. During the Empire and the first years of the Restoration, De Gérando found time, despite his political avocations, to recast the first edition of his *Histoire Comparée*, of which a second edition appeared at Paris in 1823, in 4 vols. 8vo. The plan and method of this edition are the same as in the first; but it is enriched with so many additions that it may pass for an entirely new work. The last chapter of the part published during the author's lifetime ends with the revival of letters and the philosophy of the 15th century. The second part, carrying the work down to the close of the 18th century, was published posthumously by his son in four vols. (Paris, 1847). Twenty-three chapters of this had been left complete by the author in manuscript; the remaining three were supplied from other sources, chiefly printed but unpublished memoirs.

The next valuable work of De Gérando was his essay *Du perfectionnement moral et l'éducation de soi-même*, crowned by the French Academy in 1825. The fundamental idea of this work is that human life is in reality only a great education, of which perfection is the aim.

Besides the works already mentioned, De Gérando left many others, of which we may indicate the following:—*Considérations sur diverses méthodes d'observation des peuples sauvages*, 8vo, Paris, 1801; *Éloge de Dumarsais,—discours qui a remporté le prix proposé par l*a *seconde classe de l'Institut National*, 8vo, Paris, 1805; *Le Visite du pauvre*, 8vo, Paris, 1820; *Institutes du Droit Administratif*, vols. 8vo, Paris, 1830; *Cours normal des instituteurs primaires* or *Directions relatives à l'éducation physique, morale, et intellectuel dans les écoles primaires*, 8vo, Paris, 1832; *De l'éducation de Sourds-Muets*, 2 vols. Paris, 1832; *De la Bienfaisance publique*, vols. 8vo, 1838. A detailed analysis of the *Histoire Compar des Systèmes* will be found in the *Fragments Philosophiques* of M Cousin.

DEGGENDORF, or DECKENDORF, the chief town of district in Lower Bavaria, about 25 miles north-west o Passau, on the left bank of the Danube, which is there crosse by two iron bridges. It is situated at the lower end o the beautiful valley of the Perlbach, with the mountains o the Bavarian Forest rising behind; and in itself it is well-built and attractive town. Besides the administrativ offices it possesses an old council-house dating from 156 a hospital, a lunatic asylum, an orphanage, a poor-house and a large parish church rebuilt in 1756; but of greate interest than any of these is the Church of the Sacre Tomb, which for centuries attracted thousands of pilgrim to its *Porta Cœli*, *Gnadenpforte*, or Gate of Mercy, opene annually on St Michael's Eve, near the end of September and closed again on the 4th of October. In 1837, on the celebration of the 500th anniversary of this solemnity, the number of pilgrims was reckoned at nearly 100,000. Such importance as the town possesses is now rather commercial than religious,—it being the main depôt for the timber-trade of the Bavarian Forest, a station for the Danube steamboat company, and the seat of several mills, breweries, potteries, and other industrial establishments. On the bank of the Danube, outside the town, are the remains of the castle of Findelstein; and on the Geiersberg, in the immediate vicinity, stands the old pilgrimage-church of *Mariæ Dolorum*. About six miles to the north is the village of Metten, with the Benedictine monastery founded by Charlemagne in 801, restored as an abbey in 1840 by Louis I. of Bavaria, and well-known for its educational institutions. The first mention of Deggendorf occurs in 868, and it appears as a town in 1212. Henry XIII. of the Landshut dynasty made it the seat of a custom-house; and in 1331 it became the residence of Henry III. of Natternberg, so called from a castle in the neighbourhood. In 1337 there took place in the town a dreadful massacre of the Jews, who were accused of having thrown the sacred host of the Church of the Sacred Tomb into a well; and it is probably from about this date that the pilgrimage above mentioned came into vogue. The town was captured by the Swedish forces in 1633, and in the war of the Austrian succession it was more than once laid in ashes. Population in 1871, 5452.

See Grüber and Müller, *Der Bayerische Wald*, Ratisbon, 1851; Mittermüller, *Die heil. Hostien und die Juden in Deggendorf*, Landshut, 1866; and *Das Kloster Metten*, Straubing, 1857.

DEHRA DÚN, a district of British India in the Meerut (Mirat) division of the lieutenant-governorship of the North-Western Provinces, lies between 29° 57′ and 30° 59′ N. lat., and 77° 37′ 15″ and 78° 22′ 45″ E. long. It comprises the valley (*dún*) of Dehra, together with the hill division (*parganá*) of Jaunsár Báwar, which runs from S.E to N.W. of it, on the north. The district is bounded on the N. by the native state of Tehri or Garhwál, on the E. by British Garhwál, on the S. by the Siwálik hills, which separate it from Saháranpur district, and on the W. by the hill states of Sirmur, Jubol, and Taránch. The valley (*the Dún*) has an area of about 673 square miles, and forms a parallelogram 45 miles from N.W. to S.E. and 15 miles broad. It is well wooded, undulating, and intersected by streams. On the N.E. the horizon is bounded by the Mussooree (Mansúri) or lower range of the Himálayas, and on the S. by the Siwálik hills. The Himálayas in the north of the district attain a height of between 7000 and 8000 feet, one peak reaching an elevation of 8565 feet; the highest point of the Siwálik range is 3041 above sea-level. The principal passes through the Siwálik hills are the Timli pass, leading to the military station of Chakráta, and the Mohand pass leading to the sanatoriums of Mussooree and Landaur. The Ganges bounds the Dehra valley on the E.; the Jumna bounds it on the W. From a point about midway between the two rivers, and near the town of Dehra, runs a ridge which forms the water-shed of the valley. To the west of this ridge, the water collects to form the Asan, a tributary of the Jumna; whilst to the east the Suswa receives the drainage and flows into the Ganges. To the east the valley is characterized by swamps and forests, but to the west the natural depressions freely carry off the surface drainage. Along the central ridge, the water-level lies at a great depth from the surface (228 feet), but it rises gradually as the country declines towards the great rivers. To meet the demand for water five canals have been constructed, and are fed by the hill streams. These canals have a total length of 67 miles, irrigate about 10,734 acres, and yield a net annual revenue of about £2300. Jaunsár Báwar, north of the valley, comprises a triangular hilly tract, situated between the Tons and Jumna rivers near their point of confluence, and has an area of about 343 square miles. It is covered with forests of deodars, firs, cypresses, and oaks.

The agricultural products consist of rice, *mandua* (*Eleusine corocana*), oil seeds, millets, vegetables, and garden crops, such as potatoes, turmeric, red pepper, &c. The method of cultivation in the valley does not differ from that adopted in the plains; but in Jaunsár, the *khil* or *jum* system of cultivation is largely practised. This consists in clearing and burning the undergrowth on the steep banks of ravines and hills, and in sprinkling the seed, chiefly millets, over the ashes. The process yields a good crop for about two years, when the site is abandoned. The principal industries are tea planting and cultivation, rhea cultivation, and recently silk cultivation. The area under tea in 1872 was 2024 acres, yielding an out-turn of 297,828 ℔, valued at £17,486.

The total revenue derived from Dehra district (exclusive of forests) in 1872–73 amounted to £19,169. Since 1872 the Dehra valley has been subject to the ordinary laws of other settled districts; but in the hilly division of Jaunsár a less formal code is better suited to the people, and this tract is still "non-regulation." The fiscal arrangements of Jaunsár are also peculiar. The tract is divided into *khats*, each presided over by a *sayana*, or head-man. The *sayanas* engage with the Government for the payment of the land revenue, and exercise police and civil jurisdiction in their respective *khats*; whilst a committee of *sayanas*, subject to the control of the British Superintendent of Dehra Dún, decide graver disputes affecting one or more *khats*. Education is progressing rapidly in the Dehra valley. Schools have also been established in Jaunsár. Mussooree has Protestant diocesan schools for European boys and girls; and similar institutions are managed by Roman Catholic priests for members of that faith. It likewise forms the head-quarters of an active American mission. There is little crime in the district, and in Jaunsár no regular police are found necessary.

The principal places in the district are Dehra, Mussooree, with the military sanatarium of Landaur, and the military station of Chakráta. Dehra town is the civil head-quarters of the district, and is constituted a municipality. It contained (1872) a total population of about 7000 souls, (5000 Hindus, and 2000 Mahometans). The municipal income is mainly derived from a house tax. Dehra is the head-quarters of the 2d Gurkha regiment, and of the Great Trigonometrical Survey. The hill station of Mussooree is a favourite summer resort. Its population varies according to the season of the year. During the winter months it is almost entirely deserted. Landaur, the military depot for European convalescents, is really a portion of Mussooree. Chakráta is a hill station for a British regiment of infantry.

The census of 1872 returned the population of the entire district at 116,953 souls, of whom 102,814 were Hindus, 12,427 Mussulmans, 1061 Europeans, 191 Eurasians, and 460 native Christians. The Brahmans numbered 10,279, Rájputs or military caste 33,12[illegible], Baniyás or traders 2664. The Brahmans and Rájputs chiefly belong to the spurious hill clans bearing these names. The Mahometan population consists principally of Patháns and Shaikhs.

DEISM is the received name for a current of theological thought which, though not confined to one country, or to any well-defined period, had England for its principal source, and was most conspicuous in the last years of the 17th and the first half of the 18th century. The deists, differing widely in important matters of belief, were yet agreed in seeking above all to establish the certainty and sufficiency of natural religion in opposition to the positive religions, and in tacitly or expressly denying the unique significance of a supernatural revelation in the Old and New Testaments. They either ignored the Scriptures, endeavoured to prove them in the main but a helpful republication of the *Evangelium æternum*, or directly impugned their divine character, their infallibility, and the validity of their evidences as a complete manifestation of the will of God. The term deism is not only used to signify the main body of the deists' teaching, or the tendency they represent, but has of late especially come into use as a technical term for one specific metaphysical doctrine as to the relation of God to the universe, assumed to have been characteristic of the deists, and to have distinguished them from atheists, pantheists, and theists,—the belief, namely, that the first cause of the universe is a personal God, but is not only distinct from the world but apart from it and its concerns.

The words deism and deist were treated as novelties in the polemical theology of the latter half of the 16th century in France, but were used substantially in the same sense as they were a century later in England. By the majority of those historically known as the English Deists, from Blount onwards, the name was owned and honoured. They were also occasionally called *rationalists*. *Free-thinker* (in Germany, *freidenker*) was generally taken to be synonymous with deist, though obviously capable of a wider signification, and as coincident with *esprit fort*, and with *libertin* in the original and theological sense of the latter word. *Naturalists* was a name frequently used of such as recognized no god but nature, of so-called Spinozists, atheists; but both in England and Germany, in the 18th century, this word was more commonly and aptly in use for those who founded their religion on the *lumen naturæ* alone. The same men were not seldom assaulted under the name of *theists*; the later distinction between theist and deist, which stamped the latter word as excluding the belief in providence or in the immanence of God, was apparently formulated in the end of the 18th century by those rationalists who were aggrieved at being identified with the naturalists.

The chief names amongst the deists are those of Lord Herbert (1581–1648), Blount (1654–1693), Tindal (1657–1733) Woolston (1669–1733), Toland (1670–1722), Shaftesbury (1671–1713) Bolingbroke (1678–1751), Collins (1676–1729), Morgan (?–1743), and Chubb (1679–1746). Annet, who died in 1768, and Dodwell who made his contribution to the controversy in 1742, are of less importance. Of the ten first named, nine appear to have been born within twenty-five years of one another; and it is noteworthy that by far the greater part of the [illegible] as well as of their voluminous [illegible] half century. [illegible] of thought cognate [illegible] the time of its [illegible] how why, [illegible] with a [illegible] light of [illegible] their ability, [illegible] of positive [illegible] and especially [illegible] have been [illegible] Copernican [illegible] conception [illegible] In physics, [illegible] triumph of the [illegible] Newton's system. [illegible] with time- [illegible] done even in [illegible] Bacon. Locke's [illegible] a school for [illegible] scholas- [illegible] thinkers seek to [illegible] simplicity [illegible] on [illegible] distinctively [illegible] Church of England, others [illegible] the realm of [illegible] or the [illegible] had revived [illegible] Arians and [illegible] from the free- [illegible] might be [illegible] landmarks. [illegible] and Chri- [illegible] of Mill and [illegible] controversy; and the [illegible] Theologico-Politicus had [illegible] than ever his [illegible] English revolution [illegible] political and [illegible] theory; and [illegible] Much new [illegible] the free press of [illegible] results. [illegible] was the same from [illegible] have any [illegible] through a sufficiently [illegible] deistic thought, [illegible] by [illegible]

[illegible] either as a whole or in its details. Blount, a man of a very different spirit, did both, and in so doing may be regarded as having inaugurated the second main line of deistic procedure, that of historico-critical examination of the Old and New Testaments. Blount adopted and expanded Hobbes's arguments against the Mosaic authorship of the Pentateuch; and, mainly in the words of Burnet's *Archæologia Philosophica*, he asserts the total inconsistency of the Mosaic Hexaemeron with the Copernican theory of the heavens, dwelling with emphasis on the impossibility of admitting the view developed in Genesis, that the earth is the most important part of the universe. He assumes that the narrative was meant *ethically*, not *physically*, in order to eliminate false and polytheistic notions; and he draws attention to that double narrative in Genesis which was elsewhere to be so fruitfully handled. The examination of the miracles of Apollonius of Tyana, professedly founded on papers of Lord Herbert's, is meant to suggest similar considerations with regard to the miracles of Christ. Naturalistic explanations of some of these are proposed, and a mythical theory is distinctly foreshadowed when Blount dwells on the inevitable tendency of men, especially long after the event, to discover miracles attendant on the birth and death of their heroes. Blount assaults the doctrine of a mediator as irreligious; and much more pronouncedly than Herbert he dwells on the view, afterwards regarded as a special characteristic of all deists, that much or most error in religion has been invented or knowingly maintained by sagacious men for the easier maintenance of good government, or in the interests of themselves and their class. And when he heaps suspicion, not on Christian dogmas, but on beliefs of which the resemblance to Christian tenets is sufficiently patent, the real aim is so transparent that his method seems to partake rather of the nature of literary eccentricity than of polemical artifice; yet by this disingenuous indirectness he gave his argument that savour of duplicity which ever after clung to the popular conception of deism.

Shaftesbury, dealing with matters for the most part different from those usually handled by the deists, stands almost wholly out of their ranks. But he showed how loosely he held the views he did not go out of his way to attack, and made it plain how little weight the letter of Scripture had for himself; and, writing with much greater power than any of the deists, he was held to have done more than any one of them to forward the cause for which they wrought. Founding ethics on the native and cultivable capacity in men to appreciate worth in men and actions, and associating the apprehension of morality with the apprehension of beauty, he makes morality wholly independent of scriptural enactment, and still more of theological forecasting of future [illegible]. He yet insisted on religion as [illegible] and, arguing that religion is inseparable from a high and [illegible] enthusiasm for the divine plan of the universe, he [illegible] religion in feeling, [illegible] good works. The [illegible] he said, [illegible] "pay handsome [illegible]" "explode [illegible] or warmth [illegible] in the protest [illegible] noses," [illegible] standard which [illegible] every respect [illegible] who afterwards, in [illegible] complacent [illegible]

T[illegible] hostility to [illegible] of the [illegible] Christian faith, insisted that Christianity was not mysterious, and that the value of gion could not lie in any unintelligible element; though cannot know the real essence of God or of any of his atures, yet our beliefs about God must be thoroughly sistent with reason. Afterwards, Toland discussed, with siderable real learning and much show of candour, the nparative evidence for the canonical and apocryphal Scrip- es, and demanded a careful and complete historical exami- tion of the grounds on which our acceptance of the New stament canon rests. He contributed little to the solution the problem, but forced the investigation of the canon ke on theologians and the reading public. Again, he etched a view of early church history, further worked out Semler, and surprisingly like that which, as elaborated the Tübingen school, is still held with modifications by a rge number of students of Christian antiquity. He tried show, both from Scripture and extra-canonical literature, at the primitive church, so far from being an incorporate dy of believers with the same creed and customs, really nsisted of two schools, each possessing its "own gospel" —a school of Ebionites or Judaizing Christians, and the ore liberal school of Paul. These parties, consciously but nicably differing in their whole relation to the Jewish law d the outside world, were subsequently forced into a n-natural uniformity. The cogency of Toland's argu- ents was weakened by his manifest love of paradox.

Collins, who had created much excitement by his *iscourse of Free-thinking*, insisting on the value and cessity of unprejudiced inquiry, published at a later stage the deistic controversy the famous argument on the idences of Christianity. Christianity is founded on udaism; its main prop is the argument from the fulfil- ent of prophecy. Yet no interpretation or re-arrangement the text of Old Testament prophecies will secure a fair nd non-allegorical correspondence between these and their leged fulfilment in the New Testament. The inference is ot expressly drawn. Collins indicates the possible extent which the Jews may have been indebted to Chaldeans nd Egyptians for their theological views, especially as great part of the Old Testament would appear to have been re-modelled by Ezra; and, after dwelling on the points in which the prophecies attributed to Daniel differ from all other Old Testament predictions, he states the greater number of the arguments still used to show that the book of Daniel deals with events past and contemporaneous, and is from the pen of a writer of the Maccabean period.

Woolston, at first to all appearance working earnestly in behalf of an allegorical but believing interpretation of the New Testament miracles, ended by assaulting, with a yet unknown violence of speech, the absurdity of accepting them as actual historical events, and did his best to overthrow the credibility of Christ's principal miracles. The bitterness of his outspoken invective against the clergy, against all priestcraft and priesthood, was a new feature in deistic literature, and injured the author more than it furthered his cause.

Tindal's aim seems to have been a sober statement of the whole case in favour of natural religion, with copious but moderately worded criticism of such beliefs and usages in the Christian and other religions as he conceived to be either non-religious or directly immoral and unwholesome. The work in which he endeavoured to prove that true Christianity is as old as the creation, and is really but the republication of the gospel of nature, soon gained the name of the "Deist's Bible."

Morgan criticised with great freedom the moral character of the persons and events of Old Testament history, developing the theory of conscious "accommodation" on the part of the leaders of the Jewish church. This accommodation of truth, by altering the form and substance of it to meet the views and secure the favour of ignorant and bigoted contemporaries, Morgan attributes also to the apostles and to Jesus. He likewise expands at great length a theory of the origin of the Catholic Church much like that sketched by Toland, but assumes that Paul and his party, latterly at least, were distinctly hostile to the Judaical party of their fellow-believers in Jesus as the Messias, while the college of the original twelve apostles and their adherents viewed Paul and his followers with suspicion and disfavour. Persecution from without Morgan regards as the influence which mainly forced the antagonistic parties into the oneness of the catholic and orthodox church.

Annet made it his special work to invalidate belief in the resurrection of Christ, and to discredit the work of Paul.

Chubb, the least learnedly educated of the deists, did more than any of them, save Herbert, to round his system into a logical whole. From the New Testament he sought to show that the teaching of Christ substantially coincides with natural religion as he understood it. But his main contention is that Christianity is not a doctrine but a life, not the reception of a system of truths or facts, but a pious effort to live in accordance with God's will here, in the hope of joining him hereafter. Chubb dwells with special emphasis on the fact that Christ preached the gospel to the poor, and argues, as Tindal had done, that the gospel must therefore be accessible to all men without any need for learned study of evidences for miracles, and intelligible to the meanest capacity.

Dodwell's ingenious thesis, that Christianity is not founded on argument, was certainly not meant as an aid to faith; and, though its starting-point is different from all other deistical works, it may safely be reckoned amongst their number.

Though himself contemporary with the earlier deists, Bolingbroke's principal works were posthumously published after interest in the controversy had declined. His whole strain, in sharp contrast to that of most of his predecessors, is cynical and satirical, and suggests that most of the matters discussed were of small personal concern to himself. He gives fullest scope to the ungenerous view that a vast proportion of professedly revealed truth was ingeniously palmed off by the more cunning on the more ignorant for the convenience of keeping the latter under. But he writes with keenness and wit, and knows well how to use the materials already often taken advantage of by earlier deists.

In the substance of what they received as natural religion, the deists were for the most part agreed; Herbert's articles continued to contain the fundamentals of their theology. Religion, though not identified with morality, had its most important outcome in a faithful following of the eternal laws of morality, regarded as the will of God. With the virtuous life was further to be conjoined a humble disposition to adore the Creator, avoiding all factitious forms of worship as worse than useless. The small value attributed to all outward and special forms of service, and the want of any sympathetic craving for the communion of saints, saved the deists from attempting to found a free-thinking church, a creedless communion. They seem generally to have inclined to a quietistic accommodation to established forms of faith, till better times came. They steadfastly sought to eliminate the miraculous from theological belief, and to expel from the system of religious truth all debatable, difficult, or mysterious articles. They aimed at a rational and intelligible faith, professedly in order to make religion, in all its width and depth, the heritage of every man. They regarded with as much suspicion the notion of a "peculiar people" of God, as of a unique revelation, and insisted on the salvability of the heathen. They rejected the doctrine of the Trinity, and protested against mediatorship, atonement, and the imputed righteousness of Christ, always laying more stress on the teaching of Christ than on the teaching of the church about him; but they repeatedly laid claim to the name of Christians or of Christian deists. Against superstition, fanaticism, and priestcraft they were incessantly lifting up their testimony. They all recognized the soul of man—not regarded as intellectual alone—as the ultimate court of appeal. But they varied much in their attitude towards the Bible. Some were content to argue their own ideas into Scripture, and those they disliked out of it; to one or two it seemed a satisfaction to discover difficulties in Scripture, to point to historical inaccuracies and moral defects. Probably Chubb's position on this head is most fairly characteristic of deism. He holds that the narrative, especially of the New Testament, is in the main accurate, but, as written after the events narrated, has left room for misunderstandings and mistakes. The apostles were good men, to whom, after Christ, we are most indebted; but they were fairly entitled to their own private opinions, and naturally introduced these into their writings. The epistles, according to Chubb, contain errors of fact, false interpretations of the Old Testament, and sometimes disfigurement of religious truth. Fortunately, however, the points on which the private opinions of apostolic men might naturally differ most widely, such as the doctrine of the Logos, are matters which have nothing to do with the salvation of souls.

The general tendency of the deistical writings is sufficiently self-consistent to justify a common name. But it is vain to speak of deism as a compact system, or to regard it as the outcome of any one line of philosophical thought. Of matters generally regarded as pertaining to natural religion, that on which they were least agreed was the certainty, philosophical demonstrability, and moral significance of the immortality of the soul, so that the deists have sometimes been grouped into "mortal" and "immortal" deists. For some the belief in future rewards and punishments was an essential of religion; some seem to have questioned the doctrine as a whole; and, while others made it a basis of morality, Shaftesbury protested against the ordinary theological form of the belief as immoral. No two thinkers could well be more opposed than Shaftesbury and Hobbes; yet sometimes ideas from both were combined by the same writer. Collins was a pronounced necessitarian; Morgan regarded the denial of free will as tantamount to atheism. And nothing can be more misleading than to assume that the belief in a Creator, existent wholly apart from the work of his hands, was characteristic of the deists as a body. In none of them is any theory on the subject specially prominent; save in their denial of miracles, of supernatural revelation, and a special redemptive interposition of God in history, they seem to have thought of providence much as the mass of their opponents did. Herbert starts his chief theological work with the design of vindicating God's providence. Shaftesbury vigorously protests against the notion of a wholly transcendent God. Morgan more than once expresses a theory that would now be pronounced one of immanence. Toland, the inventor of the name of pantheism, was notoriously, for a great part of his life, in some sort a pantheist. And while as thinkers they diverged in their opinions, so too the deists differed radically from one another in their character, in reverence for their subject, and in religious earnestness and moral worth.

The deists were not powerful writers; none of them was distinguished by wide and accurate scholarship; hardly any was either a deep or comprehensive thinker. But though they generally had the best scholarship of England against them, they were bold, acute, well-informed men; they appreciated more fully than their contemporaries not a few truths now all but universally accepted; and they seemed therefore entitled to leave their mark on subsequent theological thought. Yet while the seed they sowed was taking deep root in France and in Germany, the English deists, the most notable men of their time, were soon forgotten, or at least ceased to be a prominent factor in the intellectual life of the century. The controversies they had provoked collapsed rather than were finally settled; and deism became a by-word even amongst those who were in no degree anxious to appear as champions of orthodoxy.

The fault was not wholly in the subjectivism of the movement. But the subjectivism that founded its theology on the "common sense" of the individual was accompanied by a fatal pseudo-universalism which, cutting away all that was peculiar, individual, and most intense in all religions, left in any one of them but a lifeless form. A theology consisting of a few vague generalities was sufficient to sustain the piety of the best of the deists; but it had not the concreteness or intensity necessary to take a firm hold on those whom it emancipated from the old beliefs. The negative side of deism came to the front, and, communicated with fatal facility, seems ultimately to have constituted the deism that was commonly professed at the clubs of the wits and the tea-tables of polite society. But the intenser religious life before which deism fell was also a revolt against the abstract and argumentative orthodoxy of the time.

That the deists appreciated fully the scope of difficulties in Christian theology and the sacred books is not their most noteworthy feature; but that they made a stand, sometimes cautiously, often with outspoken fearlessness, against the presupposition that the Bible is the religion of Protestants. They themselves gave way to another presupposition equally fatal to true historical research, though in great measure common to them and their opponents. It was assumed by deists in debating against the orthodox, as it is now by orthodox Protestants in contending against the Romish Church, that the flood of error in the hostile camp was due to the benevolent cunning or deliberate self-seeking of unscrupulous men, held to by the ignorant with the obstinacy of prejudice.

Yet deism deserves to be remembered as a strenuous protest against bibliolatry in every degree and against all traditionalism in theology. It sought to look not a few facts full in the face, from a new point of view and with a thoroughly modern, though unhistorical spirit. It was not a religious movement; and though, as a defiance of the accepted theology, its character was mainly theological, the deistical crusade belongs, not to the history of the church, or of dogma, but to the history of general culture. It was an attitude of mind, not a body of doctrine; its nearest parallel is probably to be found in the eclectic strivings of the Renaissance philosophy and the modernizing tendencies of cisalpine humanism. The controversy was assumed to be against prejudice, ignorance, obscurantism; what monks were to Erasmus the clergy as such were to Woolston. Yet English deism was in many ways characteristically English. The deists were, as usually happens with the leaders of English thought, no class of professional men, but represented every rank in the community. They made their appeal in the mother tongue to all men who could read and think, and sought to reduce the controversy to its most direct practical issue, making it turn as much as possible on hard facts or the data of common sense. And, with but one or two exceptions, they avoided wildness in their language as much as in the general scheme of theology they proposed. If at times they had recourse to ambiguity of speech and veiled polemic, this might be partly excused by the death of Aikinhead on the scaffold, and Woolston's imprisonment.

French deism, the direct progeny of the English movement, was equally short-lived. Voltaire was to the end a deist of the school of Bolingbroke; Rousseau could have claimed kindred with the nobler deists. Diderot was for a time heartily in sympathy with deistic thought; and the *Encyclopédie* was in its earlier portion an organ of deism. But as Locke's philosophy became in France sensationalism, and as Locke's pregnant question, reiterated by Collins, how we know that the divine power might not confer thought on matter, led the way to dogmatic materialism, so deism soon gave way to forms of thought more directly and extremely subversive of the traditional theology.

In Germany there was a native free-thinking theology nearly contemporary with that of England, whence it was greatly developed and supplemented. The compact rational philosophy of Wolff nourished a theological rationalism which in Reimarus was wholly undistinguishable from dogmatic deism; while, in the case of the historico-critical school to which Semler belonged, the distinction is not always easily drawn—although these rationalists professedly recognized in Scripture a real divine revelation, mingled with local and temporary elements. It deserves to be noted here that the former. the theology of the *Aufklärung*, was, like that of the deists, destined to a shortlived notoriety; whereas the solid, accurate, and scholarly researches of the rationalist critics of Germany, undertaken with no merely polemical spirit, not only form an epoch in the history of theology, but have taken a permanent place in the body of theological science. Ere *rationalismus vulgaris* fell before the combined assault of Schleiermacher's subjective theology and the deeper historical insight of the Hegelians, it had found a refuge successively in the Kantian postulates of the practical reason, and in the vague but earnest faith-philosophy of Jacobi.

In England, though the deists were forgotten, their spirit was not wholly dead. For men like Hume and Gibbon the standpoint of deism was long left behind; yet Gibbon's famous two chapters might well have been written by a deist. Even now, between scientific atheism and speculative agnosticism on the one hand and church orthodoxy on the other, many seem to cling to a theology nearly allied to deism. Rejecting miracles and denying the infallibility of Scripture, protesting against Calvinistic views of sovereign grace and having no interest in evangelical Arminianism, the faith of such inquirers seems fairly to coincide with that of the deists. Wherever religious indifferentism is rife, the less generous forms of deism are still alive. And even some cultured theologians, the historical representatives of latitudinarianism, seem to accept the great body of what was contended for by the deists, though they have a fuller appreciation of the power of spiritual truth, and a truer insight into the ways of God with man in the history of the world.

The deists displayed a singular incapacity to understand the true conditions of history; yet amongst them there were some who pointed the way to the truer, more generous interpretation of the past. When Shaftesbury wrote that "religion is still a discipline, and progress of the soul towards perfection," he gave birth to the same thought that was afterwards hailed in Lessing's *Erziehung des Menschengeschlechtes* as the dawn of a fuller and a purer light on the history of religion and on the development of the spiritual life of mankind.

See Leland's *View of the Principal Deistical Writers*, 2 vols. 1754; Lechler's *Geschichte des Englischen Deismus*, 1841; Rev. John Hunt, *Religious Thought in England*, 3 vols. 1870-72; Leslie Stephen, *History of English Thought in the 18th Century*, 2 vols. 1876. (D. P.)

DEJANIRA, the wife of Hercules. See Hercules.

DEKKER, Jeremias de (1610–1666), a Dutch poet, was born at Dort. in 1610. He received his entire education from his father, a native of Antwerp, who, having embraced the reformed religion, had been compelled to take refuge in Holland. Entering his father's business at an early age, he found leisure to cultivate his taste for literature and especially for poetry, and to acquire without assistance a competent knowledge of English, French, Latin, and Italian. His first poem was a paraphrase of the Lamentations of Jeremiah (*Klaagliedern van Jeremias*), which was followed by translations and imitations of Horace, Juvenal, and other Latin poets. The most important of his original poems were a collection of epigrams (*Puntdichten*) and a satire in praise of avarice (*Lof der Geldzucht*). The latter is his best known work. Written in a vein of light and yet effective irony, it is usually ranked by critics along with Erasmus's *Praise of Folly*. Dekker died at Amsterdam in November 1666. A complete collection of his poems, edited by Brouerius van Nideck, was published at Amsterdam in 1726 under the title *Exercises Poétiques* (2 vols. 4to). Selections from his poems are included in Siegenbeck's *Proeven van nederduitsche Dichtkunde* (1823), and from his epigrams in Geijsbeek's *Epigrammatische Anthologie*, 1827.

DEKKER, Thomas, dramatist. It is impossible to make out, from the scanty records of Dekker's personal life, what manner of man he was. His name occurs frequently in Henslowe's *Diary* during the last year of the 16th century; he is mentioned there as receiving loans and payments for writing plays in conjunction with Ben Jonson, Chettle, Haughton, and Day, and he would appear to have been then in the most active employment as a playwright. The titles of the plays on which he was engaged from April 1599 to March 1599–1600 are *Troilus and Cressida*, *Orestes Fures*, *Agamemnon*, *The Stepmother's Tragedy*, *Bear a Brain*, *Pagge of Plymouth*, *Robert the Second*, *Patient Grissel*, *The Shoemaker's Holiday*, *Truth's Supplication to Candlelight*, *The Spanish Moor's Tragedy*, *The Seven Wise Masters*. At that date it is evident that Dekker's services were in great request for the stage. He is first mentioned in the *Diary* two years before, as having sold a book; the payments in 1599 are generally made in advance, "in earnest" of work to be done. In the case of three of the above plays, *Orestes Fures*, *Truth's Supplication*, and the *Shoemaker's Holiday*, Dekker is paid as the sole author. Only the *Shoemaker's Holiday* has been preserved; it was published in 1600. It would be unsafe to argue from the classical subjects of some of these plays that Dekker was then a young man from the university, who had come up like so many others to make a living by writing for the stage. Classical knowledge was then in the air; playwrights in want of a subject were content with translations, if they did not know the originals. However educated, Dekker was then a young man just out of his teens, if he spoke with any accuracy when he said that he was threescore in 1637; and it was not in scholarly themes that he was destined to find his true vein. The call for the publication of the *Shoemaker's Holiday*, which deals with the life of the city, showed him where his strength lay. To give a general idea of the substance of Dekker's plays, there is no better way than to call him the Dickens of the Elizabethan period. The two men were as unlike as possible in their habits of work, Dekker having apparently all the thriftlessness and impecunious shamelessness of Micawber himself. Dekker's Bohemianism appears in the slightness and hurry of his work, a strong contrast to the thoroughness and rich completeness of every labour to which Dickens applied himself; perhaps also in the exquisite freshness and sweetness of his songs, and the natural charm of stray touches of expression and description in his plays. But he was like Dickens in the bent of his genius towards the representation of the life around him in

London, as well as in the humorous kindliness of his way of looking at that life, his vein of sentiment, and his eye for odd characters. There is a passage in Ben Jonson's caricature of Dekker under the name of "Crispinus,"—an allusion to his *Shoemaker's Holiday,*—from which it would appear that Dekker prided himself on his powers of observation. The less is included in the greater; the random pickings of Dekker, hopping here and there in search of a subject, give less complete results than the more systematic labours of Dickens. Dekker's Simon Eyre, the good-hearted, mad shoemaker, and his Orlando Friscobaldo, are touched with a kindly humour in which Dickens would have delighted; his Infelices, Fiamettas, Tormiellas, even his Bellafronta, have a certain likeness in type to the heroines of Dickens; and his roaring blades and their gulls are prototypes of Sir Mulberry Hawk and Lord Frederick Verisopht. Only there is this great difference in the spirit of the two writers, that Dekker wrote without the smallest apparent wish to reform the life that he saw, desiring only to exhibit it; and that on the whole, apart from his dramatist's necessity of finding interesting matter, he cast his eye about rather with a liking for the discovery of good under unpromising appearances than with any determination to detect and expose vice. The observation must also be made that Dekker's personages have much more individual character, more of that mixture of good and evil which we find in real human beings. Hack-writer though Dekker was, and writing often under sore pressure there is no dramatist whose personages have more of the breath of life in them; drawing with easy, unconstrained hand, he was a master of those touches by which an imaginary figure is brought home to us as a creature with human interests. A very large part of the motive power in his plays consists in the temporary yielding to an evil passion. The kindly philosophy that the best of natures may be for a time perverted by passionate desires is the chief animating principle of his comedy. He delights in showing women listening to temptation, and apparently yielding, but still retaining sufficient control over themselves to be capable of drawing back when on the verge of the precipice. The wives of the citizens were his heroines, pursued by the unlawful addresses of the gay young courtiers; and on the whole Dekker, from inclination apparently as well as policy, though himself, if Ben Jonson's satire had any point, a bit of a dandy in his youth, took the part of morality and the city, and either struck the rakes with remorse or made the objects of their machinations clever enough to outwit them. From Dekker's plays we get a very lively impression of all that was picturesque and theatrically interesting in the city life of the time, the interiors of the shops and the houses, the tastes of the citizens and their wives, the tavern and tobacco-shop manners of the youthful aristocracy and their satellites The social student cannot afford to overlook Dekker; there is no other dramatist of that age from whom we can get such a vivid picture of contemporary manners in London. He drew direct from life; in so far as he idealized, he did so not in obedience to scholarly precepts or dogmatic theories, but in the immediate interests of good-natured farce and tender-hearted sentiment.

In all the serious parts of Dekker's plays there is a charming delicacy of touch, and his smallest scraps of song are bewitching; but his plays, as plays, owe much more to the interest of the characters and the incidents than to any excellence of construction. We see what use could be made of his materials by a stronger intellect in *Westward Ho!* which he wrote in conjunction with John Webster. The play, somehow, though the parts are more firmly knit together, and it has more unity of purpose, is not so interesting as Dekker's unaided work. Middleton formed a
more successful combination with Dekker than
the *Honest Whore*, or the *Converted Courtesan*. i
regarded as the best that bears Dekker's name.
he had the assistance of Middleton. although the
was so immaterial as not to be worth acknowled
title-page. Still that Middleton, a man of little
of much practical talent and robust humour. was
to Dekker in determining the form of the play m
believed. The two wrote another play in c
Roaring Girl, for which Middleton probably co
good deal of the matter. as well as a more symme
than Dekker seems to have been capable of de
the *Witch of Edmonton*, except in a few sc
difficult to trace the hand of Dekker with any
his collaborateurs were John Ford and William I
Ford probably belongs the intense brooding and
wrath of the old hag, which are too direct and ha
energy for Dekker, while Rowley may be supp
responsible for the delineation of country life.

When Langbaine wrote his *Account of th*
Dramatic Poets in 1691, he spoke of Dekke
"more famous for the contention he had with I
for the bays, than for any great reputation he
by his own writings." This is an opinion that c
professed now, when Dekker's work is read. In
tion with Ben Jonson, one of the most celebrat
of authors, the origin of which is matter of dispu
seems to have had very much the best of it.
imagine that Jonson's attack was stinging at
because it seems to be full of sarcastic personal
is dull enough now when nobody knows what D
like, nor what was the character of his mother.
nothing in the *Poetaster* that has any point as
Dekker's powers as a dramatist, while on the c
Untrussing of the Humorous Poet is full of pung
of Jonson's style, and of retorts and insults conc
happiest spirit of good-natured mockery. Dekk
accused of poverty of invention in adopting the c
the *Poetaster*, but it is of the very pith of th
Dekker should have set on Jonson's own fo
Captain Tucca to abuse Horace himself.

Dekker's plays were published in the following
Shoemaker's Holiday, 1600; *The Pleasant Comedy of old*
1600; *Satiromastrix*, 1602; *Patient Grissel* (in conj
Chettle and Haughton) 1603; *The Honest Whore* (Pa
The Whore of Babylon, 1607; *Westward Ho! Nor*
and *Sir Thomas Wyatt* (in conjunction with Web
The Roaring Girl (in conjunction with Middleton). 16
not good, the Devil is in it, 1612; *The Virgin Martyr*
tion with Massinger), 1622; *Match Me in London*,
Wonder of a Kingdom, 1636; *The Sun's Darling* (n
till 1656); and *The Witch of Edmonton* (written
tion with Rowley and Ford), 1658. An edition of t
dramatic works of Dekker is published by John Pea
of his prose tracts, of which he wrote many, are repri
Shakespeare Society, notably *The Seven Deadly Sins of*
The Gull's Hornbook.

DE LA BECHE, Henry Thomas (1796–18
the band of enthusiastic workers by whom the
geology was developed so rapidly in England
early part of this century, was born in the year 1
father, an officer in the army, possessed landed
Jamaica, but died while his son was still young.
accordingly spent his youth with his mother am
teresting and picturesque coast cliffs of the so
England, where probably he early imbibed the
geological pursuits, and cultivated that mark
faculty, to which in large measure he owed the hi
he ultimately reached. When fourteen years of
destined, like his friend Murchison, for the mi
fession, he entered the college at Great Marlowe
specially distinguished himself by the rapidity
with which he executed sketches showing t

features of a district. But this aptitude, which would have been of great service in a soldier's life, was not called forth for warlike purposes. The peace of 1815 changed the career of many young aspirants for military distinction, and among them De la Beche. Instead of pursuing the calling he had chosen, he began to devote himself with ever-increasing assiduity to the pursuit of geology. When only twenty-one years of age he joined the Geological Society of London, continuing throughout life to be one of its most active, useful, and honoured members. Possessing a fortune sufficient for the gratification of his tastes, he visited many localities of geological interest in Britain, and spent some time on the Continent studying features in the geology and physical geography of France and Switzerland. His journeys seldom failed to bear fruit in suggestive notes, papers, or sketches. Early attachment to the south-west of England led him back to that region, where, with augmented power from enlarged experience and reflection, he began the detailed investigation of the rocks of Cornwall and Devon. Thrown much into contact with the mining community of that part of the country, he conceived the idea that the nation ought to compile a geological map of the United Kingdom, and collect and preserve specimens to illustrate, and perhaps even to aid in further developing, its mineral industries. He showed his skilful management of affairs by inducing the Government of the day to recognize his work and give him an appointment in connection with the Ordnance Survey. This formed the starting-point of the present Geological Survey of Great Britain and Ireland. Year by year increasing stores of valuable specimens were transmitted to London; for De la Beche enlisted the sympathy and co-operation of the mining authorities of Cornwall and Devon. At last the building where the young Museum of Economic Geology was placed became too small. But De la Beche, having seen how fruitful his first idea had become, determined to use all his persuasion to prevail on the authorities not merely to provide a large structure, but to widen the whole scope of the scientific establishment of which he was the head, so as to impart to it the character of a great educational institution where practical as well as theoretical instruction should be given in every branch of science necessary for the conduct of mining work. In this endeavour he was again successful. Parliament sanctioned the erection of a museum in Jermyn Street, London, and the organization of a staff of professors with laboratories and other appliances. The establishment was opened in 1851. The Geological Survey also, which had grown up under his care, no longer under the Ordnance Department, received a new organization and an increase to its staff. To De la Beche belongs the high praise of having entirely originated and developed this important branch of the public service. Many foreign countries have since formed geological surveys avowedly based upon the organization and experience of that of the United Kingdom. The British colonies, also, have in many instances established similar surveys for the development of their mineral resources, and have had recourse to the parent survey for advice and for officers to conduct the operations.

De la Beche was an able mineralogist as well as an admirable field-geologist. He published numerous memoirs on English geology in the *Transactions of the Geological Society of London*, as well as in the *Memoirs of the Geological Survey of the United Kingdom*. He likewise wrote a valuable text-book of geology, and a work of singular breadth and clearness—*Researches in Theoretical Geology*—in which he enunciated a philosophical treatment of geological questions much in advance of his time. An early volume, *How to Observe in Geology*, was rewritten and enlarged by him late in life, and published under the title of *The Geological Observer*. It was marked by wide practical experience, multifarious knowledge, philosophical insight, and a genius for artistic delineation of geological phenomena. He received from many foreign societies recognition of his services to science, and at the close of his life was awarded the Wollaston medal—the highest honour in the gift of the Geological Society of London. After a life of constant activity he began to suffer from partial paralysis, but, though becoming gradually worse, continued able to transact his official business until a few days before his death, which took place on 13th April 1855.

DELACROIX, FERDINAND VICTOR EUGÈNE, (1798–1863), a French painter of history, was born at Charenton-St-Maurice, near Paris, 26th April 1798. His father was a partisan of the most violent faction during the time of the Revolution. The family affairs seem to have been conducted in the wildest manner, and the accidents that befell the child, well authenticated as they are said to be, make it almost a miracle that he survived. He was first nearly burned to death in the cradle by a nurse falling asleep over a novel, and the candle dropping on the coverlet; this left permanent marks on his arms and face. He was next dropped into the sea by another *bonne*, who was climbing up a ship's side to see her lover. He was nearly poisoned, and nearly choked, and, to crown all, he tried to hang himself, without any thought of suicide, in imitation of a print exhibiting a man in that position of final ignominy. The prediction of a charlatan founded on his horoscope has been preserved:—"Cet enfant deviendra un homme célèbre, mais sa vie sera des plus laborieuses, des plus tourmentées, et toujours livrée à la contradiction."

Delacroix the elder died at Bordeaux when Eugene was seven years of age, and his mother returned to Paris and placed him in the Lycée Napoléon. Afterwards, on his determining to be a painter, he entered the *atélier* of Baron Guérin, who affected to treat him as an amateur. His fellow-pupil was Scheffer, who was alike by temperament and antecedents the opposite of the *bizarre* Delacroix, and the two remained antagonistic to the end of life. Delacroix's acknowledged power and yet want of success with artists and critics—Thiers being his only advocate—perhaps mainly resulted from his bravura and rude dash in the use of the brush, at a time when smooth roundness of surface was general. His first important picture, Dante and Virgil, was painted in his own studio; and when Guérin went to see it he flew into a passion, and told him his picture was absurd, detestable, exaggerated. "Why ask me to come and see this? you knew what I must say." Yet his work was received at the Salon, and produced an enthusiasm of debate (1822). Some said Géricault had worked on it, but all treated it with respect. Still in private his position, even after the larger tragic picture, the Massacre of Scipio, had been deposited in the Luxembourg by the Government, became that of an Ishmaelite The war for the freedom of Greece then going on moved him deeply, and his next two pictures—Marino Faliero Decapitated on the Giant's Staircase of the Ducal Palace (which has always remained a European success), and Greece Lamenting on the Ruins of Missolonghi—with many smaller works, were exhibited for the benefit of the patriots in 1826. This exhibition was much visited by the public, and next year he produced another of his important works, Sardanapalus, from Byron's drama. After this, he says, "I became the abomination of painting. I was refused water and salt,"—but he adds with singularly happy naïveté, "J'étais enchanté de moi-même!" The patrimony he inherited, or, perhaps it should be said, what remained of it, was 10,000 *livres de rente*, and with economy he lived on this, and continued the expensive process of painting large historical pictures. In 1831 he reappeared in the Salon with six works, and immediately after left for Morocco, where he found much congenial matter. Delacroix never went to Italy; he refused to go on principle, lest the old masters, either in spirit or manner, should impair his originality and self-dependence. His greatest admiration in literature was the poetry of Byron; Shakespeare also attracted him for tragic inspirations; and of course classic subjects had their turn on his easel.

He continued his work indefatigably, having his pictures very seldom favourably received at the Salon. These were sometimes very large, full of incidents, with many figures. Drawing of Lots in the Boat at Sea, from Byron's *Don Juan*, and the Taking of Constantinople by the Christians, were of that character, and the first-named was one of his noblest creations. In 1845 he was employed to decorate the library of the Luxembourg, that of the Chamber of Deputies in 1847, the ceiling of the Gallery of Apollo in the Louvre in 1849, and that of the Salon de la Paix in the Hotel de Ville in 1853. He died on the 13th August 1863; and in August 1864 an exposition of his works was opened on the Boulevard des Italiens. It contained 174 pictures, many of them of large dimensions, and 303 drawings, showing immense perseverance as well as energy and versatility.

DELAGOA BAY (*i.e.*, in Portuguese, the Bay of the Swampy Land), an inlet on the east coast of South Africa, between 25° 40′ and 26° 20′ S. lat., with a length from north to south of about 60 miles, and a breadth of about 20. It is protected by a series of islands stretching north from the mainland; and in spite of a bar at the entrance, and a number of shallows within, it forms a valuable harbour, accessible to large vessels at all seasons of the year. The surrounding country is low and very unhealthy, but the island of Inyak has a height of 240 feet, and is used by the natives as a kind of sanatorium. A river 12 or 18 feet deep, variously known as the Manhissa, the Unkomogazi, or King George's River, enters at the north; several smaller streams, the Matolla, the Dundas, and the Tembi, from the Lobombo Mountains, meet towards the middle in the estuary called the English River; and, of greatest importance of all, the Umzati, which has its head-waters in the Draken Berg of the Transvaal settlement, disembogues in the south. The bay was discovered by the Portuguese navigator Vasco da Gama in 1498; and the Portuguese post of Lorenzo Marques was established not long after to the north of the English River. A Dutch settlement was founded in 1720; but in 1730 it was abandoned. In 1822 Captain Owen, finding that the Portuguese seemed to exercise no jurisdiction to the south of Lorenzo Marques, hoisted the English flag and appropriated the country from the Dundas or English River southwards; but, when he visited the bay again in the following year, he found the Portuguese governor, Lupe de Cardenas, in possession, and expelled him. Between the English and Portuguese Governments the question of possession was left undecided till the claims of the republic of Transvaal brought the subject forward. In 1835 the discontented boers, under Orich, had attempted to form a settlement on the bay; and in 1868 the Transvaalian president, Martin Wessel Pretorius, incorporated the country on each side of the Umzati down to the sea. The whole matter in dispute between the three powers was submitted to the arbitration of M. Thiers, the French president; and on April 19, 1875, his successor Marshal Macmahon declared in favour of the Portuguese. In December 1876 the Lisbon Government sent out an expedition of artizans and military workmen to Lorenzo Marques, with a battery of six guns for the defence of the settlement.

See Owen's "Narrative of Voyages," &c., in *Journal of Roy. Geogr.* [illegible]; [illegible], *M*[illegible] *sobre os dominios Portuguezes na Africa* [illegible]; *Report of the Min. of Marine and the Colonies of Portugal*, 1863–64; "Baie de Delagoa," in *Bulletin de la Société de Géogr.* 1878.

DELAMBRE, Jean Baptiste Joseph (1749–1822), an eminent mathematician and astronomer, was born at Amiens, September 19, 1749. He commenced his studies in the gymnasium of that town under the celebrated poet Delille, with whom he maintained an intimate friendship till his death. Having obtained an exhibition founded by one of his ancestors for the benefit of the town of Amiens, he was enabled to prosecute his studies for a time at the Collége du Plessis in Paris. The expiry of this privilege, however left him to struggle with great privations. During the interval in which he was awaiting permanent employment he devoted himself to historical and literary studies. He undertook extensive translations from Latin, Greek, Italian and English, and at the same time entered on the study of the mathematical sciences. For about a year he supported himself by teaching at Compiègne. On his return to Paris in 1771 he obtained the situation of tutor in the family of D'Assy, the receiver-general of finance. By this time he had resolved to give himself specially to the study of physics and astronomy.

At the College of France he attended the lectures of Lalande, on whose works he had even at that time made a complete commentary. This was first remarked when, in the course of instruction, an occasion presented itself of citing from memory a passage of Aratus. Lalande immediately intrusted to him the most complicated astronomical calculations, and prevailed on D'Assy to establish an observatory at his house, where Delambre applied himself to astronomical observations. In 1781 the discovery of the planet Uranus by Herschel led the Academy of Sciences to propose the determination of its orbit as the subject of one of its annual prizes. Delambre undertook the formation of tables of its motion, and the prize was awarded to him. His next effort was the construction of solar tables, and tables of the motions of Jupiter and Saturn. He took part in the sitting of the Academy of Sciences when Laplace communicated his important discoveries on the inequalities of Jupiter and Saturn; and he formed the design of applying the result of that profound analysis to the completion of tables of the two planets. Delambre turned his attention more especially to the satellites of Jupiter—an undertaking of great difficulty and extent. He had been engaged for several years in the composition of his ecliptical tables, when the Academy of Sciences offered a prize for the subject, which was awarded to him. In the same year (1792) he was elected a member of the Academy.

Immediately afterwards he was appointed, along with Méchain, by the French section of the joint English and French commission to measure an arc from Dunkirk to Barcelona as a basis for the metric system. This undertaking, in itself laborious, was rendered highly dangerous to the personal safety of those engaged in it by the events of the Revolution. Méchain died whilst the work was proceeding; and its successful termination in 1799 was due to the ability and the prudence of Delambre. A full and interesting account of the work was published in his *Base du Système Métrique Décimal* (3 vols. 1806–10), for which he obtained, by a unanimous vote, the prize awarded by the National Institute of France to the most important work in physical science of the preceding ten years.

Delambre, who had been chosen as an associate of almost every scientific body in Europe, was appointed in 1795 a member of the French Board of Longitude, and in 1803 perpetual secretary for the mathematical sciences in the Institute. In 1807 he succeeded Lalande in the chair of astronomy of the College of France, and he was appointed one of the principal directors (*titulaires*) of the university.

For twenty years he performed faithfully and impartially the duties of his office in one of the classes of the Institute. His annual reports, his historical *éloges*, which have been published, and his exposition of the progress of science are eminently distinguished by profound erudition, literary skill, and, above all, by generous appreciation of the works of others. His literary and scientific labours were very numerous, and, in respect of excellence, of the highest order. His *History of Astronomy*, published at intervals, and forming when complete six quarto volumes, is a work of prodigious research. It puts the modern astronomer in possession of all that had been done, and of the methods employed by those who lived before him.

His *Méthodes Analytiques pour la Détermination d'un Arc du Méridien*, his numerous memoirs in the additions to the *Connaissances des Temps*, and his *Astronomie Théorique et Pratique* exhibit the finest applications of modern analysis to astronomy and geography.

It is a remarkable fact that Delambre did not apply himself to astronomical observations until he had reached the comparatively late age of thirty-five. He was appointed a member of the Royal Council of Public Instruction in 1814; but he lost the place in 1815. He was in Paris when it was taken by the allied armies; and, in a letter written at that time to a friend and pupil, he says that on the day of the siege, in the hearing of the cannonade, he laboured with tranquillity in his study from eight in the morning till midnight. He had a happier fate than Archimedes in a like position, for he was not molested by the victors, and no one was billeted on him, probably from respect to his high reputation. At the creation of the Legion of Honour in 1802 Delambre was made a member of that order. He was appointed chevalier of St Michael in 1817, an officer in the Legion of Honour in 1821; but a long time before, he had been created an hereditary chevalier, with an endowment, which was decreed as a national reward.

The life of continued and hard study which Delambre led at last affected his health. The disease by which he was cut off became apparent in the month of July 1822. His total loss of strength, with frequent and long continued fainting-fits, gave warning of a fatal result, which occurred on the 19th August 1822.

The following is a list of his works which appeared separately:—*Tables de Jupiter et de Saturn* (1789); *Tables du Soleil, de Jupiter, de Saturn, d'Uranus, et des Satellites de Jupiter, pour servir à la 3me édition l'Astronomie de Lalande* (1792); *Méthodes Analytiques pour la Détermination d'un Arc du Méridien* (1799); *Tables Trigonométriques Décimales, par Borda, revues, augmentées, et publiées par M. Delambre*, (1801); *Tables du Soleil, publiées par le Bureau des Longitudes* (1806); *Base du Système Métrique Décimal*, &c. (3 vols. in 4to, 1806–1810); *Rapport Historique sur les Progrès des Sciences Mathématiques depuis* 1789, &c. (1810); *Abrégé d'Astronomie, ou Leçons Élémentaires d'Astronomie Théorique et Pratique*, in 8vo; *Astronomie Théorique et Pratique* (3 vols. in 4to, 1814); *Tables Écliptiques des Satellites de Jupiter* (1817); *Histoire de l'Astronomie Ancienne* (2 vols. in 4to, 1817); *Histoire de l'Astronomie du Moyen Age* (1819, 1 vol. in 4to); *Histoire de l'Astronomie Moderne* (1821, 2 vols. in 4to); *Histoire de l'Astronomie au Dixhuitième Siècle* (1 vol. 4to, 1827). In addition to these, he furnished a very considerable number of memoirs (about 28) on various points of astronomy to the *Connaissances de Temps*, beginning with the year 1788. He also contributed to the Memoirs of the Academies of Stockholm, St Petersburg, Berlin, and Turin, and to those of the first class of the French Institute; and he composed *éloges* on many of his contemporaries at their death.

DE LA RIVE, AUGUSTE (1801–1873), a Swiss physicist, distinguished chiefly for his researches on the subject of electricity, was born at Geneva on the 9th October 1801. He belonged to a good family closely connected with that of the Count Cavour, and he inherited his taste for natural science from his father, an eminent physician and chemist. After an unusually brilliant career as a student, he was appointed at the early age of twenty-two to the chair of natural philosophy in the Academy of Geneva. For some years after his appointment he devoted himself specially to the investigation of the specific heat of gases, and to observations for determining the temperature of the earth's crust. In the latter inquiry he availed himself of an artesian well that had been bored to a depth of 700 feet, and his observations were adopted by Poisson as the basis of his calculations. The comparatively new subject of electricity, however, received much of his attention from the first, and it gradually became the chief object of his scientific work. His name is associated with original discoveries in connection with magnetism, electro-dynamics, the connection of magnetism with electricity, the properties of the voltaic arc, and the passage of electricity through extremely rarefied media. His researches on the last-mentioned subject led him to form a new theory of the aurora borealis, which, though not free from difficulties, is on the whole the most probable explanation of a very obscure phenomenon. The most valuable practical result of his scientific discoveries was the process of electro-gilding carried out by Messrs Elkington & Ruolz from a memoir which he communicated to the Académie des Sciences. By making it known in this way he voluntarily renounced all the profits of his discovery. Between 1853 and 1858 De la Rive published a complete treatise on electricity in three octavo volumes, which was regarded as a work of high authority, and was at once translated into English, German, and Italian. Its author's scientific reputation received the usual recognition in his election to the membership of most of the learned societies of Europe. In 1842 he received the grand prize of 3000 francs from the Académie des Sciences for his discovery of the electro-gilding process; and in 1864 he received the highest honour open to the scientific men of Europe in his nomination as one of the eight foreign associates of the Academy. De la Rive's birth and fortune gave him considerable social and political influence. He was distinguished for his hospitality to literary and scientific men, and for his interest in the welfare and independence of his native country. In 1860, when the annexation of Savoy and Nice had led the Genevese to fear French aggression, De la Rive was sent by his fellow-citizens on a special embassy to England, and succeeded in securing a declaration from the English Government, which was communicated privately to that of France, that any attack upon Geneva would be regarded as a *casus belli*. On the occasion of this visit the university of Oxford conferred upon De la Rive the honorary degree of D.C.L. When on his way to pass the winter at Cannes he died suddenly at Marseilles, on the 28th November 1873.

DELAROCHE, HIPPOLYTE, commonly known as PAUL (1797–1856), one of the most accomplished painters of the eclectic modern school, was born in Paris, 17th July 1797. He is always spoken of as one of the most fortunate and successful of men, as well as one of the ablest, since he never appeared to encounter any obstacles or to feel any difficulties.

The father of Delaroche was an expert who had made a fortune, to some extent, by negotiating and cataloguing, buying and selling. He was proud of his son's talent, and able to forward his artistic education. The master selected was Gros, then painting life-size histories, and surrounded by many pupils. In this *atélier* Delaroche met Bonington (an English youth of whose work we see little, but who has had a very considerable influence in France), Roqueplan, Bellangé, Eugène Lami, and others. In no haste to make an appearance in the Salon, his first exhibited picture was a large one, Josabeth saving Joas, 1822. This picture led to his acquaintance with Géricault and Delacroix, with whom he remained on the most friendly terms, the three forming the central group of a numerous body of historical painters, such as perhaps never before lived in one locality and at one time.

From 1822 the record of his life is to be found in the successive works coming from his hand. He visited Italy in 1838 and 1843, when his father-in-law, Horace Vernet, was director of the French Academy. His studio in Paris was in the Rue Mazarine, where he never spent a day without some good result, his hand being sure and his knowledge great. His subjects, definitely expressed and popular in their manner of treatment, illustrating certain views of history dear to partisans, yet romantic in their general interest, were painted with a firm, solid, smooth surface, which gave an appearance of the highest finish. This solidity, found also on the canvas of Vernet, Scheffer, Leopold Robert, and Ingres, was the manner of the day. It repudiates the technical charm of texture and variety of handling which the English school inherits as a tradition from the time of Reynolds; but it is more easily understood by the world at large, since a picture so executed depends for its interest rather on the history, scene in nature, or object depicted, than on the executive skill, which may or may not be critically appreciated. We may add, that his point of view of the historical characters which he treated is not always just, whatever self-command we may give him credit for. Cromwell lifting the Coffin-lid and looking at the Body of Charles is an incident only to be excused by an improbable tradition; but the King in the Guard-Room, with villainous round-head soldiers blowing tobacco smoke in his patient face, is a libel on the Puritans; and Queen Elizabeth dying on the Ground, like a she-dragon no one dares to touch, is sensational; while the Execution of Lady Jane Grey is represented as taking place in a dungeon. Nothing can be more incorrect than this last as a reading of English history, yet we forget the inaccuracy in admiration of the treatment which represents Lady Jane, with bandaged sight, feeling for the block, her maids covering their faces, and none with their eyes visible among the many figures. On the other hand, Strafford led to Execution, when Laud stretches his lawn-covered arms out of the small high window of his cell to give him a blessing as he passes along the corridor, is perfect; and the splendid scene of Richelieu in his gorgeous barge, preceding the boat containing Cinq-Mars and De Thou carried to execution by their guards, is perhaps the most dramatic semi-historical work ever done. The Princes in the Tower must also be mentioned as a very complete creation; and the young female Martyr floating dead on the Tiber is so pathetic that criticism feels hard-hearted and ashamed before it. As a realization of a page of authentic history, again, no picture can surpass the Assassination of the Duc de Guise at Blois. The expression of the murdered man stretched out by the side of the bed, the conspirators all massed together towards the door and far from the body, show exact study as well as insight into human nature. This work was exhibited in his meridian time, 1835; and in the same year he exhibited the Head of an Angel, a study from Horace Vernet's young daughter Louise, the love of whom was the absorbing passion of his life, and from the shock of whose death, in 1845, it is said he never quite recovered. By far the finest productions of his pencil after her death are of the most serious character, a sequence of small elaborate pictures of incidents in the Passion. Two of these, the Virgin and the other Maries, with the apostles Peter and John, within a nearly dark apartment, hearing the crowd as it passes haling Christ to Calvary, and St John conducting the Virgin home again after all is over, are beyond all praise as exhibiting the divine story from a simply human point of view. They are pure and elevated, and also dramatic and painful. Delaroche was not troubled by ideals, and had no affectation of them. His sound but hard execution allowed no mystery to intervene between him and his *motif*, which was always intelligible to the million, so that he escaped all the waste of energy that painters who try to be poets on canvas suffer. Thus it is that essentially the same treatment was applied by him to the characters of distant historical times, the founders of the Christian religion, and the real people of his own day, such as Napoleon at Fontainebleau, or at St Helena, or Maria Antoinette leaving the Convention after her sentence.

In 1837 Delaroche received the commission for the great picture, 27 metres long, in the hemicycle of the lecture theatre of the École des Beaux Arts. This represents the great artists of the modern ages assembled in groups on either hand of a central elevation of white marble steps, on the topmost of which are three thrones filled by the architects and sculptors of the Parthenon. To supply the female element in this vast composition he introduced the genii or muses, who symbolize or reign over the arts, leaning against the balustrade of the steps, beautiful and queenly figures with a certain antique perfection of form, but not informed by any wonderful or profound expression. The portrait figures are nearly all unexceptionable and admirable. This great and successful work is on the wall itself, an inner wall however, and is executed in oil. It was finished in 1841, and considerably injured by a fire which occurred in 1855, which injury he immediately set himself to remedy; but he died before he had well begun, on the 4th November 1856. Robert Fleury finished the repairs, and the picture as yet shows no sign of decay.

Personally Delaroche exercised even a greater influence than by his works. Though short and not powerfully made, he impressed every one as rather tall than otherwise; his physiognomy was accentuated and firm and his fine forehead gave him the air of a minister of state. (W. B. SC.)

DELARUE, GERVAIS (1751–1835), a French historical investigator, and one of the chief authorities on Norman and Anglo-Norman literature. He was a native of Caen, received his education at the university of that town, and was ultimately raised to the rank of professor. His first historical enterprize was interrupted by the French Revolution, which forced him to take refuge in England; but the interruption was the less to be regretted as he found the fullest encouragement from his northern compeers, and had the opportunity of examining a vast mass of original documents in the Tower and elsewhere, which proved of the utmost assistance to his investigations. In the preface to the second volume of his greatest work—the *Essais historiques*—he speaks feelingly of the kindness he had experienced, and mentions his supreme gratification at receiving the approval of Sir Walter Scott. From England he passed over to Holland, still in prosecution of his favourite task; and there he remained till 1798, when the way was open for his return to France. The rest of his life was spent in his native town, where he was chosen principal of his university. While in England he had been elected a member of the Royal Society of Antiquaries; and in his own country he was made a corresponding member of the Institute, and was enrolled in the Legion of Honour.

Besides numerous articles in the *Memoirs of the Royal Society of London*, the *Mémoires de l'Institut*, the *Mémoires de la Société d'Agriculture de Caen*, and in other periodical collections, he published separately *Essais historiques sur les Bardes, les Jongleurs, et les Trouvères normands et anglo-normands*, 3 vols. 1834, and *Recherches historiques sur la Prairie de Caen*, 1837, and since his death have appeared *Mémoires historiques sur le palinod de Caen*, 1841; *Recherches sur la tapisserie de Bayeux*, 1841; and *Nouveaux Essais historiques sur la ville de Caen*, 1842. In all his writings he displays a strong partiality for everything Norman, and rates the Norman influence on French and English literature as of the very highest moment.

DELAVIGNE, Jean François Casimir (1793–1843), French poet and dramatist, was born April 4, 1793, at Havre, whence his father sent him at an early age to Paris, there to be educated at the Lycée Napoléon. During the first years of his attendance at this school he was little else than a dullard, but on reaching the age of fourteen he seems to have undergone a complete change—sluggishness gave place to unusual facility in the acquisition of knowledge; a decided taste for literary studies, especially poetry, was evinced; and he quickly became a distinguished student. He read with avidity all the poets, great and small, to whose works access was obtainable, and was known to spend many an hour snatched from school duties in the elaboration of his own juvenile pieces. Constitutionally of an ardent and sympathetic temperament, with a mind the natural intelligence of which was quickened by extensive miscellaneous reading, and by contact with a world then in a state of revolutionary ferment, it will be seen that Delavigne had much in his favour when he first sought popular applause. An opportunity for display soon presented itself. On the 20th of March 1811 the Empress Marie Louise gave birth to a son, christened in his very cradle king of Rome. This long-desired event was hailed with the utmost satisfaction; congratulations reached Napoleon from every quarter of Europe, and fifty millions of human beings did homage to their future sovereign. But the poets were dumb. Our young aspirant to fame, therefore, seeing the field unoccupied, composed a festal hymn. It was completely successful; even the critics were pleased. On being shown the verses, Andrieux, albeit a man little disposed to flatter, exclaimed, "Bring him to me! He shall make nothing but verses, and these, I hope, good ones." Encouragement such as this augured well for the future; but Delavigne's purse was scantily furnished, and his friends were poor and unable to render any assistance. At this point he was fortunate in securing as a patron Count Français of Nantes, who attached him to the revenue office, but with the single proviso, that he should not trouble himself to appear at his post oftener than once a month.

About this time he competed twice for an academy prize, but without success. A victory, however, was at hand. Amid the throes in which society laboured at the period of Napoleon's downfall, Delavigne, catching inspiration from the mingled hopes and fears which agitated his fellow-countrymen, burst upon the world with two impassioned poems, the first entitled *Waterloo*, the second, *Dévastation du Musée*, both written in the heat of patriotic enthusiasm, and teeming with popular political allusions. A third, but of inferior merit, *Sur le besoin de s'unir après le départ des étrangers*, was afterwards added. These stirring pieces, termed by him *Messéniennes*, sounded a key-note which found an echo in the hearts of all. Twenty-five thousand copies were sold; Delavigne was famous. Nor was his reputation made solely with the populace; his verses were the subject of much discussion in court circles; and in spite of their political tone it was thought necessary to bestow upon him some mark of attention. He was therefore appointed to an honorary librarianship, with no duties to discharge. Thus was he fortunately rendered independent by the offer of one sinecure just as he was deprived of another, for his intercourse with Français had now ceased.

Having achieved so signal a triumph in one department of literature, Delavigne was desirous of attaining distinction in another, and accordingly brought out upon the stage a play well-known under the title of *Les Vêpres Siciliennes*. The manuscript having been refused at the Théâtre-Français, the critic of which, a supercilious poetaster, told him that "*some day* he might write comedy very fairly," the mortified author, like Voltaire on a similar occasion, cast the sheets into the flames, from which they were rescued by his brother Germain. A better fate than burning awaited the piece, and in 1819 it was performed at the Odéon, then just rebuilt. On the night of the first representation, which was warmly received, Picard, the manager, threw himself into the arms of his elated friend, exclaiming, "You have saved us! You are the founder of the second French Theatre." This was followed up by the production of the *Comédiens* (1820), a poor play, with little plot, and the *Paria* (1821), with still less, but containing some well-written choruses. The latter piece obtained a longer lease of life than its intrinsic literary merits warranted, on account of the popularity of the political opinions freely expressed in it—so freely expressed, indeed, that the displeasure of the king was incurred, and Delavigne lost his post. But the duke of Orleans, willing to gain the people's good wishes by complimenting their favourite, wrote to him as follows,—"The thunder has descended on your house; I offer you an apartment in mine." Accordingly he became librarian at the Palais-Royal, a position retained during the remainder of his life. It was here that he wrote the *École des Vieillards*, which gained his election to the Academy in 1825. To this period also belong *La Princess Aurélie* (1828), and *Marino Faliero* (1829), a drama in the romantic style.

For his success as a writer Delavigne was in no small measure indebted to the stirring nature of the times in which he lived. The *Messéniennes*, which first introduced him to universal notice, had their origin in the excitement consequent on the occupation of France by the allies in 1815. Another crisis in his life and in the history of his country, the revolution of 1830, stimulated him to the production of a second masterpiece, *La Parisienne*. This song, set to music by Auber, was on the lips of every Frenchman, and rivalled in popularity the celebrated *Marseillaise*. A companion piece, *La Varsovienne*, was written for the Poles, by whom it was sung on the march to battle.

Other works of Delavigne followed each other in rapid succession:—*Don Juan d'Autriche* (1835), *Une Famille au temps du Luther* (1836), *La Popularité* (1838), *La Fille du Cid* (1839), *Le Conseiller rapporteur* (1841), and *Charles VI.* (1843), an opera partly written by his brother.

But the poet had reached the acme of his reputation, and was now on the decline. In 1843 he quitted Paris to seek in Italy the health his labours had cost him. At Lyons his strength altogether gave way, and on the 11th of December, while listening to his wife, who read aloud one of Scott's novels, he gently expired, murmuring some verses.

By many of his own time Delavigne was looked upon as unsurpassed and unsurpassable. Every one bought his works; nay more, every one read them. If a new play of his was announced at the theatre, it was the affair of a month to secure a seat. Talma and Mademoiselle Mars felt honoured in receiving from him a part; theatrical managers lay in wait for the fruits of his pen. But the applause of the moment was gained at the sacrifice of lasting fame. Delavigne wrote but for the hour; he was too little the retired, contemplative poet, and too much the busy man of the world. In the region of politics alone does he shine; when he quits this sphere it is to descend to the level of utter common-place.

But as a writer Delavigne had many excellencies. He is never at a loss for language, yet expresses himself in a terse and vigorous style. The poet of reason rather than of imagination, he recognizes his own province, and is rarely tempted to flights of fancy beyond his powers. He wrote always as he would have spoken, from sincere conviction. In private life he was in every way estimable,—upright, amiable, devoid of all jealousy, and generous to a fault. The best edition of his works is that of Furne, in 8 volumes. (E. S. R.)

DELAWARE, one of the States of the American Union (next to Rhode Island, the smallest in extent), is situated on the Atlantic seaboard, forming part of the peninsula between the Chesapeake and Delaware Bays. It covers an area of 2120 square miles. The population in 1840, and at the end of every ten years down to 1870. has been as follows:—

	White.	Free coloured.	Slaves.	Total
1840	58,561	16,919	2605	78,085
1850	71,169	18,073	2290	91,532
1860	90,589	19,829	1798	112,216
1870	102,221	22,794	...	125,015

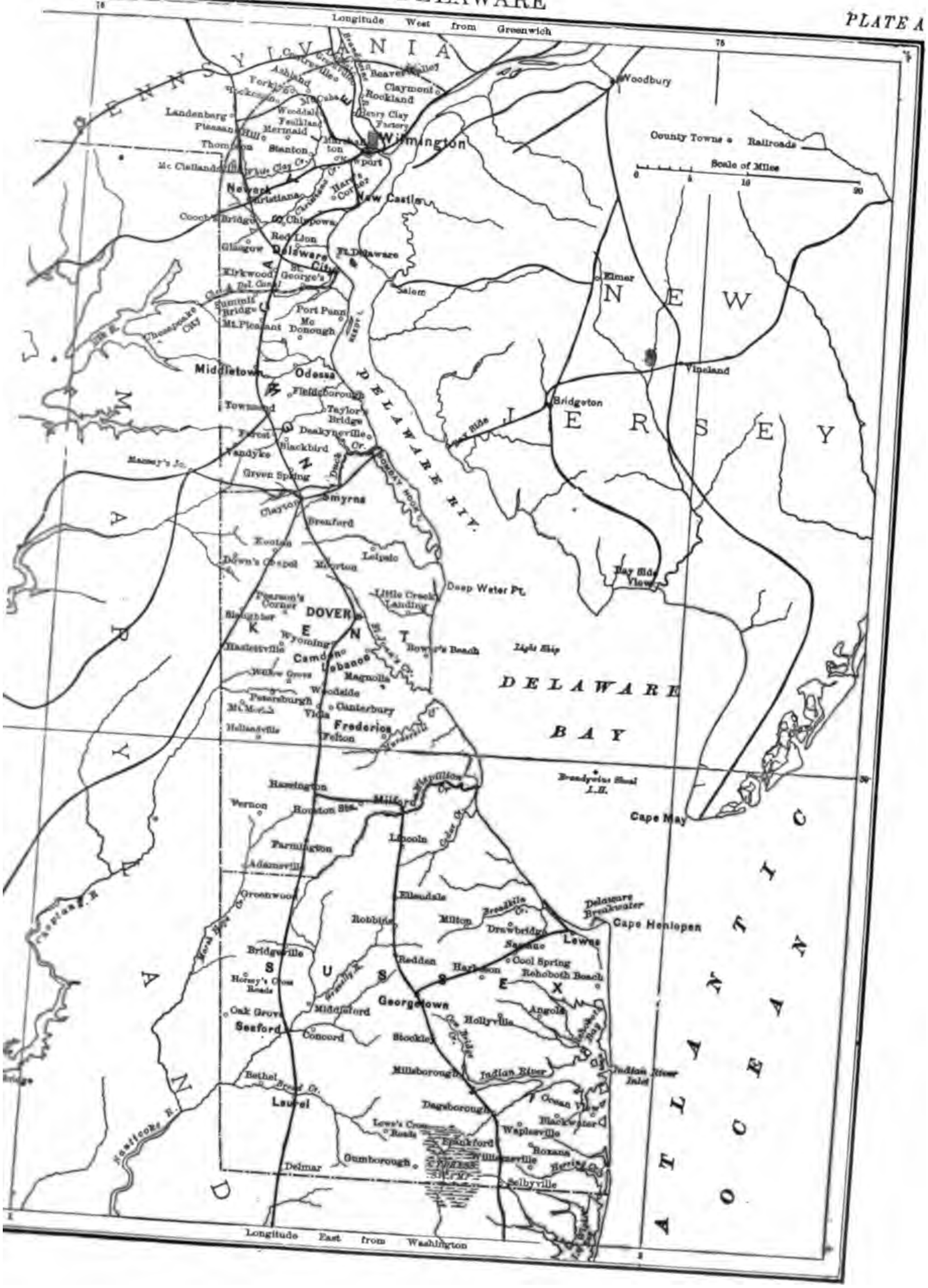
It is bounded on the N. by Pennsylvania, on the W. and S. by Maryland, and on the E. by the Atlantic Ocean and the Delaware Bay and River. Its rivers are small and unimportant, and most of them flow into the Delaware Bay or River The Delaware and Chesapeake Canal connects the two great bays, and makes an easy water transit for produce between Philadelphia and Baltimore. Delaware is an agricultural State; a part of it is in a high state of cultivation. Besides wheat, maize, and other grain, peaches are grown in immense quantities, and sent over the country. Small fruits are also raised for transportation. In the northern parts of the State are numerous manufactories. Wilmington has large machine-shops, and cotton, paper, morocco, and carriage factories; and iron-ship building is largely carried on there. New Castle, also. has rolling-mills, and cotton and woollen factories. The flour-mills of Delaware are famous, and the Dupont Gunpowder Works, six miles from Wilmington, are the largest and oldest in the country. The Philadelphia, Wilmington, and Baltimore Railroad runs through the northern part of the State, and the Delaware Railroad goes through the whole length of the peninsula. The Wilmington and Reading Railroad makes a connection with the Pennsylvania coal region. There are five judges in the State, viz, a chancellor, who is also president of the Orphans' Court (the associate judge residing in the county serving with him in the county where the court is held), a chief justice, and an associate judge from every one of the three counties. There is a State school fund, which is further increased by the proceeds of the marriage and liquor licences. Every hundred which, by either taxation or subscription, supports a free school is entitled to its share of the fund. The debt of the State is $1,224,000, and as the cost of the government is moderate, the taxes are small.

On the 28th of August 1609 Henry Hudson sailed into the Delaware Bay; but, finding the water shallow and difficult to navigate, he made no exploration, leaving that honour to the Dutch navigators,—Hendrickson in 1616, and in 1623 Mey, whose name is borne by the eastern cape of the bay. There is a tradition that Lord De la Warr, when on his way to Virginia in 1610, anchored in the bay, but it is not authentic. It was in 1626 that Gustavus Adolphus, king of Sweden, by the advice of a Hollander, William Uesselinx, issued letters-patent for a settlement on the west shore of the Delaware River—called by the Indians Poutaxat, and by the Dutch South River—for a trading-post. The queen dowager, the royal council, the nobility, the bishops and clergy, as well as large numbers of the people, contributed money for the colony; but the long war with Germany, and the death of the king, caused the scheme to fail. In 1639 Queen Christina sent out a colony under the charge of a Dutchman, Peter Menewe, who first landed at the mouth of the Delaware, near the present town of Lewes, which they named Paradise Point. Here they made a purchase from the Indians of all the land on the west side of the river, from Cape Henlopen, at the mouth of the bay, to Trenton Falls; and as none of the Swedes understood the Indian language, the deeds were written in Dutch, and sent to Sweden for preservation. The first settlement the Swedes made in their newly acquired country, which they called New Sweden, was near the Delaware River, where the Christine and Brandywine Creeks join, and where the city of Wilmington now stands. Here they built a fort, which they called Christiana. The Dutch had a few weak settlements on the Jersey shore, but they also claimed the west bank of the river, and wrote a remonstrance to Menewe, though they did not, perhaps could not, interfere with the colony, which Minnewitz governed for three years, appointing at his death a successor. The Dutch proved troublesome neighbours, and as a retaliation for the building of Fort Christiana, they built Fort Casimir, six miles below the Swedish settlement. Still Governor Stuyvesant and the Swedish governor, Printz, were on amicable terms; and when the former visited his new fort on the west side of the Delaware, the two promised to be neighbourly and friendly, and to act as allies if needful. But in 1654, Governor Rising was sent from Sweden with a large number of colonists; and his first act was to take Fort Casimir, which he did without bloodshed, renaming it the Fort of the Holy Trinity, in honour of Trinity Sunday, when he captured it. This brought Governor Stuyvesant from New York, with six or seven vessels, and as many hundred men, who not only retook Fort Casimir, but marched to Fort Christiana and captured it also. Stuyvesant compelled the Swedes to swear allegiance to the Dutch Government, and those who refused the oath were forced to leave the country. Thus the colony of New Sweden was obliterated, and the Dutch became owners of the west shore of the Delaware River, having at Fort Casimir, which they called New Amstel, a governor of their own, though under the jurisdiction of the governor of Manhattan (New York). In 1664 Sir Robert Carr, after capturing Manhattan, sailed up South River, and took New Amstel, changing the name of the river to Delaware, and New Amstel to New Castle on Delaware; though the Swedish chronicler affirms—"there has never been a castle in it." For nine years was the colony held by the English, Carr being governor under Governor Lovelace of New York. Lord Baltimore had claimed, during the Dutch administration, all the lower part of the territory, within two miles of New Amstel, and whilst Governor Lovelace was in office he still urged his claim. In 1673 the Dutch admiral Eversten stormed New York, took it without capitulation, and again there was a Dutch governor on the Delaware. This rule was short, for in the very next year all the English colonies were ceded back to England by the Peace of Westminster. Yet the settlement on the Delaware seemed doomed to change its owners; for, becoming the property of the duke of York by a special grant, there was a governor sent to New Castle in the name of the duke, who himself never visited his possessions in America. In 1682 the duke gave, or nominally sold, "the three lower counties" to William Penn, so that they became a part of Pennsylvania. At first an effort was made that the "three lower counties" should send their delegates to the Pennsylvania assembly, which should legislate for the whole; but as the interests of the two sections of the province were different, the "three lower counties" insisted upon a separate assembly held at New Castle. After Penn's death, in 1718, there was a lawsuit between his heirs and those of Lord Baltimore, as to the boundary line between their possessions. The suit was carried into the

L-VII.

DELAWARE

PLATE A



Court of Chancery in England, and pending the trial the "three lower counties" were not sure to whom they belonged, and so paid no land rents. In 1768 the suit was decided, and commissioners appointed, who defined the boundary line of Maryland as it now stands. It was in the year 1776 that the first constitution of the State of Delaware was framed, whereby "the three lower counties on the Delaware" lost their awkward name, and again had a new form of government. In the same year Delaware, as one of the thirteen colonies, signed the Declaration of Independence; and in 1787 the State, in convention, adopted the constitution of the United States. In 1792 a new State constitution was enacted, and again in 1831, which is now in force. Under it, the governor is elected for four years, and the legislature meets biennially at Dover, the State capital. Delaware was one of the original thirteen States, and, though slave-holding, remained loyal to the Union at the secession of the Southern States in 1861.

DELAWARE, a city of the United States, capital of a county of the same name in Ohio, is situated on the west bank of the Olentangy, nearly in the centre of the State, 24 miles north of Columbus. Its principal public institutions are the Ohio Wesleyan university and a female college belonging to the same body. The manufactures consist of oil, cordage, hempen cloth, and iron work. A medicinal spring in the neighbourhood is resorted to for the benefit of its waters. Population (1870), 5641.

DEL CREDERE AGENT is one who, selling goods for his principal on credit, undertakes for an additional commission to guarantee the solvency of the purchaser.

DELFICO, MELCHIORRE (1744–1835), an eminent Italian writer on political economy, was born at Teramo in the Abruzzi on the 1st August 1744, and was educated at Naples. He devoted himself specially to the study of jurisprudence and political economy, and thus qualified himself for the valuable service he was to render to his native country by his writings on legal and economic subjects. His first publication, *Saggio filosofico nel matrimonio* (1774), was an eloquent vindication of marriage against the loose views that were prevalent. To his *Memorie sul Tribunale della Grascia e sulle Legge Economiche nelle Provincie confinante del Regno*, addressed to the king, the Neapolitans owed the abolition of the most vexatious and absurd restrictions on the sale and exportation of agricultural produce. Other *Memorie* on kindred subjects followed, and did much to promote reform in the direction of free trade. Equally beneficial was the adoption of the principles developed in his *Riflessioni sulla Vendita dei Feudi Devoluti*, in 1790, and his *Lettera al Duca di Cantalupo sú i Feudi Devoluti*, in 1795, which were so powerfully reasoned that a law was promulgated for the sale of all feudalities reverting to the crown as free estates. During the short reign of Joseph Bonaparte at Naples, Delfico was made a councillor of state, and employed in the formation of the new judicial organization of Naples. He was employed in a similar manner under Murat; and, when Ferdinand was restored in 1815, Delfico was made president of the commission of the archives, an office which he filled until 1823, when he tendered his resignation on account of his advanced age. His sovereign acknowledged his eminently patriotic services by the grant of a large pension for life. Soon after, he retired to his native town, where he died on the 21st June 1835, at the advanced age of ninety-one. Besides the works we have noticed, on which his Neapolitan fame may be said chiefly to rest, we owe to him several general works of no mean reputation, especially *Ricerche sul vero Carattere della Giurisprudenza Romana, e di sue Cultore*, 1790, and *Pensieri sulla Storia, e sull' Incertezza ed Inutilità della Medesima*, 1806, which have both been several times reprinted. In the latter he has anticipated the scepticism of Niebuhr on the early history of Rome, which he treats as fabulous; and he denies to the Romans before the second Punic war all arts but that of agriculture, and of making war on their neighbours.

See Gregoire de Filippis Delfico's *Della Vita e delle Opere di Melchiorre Delfico* (Teramo, 1836), and Tipaldo's *Biografia degli Italiani illustri* (vol. ii.)

DELFT, a town of Holland, in the province of South Holland, on the Schie, nearly ten miles from Rotterdam, and in the line of the canal between that city and the Hague. It is well and regularly built in the form of a square, but has a rather gloomy appearance from its streets being traversed by narrow stagnant canals. The public buildings comprise the Prinsenhof, or palace, where William of Orange was assassinated in 1584; the town-house, erected in 1618, with antiquarian and artistic collections; the Old Church, dating from the 11th century, and containing monuments to Van Tromp and Piet Hein, and the tomb of Leeuwenhoek, the naturalist; the New Church, founded in 1381, and interesting both for its chime of 500 bells, and as the burial-place of the princes of the house of Orange from the days of the Liberator down to the present century; the arsenal, originally erected as a warehouse for the East India Company; and the polytechnic school, with the fine collection of mechanical models formerly preserved in the dockyard at Amsterdam. It is sufficient to mention the powder-magazine, the school of military engineering, the theatre, the municipal school for the education of civil service students for the colonies, the school of design, the lunatic asylum, and Madame Renswonde's orphanage. For a long time the name of Delft was associated, not only in Holland, but even abroad, with the manufacture of excellent earthenware; but this industry, as well as the beer-brewing which was of great importance last century, has become almost extinct. The present branches are carpet-weaving, cooperage, dyeing, and distilling. The town was founded about 1075 by Duke Geoffrey of Lorraine after his conquest of Holland from Count Thierry. It was almost totally ravaged by fire in 1536; and in 1654 it lost about 1200 of its population by the explosion of a powder-magazine. In 1797 the *Christo Sacrum* Society was founded by Onder van Vyngaard-Ceanzius, the burgomaster of the city, for the utopian purpose of uniting in one community all the various branches of the Christian church. Of the celebrities of the town the most famous is Grotius, whose tomb is shown in the New Church. Population in 1874, 23,900.

DELHI,[1] a district of British India under the jurisdiction of the lieutenant-governor of the Punjab, situated between 28° 13′ and 29° 13′ N. lat. and 76° 53′ and 77 34″ E. long. It consists of a strip of territory on the right or west bank of the River Jumna, 75 miles in length, and varying from 15 to 23 miles in breadth, bounded on the N. by the district of Karnál, on the E. by the Jumna river separating it from Meerut (Mirat) and Bulandshahr districts, on the S. by Rohtak, and on the W. by Gurgáon. With the exception of a low-lying alluvial tract in the north, and a narrow fringe of fertile soil along the river bank to the south of Delhi city, the country consists of stony or hard sandy soil, where cultivation mainly depends upon artificial irrigation. This is supplied by the Western Jumna canal, which has a course of 51 miles in the district; by the Ali Murdán canal, constructed by a celebrated Persian nobleman of that name; by the new Agra canal;

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[1] The name is also applied to a Division or Commissionership, comprising the districts of Delhi, Gurgáon, and Karnál, containing a total area of 5557 square miles, with a population of 1,920,912.

and by the Jumna river, and a few hill streams. An offshoot of the Mewát hills runs in a north-easterly direction nearly across the district. This offshoot forms a sterile, rocky table-land, from two to three miles in breadth, but nowhere exceeding 500 feet above the level of the surrounding country.

The district population, according to a census taken in 1868, numbered 608,850 souls, scattered over an area of 1227 square miles, showing a density per square mile of 496 persons. According to their religious beliefs the inhabitants are thus classified:—Hindus, 438,886, or 72·08 per cent.; Mahometans, 130,645, or 21·46 per cent.: Sikhs, 580, or ·09 per cent.; others, 38,739, or 6·36 per cent. Four towns contain a population exceeding 5000,—viz., Delhi city, population 154,417; Sonipát, 12,176; Faridábád, 7990; and Balabgarh, 6281.

The principal agricultural products of the district are wheat, barley, sugar-cane, and cotton. In the lands of the northern part, commanded by the irrigation canals, cotton and sugar cane are the most lucrative staples of the autumn harvest, while *joár* (great millet), *bájrá* (spiked millet), and *makái* (Indian corn) are grown for local consumption. The spring crops consist of the better kinds of grain, such as wheat and barley, and of gram and tobacco. In some irrigated villages a superior kind of rice is grown, but it nowhere forms a staple product. Cotton cultivation is extending, and a ready market for the fibre exists in Delhi city. The total area of the district is returned at 814,672 acres, of which 525,255 are cultivated, viz., 206,853 irrigated and 318,402 unirrigated. A tract of 1147 acres, set apart by the native rulers as a hunting ground, is now inclosed by Government as a timber preserve; and other plantations along the banks of the river have recently been formed and placed under the Forest Department. The hills produce good building stone, and a fair kind of marble of two colours, black and grey. A white clay, supposed to be kaolin, is found at Arangpur, Murádpur, and Kasmpur, and has been employed with success at the Government foundry at Rurki for making crucibles. At the first named village is a crystal mine, no longer worked. The East India Railway and the Punjab Railway run trains into Delhi from their junction at Ghaziábád, about twelve miles distant, while the Rajputana State Railway traverses the district for about twelve miles in the direction of Gurgáon. The Government revenue of Delhi district in 1872-73 amounted to £383,082,—of which £89,036 was derived from the land, £261,909 from salt and custom duties, and £14,086 from stamps. The land settlement is not a permanent one, but for a term of years. For the education of the people Government in 1872–73 maintained in whole or in part 72 schools, attended by 3645 pupils, at an outlay to the state of £7760. There were also 32 unaided indigenous schools, attended by 529 pupils in 1872-73. Three Government dispensaries gave gratuitous relief to 18,303 patients, at a cost of £925, 8s. (1872-73). For administrative purposes, the district is subdivided into three *tahsíls* of Delhi, Larsauli, and Balabgarh. The staff consists of a deputy commissioner, with two assistants and two extra assistant commissioners, a judge of the small cause court, 3 *tahsíldárs* and 3 [illegible] [illegible] [illegible] a superintendent and an assistant superintendent of [illegible] and a civil surgeon.

The early history of the district [illegible] [illegible] [illegible] in the [illegible] century, the [illegible] [illegible] fell under the Marathas and the emperor Sháh Álam became a [illegible] of the Maharaja Sindhia. In 1803 [illegible] [illegible] [illegible] Maratha [illegible]. The Mughal emperor was taken under the protection of the Company, and a considerable tract of country, consisting of nearly all the present districts of Delhi and Hissar, was assigned for the maintenance of the royal family. This tract was placed under charge of a British officer as Resident, and the revenue was collected and justice administered in the name of the emperor. The annual allowance to the royal family paid from this assigned territory was originally £100,000; it was afterwards increased to £120,000, and subsequently to £150,000, exclusive of certain crown lands which yielded about £15,000 a year. The emperor received the homage of royalty; and throughout the assigned territory all judicial decrees were pronounced in his name, and sentences of death were referred to him for approval. The fiscal arrangements were under the entire control of the resident. This continued till 1832, when the office of resident was abolished, the tract being annexed to the North-Western Provinces, and a British Commissioner appointed to administer it. On the outbreak of the sepoy mutiny in 1857, the whole of the district was for a time lost to British rule, and the southern part was not subdued until after the fall of Delhi city in September 1857. In 1858 Delhi district was separated from the North-Western Provinces, and annexed to the then newly constituted lieutenant-governorship of the Punjab.

Delhi, the chief city of the district and division of the same name, and the capital of the Mughul empire, situated in 28° 39′ 40″ N. lat. and 77° 17′ 45″ E. long. abuts on the right bank of the River Jumna, and is inclosed on three sides by a lofty wall of solid stone constructed by the Emperor Sháh Jahán, and subsequently strengthened by the English at the beginning of the present century by a ditch and *glacis*. The eastern side, where the city extends to the river bank, has no wall; but the high bank is faced with masonry, and bears from the outside the appearance of one. The circuit of the wall is 5½ miles. It has ten gates, of which the principal are the Kashmir and Mori gates on the north; the Cabul and Lahore gates on the west; and the Ajmír and Delhi gates on the west. The imperial palace, now known as "the fort," is situated in the east of the city, and abuts directly on the river. It is surrounded on three sides by an imposing wall of red granite, with small round towers, and a gateway on the west and south. Since the mutiny of 1857 a great portion of the palace has been demolished in order to make room for English barracks. The more beautiful buildings in the palace, viz., the entrance hall, the *naubat khánd* or music hall, the *diwán-i-ám* or hall of public audience, the *diwán-i-khás* or hall of private audience, the *rang mahal*, and some pavilions, have been preserved intact. As Mr Fergusson well says, in his *History of Architecture*, however, these buildings "without the courts and corridors connecting them lose all their meaning, and more than half their beauty." South of the fort, in the Dariaganj quarter of the city, is a cantonment for a regiment of native infantry, which, with one wing of a European regiment stationed within the fort, makes up the garrison usually stationed at Delhi. On the opposite side of the river is the fortress of Salimgarh, erected in the 16th century by Salim Shah, and now in ruins. At this point the East India Railway enters the city by a magnificent bridge across the Jumna, passing over Salimghar and through a corner of the fort, to the railway station within the city walls. Thence the line proceeds as the Rajputana State Railway, and, after traversing the city, emerges through the wall on the north-west. In the north-eastern corner of the city, within the walls, and close to the Kashmir gate, are situated the treasury and other public offices. Dariaganj, the fort, the public offices, and the railway form an almost continuous line along the eastern and northern faces of the city,—the angle between them being devoted to public gardens. The area thus occupied amounts to nearly half of that of the entire city; it presents a comparatively open appear ance, and forms a marked contrast to the south-west quarter of the town, which is densely occupied by the shops and dwellings of the native population.

The buildings in the native town are chiefly of brick, well-built and substantial. The smaller streets are narrow and tortuous, and in many cases end in *culs de sac.* On the other hand, no city in India has finer streets than the main thoroughfares of Delhi, ten in number, thoroughly drained, metalled, and lighted. The principal thoroughfare, the Chándni Chauk, or Street of Silver, leads eastwards from the fort to the Lahore gate, and is three-quarters of a mile long by 74 feet broad. Throughout the greater part of its length, a double row of *ním* and *pípál* trees runs down its centre on both sides of a raised path, which has taken the place of the masonry aqueduct that in former days conducted water from the canal into the palace. A little to the south of the Chándni Chauk is the Jámá Masjid, or great mosque, standing out boldly from a small rocky rising ground. Begun by Sháh Jahán in the fourth year of his reign, and completed in the tenth, it still remains one of the finest buildings of its kind in India. Its front court-yard, 450 feet square, and surrounded by a cloister open on both sides, is paved with granite inlaid with marble, and commands a view of the whole city. The mosque itself, a splendid structure forming an oblong 261 feet in length, is approached by a magnificent flight of stone steps. Three domes of white marble rise from its roof, with two tall and graceful minarets at the corners in front. The interior of the mosque is paved throughout with white marble, and the walls and roof are lined with the same material. Two other mosques in Delhi deserve a passing notice,—the Kálá Masjid, or black mosque, so called from the dark colour given to it by time, and supposed to have been built by one of the early Afghan sovereigns, and the mosque of Roshán-ud-daulá. Among the more modern buildings of Delhi may be mentioned the Government College, founded in 1792, the Residency, and the Protestant church, built at a cost £10,000, by Colonel Skinner, an officer well-known in the history of the East India Company. About half-way down the Chándni Chauk is a high clock-tower, with the institute and museum opposite. Behind the Chándni Chauk, to the north, lie the Queen's Gardens; beyond them the "city lines" stretch away as far as the well-known rocky ridge, about a mile outside the town. From the summit of this ridge the view of the station and city is very picturesque. To the west and north-west, considerable suburbs cluster beyond the walls, containing the tombs of the imperial family. That of Humáyun, the second of the Mughul dynasty, is a noble building of granite inlaid with marble. It lies about two miles from the city, amid a large garden of terraces and fountains, the whole surrounded by an embattled wall, with towers and four gateways. In the centre stands a platform about 20 feet high by 200 feet square, supported by cloisters, and ascended by four great flights of granite steps. Above, rises the Mausoleum, also a square, with a great dome of white marble in the centre. About a mile to the westward is another burying-ground, or collection of tombs and small mosques, some of them very beautiful. The most remarkable is perhaps the little chapel in honour of a celebrated Mussulman saint, Nizám-ud-dín, near whose shrine the members of the late imperial family, up to the time of the mutiny, lie buried, each in his own little inclosure, surrounded by very elegant lattice-work of white marble. The Kutab Minár, or Pillar, is situated about nine miles south of the city.

The palaces of the nobles, which formerly gave an air of grandeur to the city, have for the most part disappeared. Their sites are occupied by structures of less pretension, but still of some elegance of architectural design. The city is now amply supplied with water; and much attention has of late been paid to its cleanliness and its sanitary condition generally. The principal local institution was, until 1877, the Delhi College, founded in 1792. It was at first exclusively an Oriental school, supported by the voluntary contributions of Mahometan gentlemen, and managed by a committee of the subscribers. In 1829 an English department was added to it; and in 1855 the institution was placed under the control of the Educational Department. In the mutiny of 1857 the old college was plundered of a very valuable Oriental library, and the building completely destroyed. A new college was founded in 1858, and was affiliated to the university of Calcutta in 1864. The old college attained to great celebrity as an educational institution, and produced many excellent scholars. Under orders of the Government of the Punjab (February 1877), the collegiate staff of teachers was to be withdrawn, in order to concentrate the grant available for higher-class education upon the central and more useful institution at Lahore, the present capital of the province.

The population of Delhi in 1853 was returned at 152,424, viz., 76,390 Hindus and 76,034 Mahometans. In 1868, the census showed that since the Mutiny the Mahometan population had greatly diminished, while on the other hand the Hindus had considerably increased. In that year, the population was ascertained to be made up as follows:—Hindus, 85,087 (males 46,541 and females 38,546); Mahometans, 61,720 (males 32,361 and females 29,359); Sikhs, 357 (males 267 and females 90); other denominations, 7253 (males 4177 and females 3076): total of all religions, 154,417 (males 83,346 and females 71,071). The Delhi municipality, which also embraces the suburbs, contains a population of 184,840. The total income (mainly derived from octroi duties) in 1871–72 amounted to £25,610, or an average of 2s. 9¼d. per head.

History.—From the earliest period of Indian history, Delhi or its immediate neighbourhood has been the site of a capital city. Within the circuit of a very few miles from modern Delhi, city after city has risen upon the ruins of its predecessors, and the debris of ancient buildings is now estimated to cover an area of 45 square miles. The first of these fallen capitals, Indraprástha, is supposed to date from the 15th century B.C., when the Aryan colonists of India were beginning to feel their way down the Jumna. The Sanskrit epic, the *Mahábhárata,* relates how the city was founded by Yudhisthira and his brothers, the five Pándavas. It lay upon the banks of the Jumna, near Humáyun's tomb, about two miles south of the modern city; and the Migambod *ghát,* near the old Calcutta gate of Delhi, is believed to be its one surviving relic. A list of monarchs brings the history of Indraprástha down to the middle of the 1st century B.C., when the name of Dilli, or Delhi, is first met with. By this time the city had spread or been removed some miles to the south, as far as the site now occupied by the Kutab Minár. Another blank of several centuries occurs until the 3d or 4th century A.D. To this latter period belongs the carved iron pillar near Delhi, one of the most curious monuments in India. It consists of a solid shaft of wrought iron, upwards of 16 inches in diameter, and more than 50 feet in length, of which 22 feet are above ground. The pillar bears a Sanskrit inscription in six lines, recording the history of one Rájá Dháva, who "obtained by his own arm an undivided sovereignty on the earth for a long period." Delhi next makes its appearance in history at the time of the foundation of the Tomára or Tuár dynasty by Anang Pal in 736 A.D. This ruler is said to have restored the city, and during his dynasty the capital alternated between Delhi and Kanauj. About 1151 A.D. the Tomára dynasty was overthrown by Visala Deva, the Chohan king of Ajmír, but a marriage of the daughter of the vanquished monarch to the son of the conqueror united the two families. The son of this union, the famous

Prithivi Rája, was the last Hindu ruler of Delhi. In 1191 came the invasion of Muhammad of Ghor. Defeated on this occasion, Muhammad returned two years later, overthrew the Hindus, and captured and put to death Prithivi Rája. Delhi became henceforth the capital of the Mahometan Indian empire, Kutab-ud-dín (the general and slave of Muhammad of Ghor) being left in command. His dynasty is known as that of the slave kings, and it is to them that old Delhi owes its grandest remains, among them Kutab-ud-dín's mosque and pillar, a few miles south of the modern city. The slave dynasty retained the throne till 1288, when it was subverted by Jalál-ud-dín Ghilzái. The most remarkable monarch of this dynasty was Ala-ud-dín, during whose reign Delhi was twice exposed to attack from invading hordes of Mughuls. On the first occasion, Ala-ud-dín defeated them under the walls of his capital; on the second, after encamping for two months in the neighbourhood of the city, they retired without a battle. The house of Ghilzái came to an end in 1321, and was followed by that of Taghlak. Hitherto the Pathán kings had been content with the ancient Hindu capital, altered and adorned to suit their tastes. But one of the first acts of the founder of the new dynasty, Ghiás-ud-dín Taghlak, was to erect a new capital about four miles further to the east, which he called Taghlakábád. The ruins of his fort remain, and the eye can still trace the streets and lanes of the long deserted city. Ghiás-ud-dín was succeeded by his son Muhammad Taghlak, who reigned from 1325 to 1351, and is described by Elphinstone as "one of the most accomplished princes and most furious tyrants that ever adorned or disgraced human nature." Under this monarch the Delhi of the Taghlak dynasty attained its utmost growth. His successor Firoz Sháh Taghlak transferred the capital to a new town which he founded some miles off, on the north of the Kutab, and to which he gave his own name, Firozábád. In 1398, during the reign of Mahmud Taghlak, occurred the Tartar invasion of Timurlane. The king fled to Guzerat, his army was defeated under the walls of Delhi, and the city surrendered. The town, notwithstanding a promise of protection, was plundered and burned; the citizens were massacred. The invaders at last retired, leaving Delhi without a Government, and almost without inhabitants. At length Mahmud Taghlak regained a fragment of his former kingdom, but on his death in 1412 the family became extinct. He was succeeded by the Sayyid dynasty, which held Delhi and a a few miles of surrounding territory till 1444, when it gave way to the house of Lodi, during whose rule the capital was removed to Agra. In 1526 Baber, sixth in descent from Timurlane, invaded India, defeated and killed Ibrahim Lodi at the battle of Pánipat, entered Delhi, was proclaimed emperor, and finally put an end to the Afghan empire. Baber's capital was at Agra, but his son and successor, Humáyun, removed it to Delhi. In 1540 Humayun was defeated and expelled by Sher Sháh, who entirely rebuilt the city, inclosing and fortifying it with a new wall. In his time Delhi extended from where Humayun's tomb now is to near the southern gate of the modern city. In 1555 Humayun, with the assistance of Persia, regained the throne; but he died within six months afterwards, and was succeeded by his son, the illustrious Akbar.

During Akbar's reign and that of his son Jahángír, the capital was either at Agra or at Lahore, and Delhi once more fell into decay. Between 1638 and 1658, however, Sháh Jahán rebuilt it almost in its present form; and his city remains substantially the Delhi of the present time. The imperial palace, the Jama Masjid or great mosque, and the restoration of what is now the western Jumna canal, are the works of Sháh Jahán. The Mughul empire rapidly expanded during the reigns of Akbar and his successors down to Aurungzebe, when it attained its climax. After the death of the latter monarch, in 1707, came the decline. Insurrections and civil wars on the part of the Hindu tributary chiefs, Sikhs and Marhattás, broke out. Aurungzebe's successors became the helpless instruments of conflicting chiefs. His grandson, Jahándar Sháh was, in 1713, deposed and strangled after a reign of one year; and Farrakhsiyyar, the next in succession, met with the same fate in 1719. He was succeeded by Muhammad Sháh, in whose reign the Marhattá forces first made their appearance before the gates of Delhi, in 1736. Three years later the Persian monarch, Nádir Sháh, after defeating the Mughul army at Karnál, entered Delhi in triumph. While engaged in levying a heavy contribution, the Persian troops were attacked by the populace, and many of them were killed. Nádir Sháh, after vainly attempting to stay the tumult, at last gave orders for a general massacre of the inhabitants. For fifty-eight days Nádir Sháh remained in Delhi, and when he left he carried with him a treasure in money amounting, at the lowest computation, to eight or nine millions sterling, besides jewels of inestimable value, and other property to the amount of several millions more.

From this time (1740) the decline of the empire proceeded unchecked and with increased rapidity. In 1771 Sháh Alam, the son of Alamgir II., was nominally raised to the throne by the Marhattás, the real sovereignty resting with the Marhattá chief, Sindhia. An attempt of the puppet emperor to shake himself clear of the Marhattás, in which he was defeated in 1788, led to a permanent Marhattá garrison being stationed at Delhi. From this date, the king remained a cipher in the hands of Sindhia, who treated him with studied neglect, until the 8th September 1803, when Lord Lake overthrew the Marhattás under the walls of Delhi, entered the city, and took the king under the protection of the British. Delhi, once more attacked by a Marhattá army under the Marhattá chief Holkar in 1804, was gallantly defended by Colonel Ochterlony, the British resident, who held out against overwhelming odds for eight days, until relieved by Lord Lake. From this date a new era in the history of Delhi began. A pension of £120,000 per annum was allowed to the king, with exclusive jurisdiction over the palace, and the titular sovereignty as before; but the city, together with the Delhi territory, passed under British administration.

Fifty-three years of quiet prosperity for Delhi were brought to a close by the mutiny of 1857. Its capture by the mutineers, its siege, and its subsequent recapture by the British have been often told, and nothing beyond a short notice is called for here. The outbreak at Meerut occurred on the night of the 10th May 1857. Immediately after the murder of their officers, the rebel soldiery set out for Delhi about 35 miles distant, and on the following morning entered the city, where they were joined by the city mob. Mr Fraser, the commissioner, Mr Hutchinson, the collector, Captain Douglas, the commandant of the palace guards, and the Rev. Mr Jennings, the residency chaplain, were at once murdered, as were also most of the civil and non-official residents whose houses were situated within the city walls. The British troops in cantonments consisted of three regiments of native infantry and a battery of artillery. These cast in their lot with the mutineers, and commenced by killing their officers. The Delhi magazine, then the largest in the north-west of India, was in the charge of Lieutenant Willoughby, with whom were two other officers and six non-commissioned officers. The magazine was attacked by the mutineers, but the little band defended to the last the enormous accumulation of munitions of war stored there, and, when further defence was hopeless, fired the magazine Five of the nine were killed by the explosion, and

Lieutenant Willoughby subsequently died of his injuries; the remaining three succeeded in making their escape. The occupation of Delhi by the rebels was the signal for risings in almost every military station in North-Western India. The revolted soldiery with one accord thronged towards Delhi, and in a short time the city was garrisoned by a rebel army variously estimated at from 50,000 to 70,000 disciplined men. The pensioned king, Bahádur Sháh, was proclaimed emperor; his sons were appointed to various military commands. About fifty Europeans and Eurasians, nearly all females, who had been captured in trying to escape from the town on the day of the outbreak, were confined in a stifling chamber of the palace for fifteen days; they were then brought out and massacred in the court-yard.

The siege which followed forms one of the memorable incidents of the British history of India. On the 8th June, four weeks after the outbreak, Sir H. Barnard, who had succeeded as commander-in-chief on the death of General Anson, routed the mutineers with a handful of Europeans and Sikhs, after a severe action at Badli-ka-Sarái, and encamped upon the ridge that overlooks the city. The force was too weak to capture the city, and he had no siege train or heavy guns. All that could be done was to hold the position till the arrival of reinforcements and of a siege train. During the next three months the little British force on the ridge were rather the besieged than the besiegers. Almost daily sallies, which often turned into pitched battles, were made by the rebels upon the over-worked handful of Europeans, Sikhs, and Gurkhás. A great struggle took place on the centenary of the battle of Plassey, June 23, and another on the 25th August; but on both occasions the mutineers were repulsed with heavy loss. General Barnard died of cholera in July, and was succeeded by General Archdale Wilson. Meanwhile reinforcements and siege artillery gradually arrived, and early in September it was resolved to make the assault. The first of the heavy batteries opened fire on the 8th September, and on the 13th a practicable breach was reported. On the morning of the 14th the assault was delivered, the points of attack being the Kashmír bastion, the water bastion, the Kashmír gate, and the Lahore gate. The assault was thoroughly successful, although the column which was to enter the city by the Lahore gate sustained a temporary check. The whole eastern part of the city was retaken, but at a loss of 66 officers and 1104 men killed or wounded, out of the total strength of 9866. Fighting continued more or less during the next six days, and it was not till the 20th September that the entire city and palace were occupied, and the reconquest of Delhi was complete. During the siege, the British force sustained a loss of 1012 officers and men killed, and 3837 wounded. Among the killed was General John Nicholson, the leader of one of the storming parties, who was shot through the body in the act of leading his men, in the first day's fighting. He lived, however, to learn that the whole city had been recaptured, and died on the 23d September. On the flight of the mutineers, the king and several members of the royal family took refuge at Humáyun's tomb. On receiving a promise that his life would be spared, the last of the house of Timur surrendered to Major Hodson; he was afterwards banished to Rangoon. Delhi, thus reconquered, remained for some months under military authority. Owing to the murder of several European soldiers who strayed from the lines, the native population was expelled the city. Hindus were soon afterwards re-admitted, but for some time Mahometans were rigorously excluded. Delhi was made over to the civil authorities in January 1858, but it was not till 1861 that the civil courts were regularly reopened. The shattered walls of the Kashmír gateway, and the bastions of the northern face of the city, still bear the marks of the cannonade of September 1857. Since that date, Delhi has settled down into a prosperous commercial town, and a great railway centre. The lines which start from it to the north, south, east, and west bring into its bazaars the trade of many districts. But the romance of antiquity still lingers around it, and Delhi was selected for the scene of the Imperial Proclamation on the 1st January 1877.

An excellent chapter on Delhi will be found in Mr Keene's *Fall of the Moghul Empire*. In preparing the above account, the materials have been chiefly drawn from the official *Statistical Account of Delhi District*, together with Sir J. W. Kaye's *History of the Sepoy War*. (W. W. H.)

DELIA, a festival of Apollo held in Delos. It included athletic and musical contests, for which the prize was a branch of the sacred palm. This festival was said to have been established by Theseus when returning from Crete. The Athenians took special interest in maintaining its splendour.

DELILLE, JACQUES (1738–1813), a French poet, was born on the 22d of June 1738, at Aigues-Perse in Auvergne. He was an illegitimate child, and was connected by his mother with the family of the Chancellor de l'Hôpital. With very slender means of support he was educated at the college of Lisieux in Paris, and made such progress in his studies as augured well for his future distinction. When his education was completed, he was forced to accept of a very humble situation as elementary teacher in the college of Beauvais; but this was soon exchanged for the more honourable station of professor of humanity at Amiens. After returning to Paris, where he obtained a professorship at the Collége de la Marche, he speedily acquired a considerable poetical fame, which was greatly increased by the publication (1769) of his translation of the *Georgics* of Virgil, which he had begun at Amiens. Voltaire was greatly struck with the enterprise and the success of Delille; and without any personal acquaintance with the poet he, of his own accord, recommended him and his work to the good graces of the Academy. He was at once elected a member, but was not admitted until 1774 owing to the opposition of Richelieu, who alleged that he was too young. He now aimed at a higher distinction than even a finished translation of the most finished poem in the world could confer upon him; and in the *Jardins*, which he published in 1782, he made good his pretensions as an original poet. Before he had gone far in the composition of his next poem, which was not, indeed, published till after many of his other works, he made a journey to Constantinople in the train of the ambassador M. de Choiseul Gouffier. On his return to Paris he lectured, in his capacity of professor, on the Latin poets, and was attended by a numerous audience, who were delighted, not only with his critical observations, but with his beautiful recitation. Delille continued to advance in fame and fortune, though without hazarding any more publications, till the period of the Revolution, when he was reduced to poverty, and sheltered himself in retreat from the disasters which surrounded him. He quitted Paris, and retired to St Dié, the native place of Madame Delille; and here he completed, in deep solitude, his translation of the *Æneid*, which he had begun many years before. A residence in France, however, soon became very undesirable, and he emigrated first to Basle and then to Glairesse in Switzerland, a charming village on the Lake of Bienne, opposite Rousseau's island of St Pierre. Much delighted with this enchanting country, and with the reception which he met from its inhabitants, he occupied himself constantly in the composition of poetry, and here finished his *Homme des Champs*, and his poem on the *Trois Règnes de la*

Nature. His next place of refuge was in Germany, where he composed his *La Pitié;* and finally, he passed two years in London, chiefly employed in translating *Paradise Lost.* In 1801, finding that he might return safely to Paris, he did so, carrying with him his immense *Poetical Encyclopædia.* He resumed his professorship and his chair at the Academy, but lived in retirement. His later poems were very numerous, but were not fitted to increase his reputation, which rests mainly on his translation of the *Georgics* and his *Jardins.* In his later years he became blind. He died on the 1st May 1813.

Delille left behind him little prose. His preface to the translation of the *Georgics* is an able essay, and contains many excellent hints on the art and difficulties of translation. He wrote the article "La Bruyère" in the *Biographie Universelle.* The following is the list of his poetical works:—*Les Géorgiques de Virgile, traduites en vers français*, Paris, 1769, 1782, 1785, 1809; *Les Jardins*, en quatre chants, 1780, new edition, London, 1800, Paris, 1802; *L'Hommes des Champs, ou les Géorgiques Françaises*, 1800; *Poésies Fugitives*, 1802; *Dithyrambe sur l'Immortalité de l'Ame, suivi du passage du Saint Gothard*,—poëme traduit de l'Anglais de Madame la Duchesse de Devonshire, 1802; *La Pitié*,—poëme, en quatre chants, London and Paris, 1803; *L'Enéide de Virgile, traduite en vers français*, 1805; *L'Imagination*, poëme en huit chants, 1806; *Les Trois Règnes de la Nature*, 1809; *La Conversation*, 1812. A collection given under the title of *Poésies Diverses*, 1801, was disavowed by Delille.

DELIRIUM, a temporary disorder of the mind generally occurring in connection with some form of bodily disease. It may vary in intensity from slight and occasional wandering of the mind and incoherence of expression, to fixed delusions and violent maniacal excitement, and again it may be associated with more or less of coma or insensibility (see MENTAL DISEASES). Delirium is apt to occur in most diseases of an acute nature, such as fevers or inflammatory affections, in injuries affecting the brain, in blood diseases, in conditions of exhaustion, and as the result of the action of certain specific poisons, such as opium, Indian hemp, belladonna, chloroform, and alcohol. The form of delirium which is due to the action of the last-named substance is one of great importance from its comparative frequency, and is well known by the name of Delirium Tremens.

Delirium Tremens is one of a train of symptoms of what is termed in medical nomenclature acute alcoholism, or recent excessive indulgence in alcohol. It must, however, be observed that this disorder, although arising in this manner, rarely comes on as the result of a single debauch in a person unaccustomed to the abuse of stimulants, but generally occurs in cases where the nervous system has been already subjected for a length of time to the poisonous action of alcohol, so that the complaint might be more properly regarded as acute supervening on chronic alcoholism. It is equally to be borne in mind that many habitual drunkards never suffer from delirium tremens.

It was long supposed, and is indeed still believed by some, that delirium tremens only comes on when the supply of alcohol has been suddenly cut off; but this view is now generally rejected, and there is abundant evidence to show that the attack comes on while the patient is still continuing to drink. Even in those cases where several days have elapsed between the cessation from drinking and the seizure, it will be found that in the interval the premonitory symptoms of delirium tremens have shown themselves, one of which is aversion to drink as well as food—the attack being in most instances preceded by marked derangement of the digestive functions. Occasionally the attack is precipitated in persons predisposed to it by the occurrence of some acute disease, such as pneumonia, by accidents, such as burns, [illegible], by severe mental strain, and by the deprivation of food, even where the supply of alcohol is less than would have been likely to produce it otherwise. Where, on the other hand, the quantity of alcohol taken has been very large the attack is sometimes ushered in by fits of an epileptiform character. Males are much more frequently the subjects of delirium tremens than females.

One of the earliest indications of the approaching attack of delirium tremens is sleeplessness, any rest the patient may obtain being troubled by unpleasant or terrifying dreams. During the day there is observed a certain restlessness and irritability of manner, with trembling of the hands and a thick or tremulous articulation. The skin is perspiring, the countenance oppressed-looking and flushed, the pulse rapid and feeble, and there is evidence of considerable bodily prostration. These symptoms increase each day and night for a few days, and then the characteristic delirium is superadded. The patient is in a state of mental confusion, talks incessantly and incoherently, has a distressed and agitated or perplexed appearance, and a vague notion that he is pursued by some one seeking to injure him. His delusions are usually of transient character, but he is constantly troubled with visual hallucinations in the form of disagreeable animals or insects which he imagines he sees all about him. He looks suspiciously around him, turns over his pillows, and ransacks his bedclothes for some fancied object he supposes to be concealed there. There is constant restlessness, a common form of delusion being that he is not in his own house, but imprisoned in some apartment from which he is anxious to escape to return home. In these circumstances he is ever wishing to get out of bed and out of doors, and, although in general he may be persuaded to return to bed, he is soon desiring to get up again. The trembling of the muscles from which the name of the disease is derived is a prominent but not invariable symptom. It is most marked in the muscles of the hands and arms and in the tongue. The character of the delirium is seldom wild or noisy, but is much more commonly a combination of busy restlessness and indefinite fear. When spoken to the patient can answer correctly enough, but immediately thereafter relapses into his former condition of incoherence. Occasionally maniacal symptoms develop themselves, the patient becoming dangerously violent, and the case thus assuming a much graver aspect than one of simple delirium tremens.

In most cases the symptoms undergo abatement in from three to six days, the cessation of the attack being marked by the occurrence of sound sleep, from which the patient awakes in his right mind, although in a state of great physical prostration, and in great measure if not entirely oblivious of his condition during his illness.

Although generally the termination of an attack of delirium tremens is in recovery, it occasionally proves fatal by the supervention of coma and convulsions, or acute mania, or by exhaustion, more especially when any acute bodily disease is associated with the attack. In certain instances delirium tremens is but the beginning of serious and permanent impairment of intellect, as is not unfrequently observed in confirmed drunkards who have suffered from frequent attacks of this disease.

The treatment of delirium tremens has given rise to much discussion among medical men, and the result has been that more rational views now prevail on the subject than formerly. This change is doubtless in great measure to be ascribed to the clearer ideas respecting the real nature and true cause of the malady which extensive and accurate observation has afforded. The theory once so widely accepted, that delirium tremens was the result of the too sudden breaking off from indulgence in alcohol, led to its treatment by regular and often large doses of stimulants, a practice fraught with mischievous results, since however much the delirium appeared to be thus calmed for the time, the continuous supply of the poison which was the original source of the disease inflicted serious damage upon the brain, and led in many instances to the subsequent development of insanity. The former system of prescribing large doses of opium, with the view of procuring sleep at all hazards, was no less pernicious; and there is reason to fear that not a few cases of delirium tremens have ended in fatal coma from what was in reality opium poisoning. In addition to these methods of treatment, mechanical restraint of the patient was the common practice.

The views of the disease which now prevail, recognizing the delirium as the effect at once of the poisonous action of alcohol upon the brain and of the want of food, encourage reliance to be placed for its cure upon the entire withdrawal, in most instances, of stimulants, and the liberal administration of light nutriment, in addition to quietness and gentle but firm control, without mechanical restraint. In mild attacks this is frequently all that is required. In more severe cases, where there is great restlessness, sedatives have to be resorted to, and many substances have been recommended for the purpose. Opiates administered in small quantity, and preferably by hypodermic injection, are undoubtedly of value; and chloral, either alone or in conjunction with bromide of potassium, often answers even better. Such remedies, however, should be administered with great caution, and only under medical supervision.

Stimulants may be called for where the delirium assumes the low or adynamic form, and the patient tends to sink from exhaustion, or when the attack is complicated with some other disease. Such cases are, however, in the highest degree exceptional, and do not affect the general principle of treatment already referred to, which inculcates the entire withdrawal of stimulants in the treatment of ordinary attacks of delirium tremens. (J. O. A.)

DELITZSCH, a town of Prussia, in the province of Saxony, at the head of a district in the department of Merseburg, situated on the Lober, an affluent of the Mulde, 13 miles north of Leipsic at a railway junction. Its public buildings comprise an old castle of the 14th century now used as a female penitentiary, one Roman Catholic and three Protestant churches, a normal college (*Schullehrerseminar*) established in 1873, and several other educational institutions. Besides *Kuhschwanz*, a peculiar kind of beer, it manufactures tobacco, cigars, shoes, and hosiery; and coal-mining is carried on in the neighbourhood. Originally a settlement of the Sorbian Wends, and in the 12th century part of the possessions of the bishops of Merseburg, Delitzsch ultimately passed to the Sachsen-Merseburg family, and on their extinction in 1738 was incorporated with Electoral Saxony. Ehrenberg, the famous naturalist, was born in the town in 1795. Population in 1875, 8235.

DELOLME, Jean Louis (1740–1806), jurist and constitutional writer, was born at Geneva in 1740. He studied for the bar, and had entered on the profession of an advocate in his native town when he was obliged to emigrate on account of the publication of a pamphlet entitled *Examen de trois parts de droit*, which gave offence to the authorities of the town. He found an asylum in England, where he lived for several years on the meagre and precarious income derived from occasional contributions to various journals. He maintained an honourable independence, however, until 1775, when he found himself compelled to accept aid from a charitable society to enable him to return home. He died at Sewen, a village in the canton of Schwytz, on the 16th July 1806. During his exile Delolme made a careful study of the English constitution, the results of which he published in his *La Constitution de l'Angleterre* (Amsterdam, 1771), of which an enlarged and improved edition in English appeared in 1772, and was several times reprinted. The work excited much interest as the production of a foreigner, and as containing many acute observations on the causes of the excellence of the English constitution as compared with that of other countries. It is, however, wanting in breadth of view, being written before the period when constitutional questions were treated in a philosophical manner. Several editions were published after the author's death, the latest being in 1853 by MacGregor. Delolme also wrote *A Parallel between the English Government and the former Government of Sweden* (1772), *A History of the Flagellants* (1782), based upon a work of Boileau's, *An Essay on the Union of Scotland and England* (1787), and one or two smaller works.

DELOS, now *Mikra Dili*, or Little Delos, to distinguish it from *Megali Dili*, or Great Delos, an island in the Ægean, the smallest but most famous of the Cyclades, and, according to the ancient belief, the spot round which the group arranged itself in a nearly circular form. It is a rugged mass of granite, about 12 square miles in extent, in 37° 23′ N. lat. and 25° 17′ E. long., about half a mile to the east of Megali Dili, or Rheneia, and two miles to the west of Myconos. Towards the centre it rises to its greatest height of 350 feet in the steep and rocky peak of Mount Cynthus, which, though overtopped by several eminences in the neighbouring islands, is very conspicuous from the surrounding sea. It is now completely destitute of trees; but it abounds with brushwood of lentisk and cistus, and here and there affords a patch of corn-land to the occasional sower from Myconos. Of the many traditions that were current among the ancient Greeks regarding the origin of Delos—or, as they sometimes named it, Asteria, Ortygia, Chlamydia, or Pyrpile—the most popular describes it as struck from the bed of the sea by a dint of Neptune's trident, and drifting devious through the Ægean till moored by Jupiter as a refuge for his persecuted Latona. It was soon after flooded with the birth-radiance of Apollo and Diana, and became for ever sacred to these twin deities of light. The island first appears in history as an Ionian colony and the seat of a great Ionic festival to which the Athenians, among the rest, were accustomed annually to despatch a Θεωρίς, or sacred ship, with a number of Deliasts, Θεωροί, or sacred delegates. In the 6th century B.C. the influence of the Delian Apollo was at its height; Polycrates of Samos dedicated the neighbouring island of Rheneia to his service, and Pisistratus of Athens caused all the area within sight of the temple to be cleared of the tombs by which its sanctity was impaired. About a hundred years afterwards, in the sixth year of the Peloponnesian war (426 B.C.), the Athenians instituted a more elaborate lustration, caused every tomb to be removed from the island, and established a law that ever after any one whose condition seemed to threaten its pollution by either birth or death should be at once conveyed from its shores. And even this was not accounted sufficient; for, in 422, they expelled all its secular inhabitants. After the overthrow of Corinth, in 146 B.C., the commercial element which had in all probability been present from the first in the religious gatherings, came prominently forward, and Delos became the central mart of the Ægean. In the Mithridatic war it was laid waste by Menophanes, the general of the Bithynian king; and it never recovered its former prosperity, though it is said that, under the Roman empire, 10,000 slaves were sometimes put up for sale in a single day. Hadrian attempted to found a city which was to bear the proud name of New Athens; but, when visited by Pausanias towards the close of the same century, the whole island was almost depopulated. It is now absolutely without a permanent inhabitant, though during the summer months a few shepherds cross over with their flocks from Myconos or Rheneia. As a religious centre it is replaced by Tenos and as a commercial centre by the flourishing port of Syra. Besides the site of the chief settlement or city, the following are the spots of antiquarian interest which can still be identified:—the temple of Apollo, a splendid building of the Doric order which, in the words of Mr Tozer, now forms "a confused heap of white marble fragments, columns, bases, and entablatures, lying indiscriminately together;" the portico erected by Philip of Macedon; the base (within the temple area) of the colossal statue dedicated to the Delian Apollo by the people of Naxos; a theatre of Parian marble on the slope of Mount Cynthus; a temple to Isis, further up the hill, which probably explains the myth of the connection between the brook Inopus and the Nile; the so-called "treasury" of Delos; an Ionic temple on the summit; and the circular tank or lake which supplied the water for the religious rites. The ordinary buildings on the island were constructed of native granite, but marble was imported for the nobler edifices, which were destined to serve as so many quarries to the mediæval builders of Constantinople and Venice.

See Leake, *Northern Greece;* Sallier, "Histoire de l'Isle de Délos," in *Mémoires de l'Acad. des Inscrip.;* Schwenck, *Deliacorum*, part i. 1825; Tozer, "Delos and Rheneia," in *Academy*, 1875; Lebègne, *Recherches sur Délos*, Paris, 1876.

DE LOUTHERBOURG, PHILIP JAMES (1740–1812), an artist of remarkably versatile ability and interesting personality. He was born at Strasburg, 31st October 1740, where his father, the representative of a noble Polish family, practised miniature painting in a semi-amateur manner; but he spent the greater part of his life in London, where he was naturalized, and exerted a considerable influence on the scenery of the English stage, as well as on the artists of the following generation, Turner, Martin, &c.

Young De Loutherbourg was intended for the Lutheran ministry, and was educated at the university of Strasburg. As the calling, however, was foreign to his nature, he insisted on being a painter, and placed himself under Vanloo in Paris. The result was the immediate and precocious development of extraordinary powers. Besides this triumph, and independently of it, he became a figure in the fashionable society of that day, and the friend of such men as Diderot, who had just then mainly contributed to make Gesner celebrated. He was elected into the French Academy below the age required by the law of the institution, and painted landscapes, sea-storms, battles, all of which had a celebrity above those of the specialists then working in Paris. By temperament whatever was extraordinary and sensational was attractive to him, and the *bizarre* appeared in all he did. His *début* was made by the exhibition of twelve pictures, including Storm at Sunset, Night, Morning after Rain; and when he painted common things, as a group of asses, he gave the picture such a fantastic title as—Father and Mother, Little Fanfan, Aunt and Uncle à la Bretagne, Cousin Germain, and the Perruquier of all the Family. In the next stage of his life we find him travelling in Switzerland, Germany, and Italy, distinguishing himself as much by mechanic inventions as by painting. One of these, constructed at his native city, was the wonder of the day, showing quite new effects produced in a model theatre. The exhibition of lights behind canvas representing the moon and stars, the illusory appearance of running water produced by clear blue sheets of metal and gauze, with loose threads of silver, and so on, were his devices. Charles Blanc says one of these curious models, called "Le Séraphin," still existed in the Palais Royal at the date of publication of his work, *École Française*. Having repaired to London, De Loutherbourg was employed by Garrick, who offered him £500 a year to apply his mechanisms to Drury Lane, and to superintend the scene-painting, which he did with complete success, making a new era in the adjuncts of the stage. Garrick's own piece, the *Christmas Tale*, and the pantomime, 1781-2, introduced the novelties to the public, and the delight not only of the masses, but of Reynolds and the artists, was unbounded. The green trees gradually became russet, the moon rose and lit the edges of passing clouds, and all the world was captivated by effects we now take little notice of. A still greater triumph awaited him on his opening an entertainment he called the "Eidophusicon," which showed the rise, progress, and result of a storm at sea—that which destroyed the great Indiaman, the "Halsewell,"—and the Fallen Angels raising the Palace of Pandemonium. De Loutherbourg has been called the inventor of the panorama, but this honour does not belong to him, although it first appeared about the same time as the eidophusicon. The first panorama was painted and exhibited by Barker the elder.

All this mechanism did not in the least prevent De Loutherbourg from painting. Lord Howe's Victory off Ushant, 1794, and other large naval pictures, were commissioned for Greenwich Hospital Gallery, where they still remain. His grandest work, the Destruction of the Armada, is one of the finest sea-fights ever realized on canvas. He painted also the Great Fire of London, and several historical works, one of these being the Attack of the Combined Armies on Valenciennes, 1793. He was made R.A., in addition to other distinctions, in 1781, shortly after which date we find an entirely new mental impulse taking possession of him. He joined Balsamo, Comte de Cagliostro, and travelled about with this extraordinary person,—happily leaving him, however, before the priests in Rome condemned him to death. We do not hear that Mesmer had attracted De Loutherbourg, or that the Revolution carried him away, nor do we find an exact record of his connection with Cagliostro; but there exists a pamphlet published in 1789, *A List of a few Cures performed by Mr and Mrs De Loutherbourg without Medicine*, which relates some very remarkable examples of such cures. Cagliostro had led him to seek the philosopher's stone, but his success was frustrated by a female relative breaking in on his nocturnal experiments and destroying the crucible at the very moment of projection. He died 11th March 1812. His publications are few,—some sets of etchings, and *English Scenery*, 1805. His colour is hot and brown, which has injured his fame as a painter.

DELPHI, Δελφοί, a town of ancient Greece in the territory of Phocis, famous as the seat of the most important temple and oracle of Apollo. It was situated about six miles inland from the shores of the Corinthian Gulf, in a rugged and romantic glen, closed on the N. by the steep wall-like under-cliffs of Mount Parnassus known as the Phædriades, or Shining Rocks, on the E. and W. by two minor ridges or spurs, and on the S. by the irregular heights of Mount Cirphis. Between the two mountains the Pleistus flowed from east to west, and opposite the town received the brooklet of the Castalian fountain, which rose in a deep gorge in the centre of the Parnassian cliff. The site of the ancient town is now occupied by the village of Castri, and the natural features of the scene have been somewhat altered by the earthquake of 1870; but the main points of interest can still be distinguished.

The principal building of Delphi was the temple of Apollo, which stood immediately under the shelter of the northern cliff. It appears to have been of the Doric order outside, and of the Ionic within. The front was built of Parian marble, and the sculptural decorations were extremely rich. One pediment was adorned with representations of Latona, Diana, Apollo, and the Setting Sun, and the other with Dionysus and the Thyiades; the eastern architrave was hung with gilded shields presented by the Athenians from the spoils of Marathon, and the western with similar trophies taken by the Ætolians from the Gauls; while among the subjects of the metopes are mentioned Hercules slaying the Lernean Hydra, Bellerophon and the Chimæra, Zeus and Mimas, Pallas and Enceladus, and Dionysus and a Giant. In the *pronaos* were inscribed the maxims of the Seven Sages of Greece; in the *cella* was the sacred hearth with a perpetual fire and the ὀμφαλός, or navel-stone, which was supposed to mark the centre of the world; and in the *adytum* was the sacred tripod and the subterranean chamber from which the vapour of prophecy ascended. Of less important buildings may be mentioned the *Lesche*, or public hall, the walls of which were adorned with the works of Polygnotus and other master-pieces of ancient art; the theatre, where the musical contests connected with the Pythian games were held; the *Stadium*, of which there are still considerable remains; and, in the suburb of the same name, the *Pylæa*, or assembly hall of the Amphictyonic Council. The town was entered from the east by a road from Bœotia known as the Schiste, or Cloven Way, and from the west by the great Crissean road, which was used by the pilgrims who came from the Corinthian Gulf, and by another which stretched north-west to Amphissa. These roads were regarded almost as the property of the temple, and shared in its sacredness; and each Amphictyonic state was bound to keep them in repair within its own boundaries. About seven miles to the north of the town, on the side of Mount Parnassus, was the famous Corycian cave, a large grotto in the limestone rock, which afforded the people of Delphi a refuge during the Persian invasion. It is now called in the district the Sarant' Aulai, or Forty Courts, and is said to be capable of holding 3000 people.

Of the origin of the Delphian oracle nothing is known. One legend told how the prophetic virtues of the site were discovered by a shepherd whose goats began to frisk about under the influence of the subterranean vapour; and another related how Apollo, after he had slain the great serpent Pytho on the spot, boarded a Cretan ship in the neighbouring gulf, and consecrated the crew to his service. It seems almost certain that the place was the seat of a religious establishment previous to its connection with the worship of Apollo; but its whole historic importance—which can hardly be over-estimated—is entirely due to this connection. The first temple of stone was reputed to have been built by the semi-mythical personages Trophonius and Agamedes. It was burned down in 548 B.C., but was soon after replaced by the building which has already been described. The contract for the work was taken by the Athenian family of the Alcmæonids, who were at that time in exile from the tyranny of Hippias. They employed the architect Spintharus, and acquired great credit for the disinterested liberality with which they accomplished their task. The principal facts in the history of Delphi have already been narrated in the article AMPHICTYONY (vol. i. p. 772), where the reader will also find an account of the relation in which the temple stood to the states of Greece. It only remains to tell how the sanctuary and its treasures, which had been miraculously saved from the Persians and the Gauls, were put under contribution by Sulla for the payment of his soldiers; how Nero removed no fewer than 500 brazen images from the sacred precincts; and how Constantine the Great enriched his new city by the sacred tripods, the statues of the Heliconian Muses, the Apollo, and the celebrated Pan dedicated by the Greek cities after the conclusion of the war with the Medes. Julian afterwards sent Oribasius to restore the temple; but the oracle responded to the emperor's enthusiasm with nothing but a wail over the glory that had departed.

See Pausanias for a detailed description of the town in the second century of the Christian era; the *Ion* of Euripides for many interesting descriptions; and among modern works Wilster, *De religione et oraculo Apollinis Delphici*, Copenhagen, 1827; Hullmann, *Würdigung des Delphischen Orakels*, 1837; Götte, *Das Delphische Orakel*, 1839; Curtius, *Anecdota Delphica*, 1843; Schliemann in *Allgemeine Zeitung*, 1874.

DELPHINIA, a festival of Apollo held annually on the 7th of the month Munychion (April) at Athens, where he was styled Delphinios. All that is known of the ceremonies is that a number of girls proceeded to his temple carrying suppliants' branches and seeking to propitiate Apollo, probably as a god having influence on the sea. It was at this time of year that navigation opened again after the storms of winter.

DELTA. See PHYSICAL GEOGRAPHY.

DELUC, JEAN ANDRÉ (1727–1817), geologist and meteorologist, born at Geneva, February 8, 1727, was descended from a family which had emigrated from Lucca and settled at Geneva in the 15th century. His father, François Deluc, was the author of some publications in refutation of Mandeville and other rationalistic writers, which are best known through Rousseau's humorous account of his ennui in reading them; and he gave his son an excellent education, chiefly in mathematics and natural science. On completing it he engaged in commerce, which principally occupied the first forty-six years of his life, without any other interruption than that which was occasioned by some journeys of business into the neighbouring countries, and a few scientific excursions among the Alps. During these, however, he collected by degrees, in conjunction with his brother Guillaume Antoine, a splendid museum of mineralogy and of natural history in general, which was afterwards increased by his nephew André Deluc. He at the same time took a prominent part in politics. In 1768 he was sent to Paris on an embassy to the Duc de Choiseul, whose friendship he succeeded in gaining. In 1770 he was nominated one of the Council of Two Hundred. Three years later unexpected reverses in business made it advisable for him to quit his native town, which he only revisited once for a few days. The change was welcome in so far as it set him entirely free for scientific pursuits, and it was with little regret that he removed to England in 1773. He was made a fellow of the Royal Society in the same year, and received the appointment of reader to Queen Charlotte, which he continued to hold for forty-four years, and which afforded him both leisure and a competent income. In the latter part of his life he obtained leave to make several tours in Switzerland, France, Holland, and Germany. In Germany he passed the six years from 1798 to 1804; and after his return he undertook a geological tour through England. When he was at Göttingen, in the beginning of his German tour, he received the compliment of being appointed honorary professor of geology in that university; but he never entered upon the active duties of a professorship. He was also a correspondent of the Academy of Sciences at Paris, and a member of several other scientific associations.

His favourite studies were geology and meteorology. The situation of his native country had naturally led him to contemplate the peculiarities of the earth's structure, and the properties of the atmosphere, as particularly displayed in mountainous countries, and as subservient to the measurement of heights. He inherited from his father a sincere veneration for the doctrines of Christianity, and a disposition to defend the Mosaic account of the creation against the criticism whose principal weapons were furnished by his favourite science. His royal patroness was most anxious to encourage and promote his labours in this field; and he was generally supposed to have had great success in removing the objections which had been advanced by his antagonists against the comparatively recent formation of the present continents. According to Cuvier, he ranked among the first geologists of his age. His principal geological work, *Lettres physiques et morales sur l'histoire de la terre* (6 vols. 8vo, The Hague, 1778), was dedicated to Queen Charlotte. It dealt with the appearance of mountains and the antiquity of the human race, explained the six days of the Mosaic creation as so many epochs preceding the actual state of the globe, and attributes the deluge to the filling up of cavities supposed to have been left void in the interior of the earth. This attempt to reconcile religion and science, so often since repeated, was ingenious and for a time successful with most minds. The theory of the Mosaic days was maintained in one form or other by several later geologists of high repute, though it is scarcely now thought worth discussion by any to whom that title can justly be applied.

Deluc's original experiments relating to meteorology are more valuable to the natural philosopher than most of his geological work; and he discovered many facts of considerable importance relating to heat and moisture. He noticed the disappearance of heat in the thawing of ice about the same time that Black founded on it his ingenious hypothesis of latent heat. He ascertained that water was more dense about 40° Fahr. than at the temperature of freezing, expanding equally on each side of the maximum; and he was the originator of the theory afterward re-advanced by Dalton, that the quantity of aqueous vapour contained in any space is independent of the presence or density of the air, or of any other elastic fluid; though it appears difficult to reconcile this opinion with some of the experiments of Deluc's great rival, Saussure, a philosopher who, as he very candidly allows, made in many respects more rapid progress in hygrometry than himself. Deluc's comparative experiments on his own hygrometer and on Saussure's show only that both are imperfect; but it may be inferred from them that a mean between the two would in general approach much nearer to the natural scale than either taken separately. It appears also probable that Saussure's is rather less injured by time than Deluc's, which has been found to indicate an increasing amount of mean moisture every year.

Deluc was a man of warm feelings, and of gentle and obliging manners, and his literary and scientific merits, as well as his unremitting attention to the service of the queen, insured her respect and kindness. He saw her daily for many years, and in his last illness, which was long and painful, she showed him repeated marks of benevolent regard. He died at Windsor on the 7th of November 1817.

A brief notice of his more important works, in addition to that mentioned above, will give a clear idea of the nature and range of his scientific activity. His *Recherches sur les modifications de l'Atmosphère* (2 vols. 4to, Geneva, 1772; 4 vols. 8vo, Par. 1784), contains many accurate and ingenious experiments upon moisture, evaporation, and the indications of hygrometers and thermometers, applied to the barometer employed in determining heights. In the *Phil. Trans.*, 1773, appeared his account of a new hygrometer, which resembled a mercurial thermometer, with an ivory bulb, which expanded by moisture, and caused the mercury to descend. The first correct rules ever published for measuring heights by the barometer were those he gave in the *Phil. Trans.*, 1771, p. 158. His *Lettres sur l'Histoire physique de la Terre* (8vo, Par. 1798) were addressed to Professor Blumenbach. The substance had already appeared in the *Journal de Physique*, for 1790, 1791, and 1793. The volume contains an essay written for a prize at Haarlem in 1791, but without success, on the existence of a General Principle of Morality. It also gives an interesting account of some conversations of the author with Voltaire and Rousseau. Deluc was an ardent admirer of Bacon, on whose writings he published two works,—*Bacon tel qu'il est* (8vo, Berlin, 1800), shewing the bad faith of the French translator, who had omitted many passages favourable to revealed religion, and *Précis de la Philosophie de Bacon* (2 vols. 8vo, Paris, 1802), giving an interesting view of the progress of natural science. *Lettres sur le Christianisme* (Berlin and Hanover, 1801, 1803) was a controversial correspondence with Dr Teller of Berlin in regard to the Mosaic cosmogony. His *Traité élémentaire de Géologie* (8vo, Paris, 1809, also in English, by Delafite, the same year), was principally intended as a refutation of the Vulcanian system of Hutton and Playfair, who deduced the changes of the earth's structure from the operation of fire, and attributed a higher antiquity to the present state of the continents than is required in the Neptunian system adopted by Deluc after Dolomieu. He sent to the Royal Society, in 1809, a long paper on separating the chemical from the electrical effect of the pile, with a description of the electric column and aerial electroscope, in which he advanced opinions so little in unison with the latest discoveries of the day, that the council deemed it inexpedient to admit them into the *Transactions*. He had, indeed, on other occasions shown somewhat too much scepticism in the rejection of new facts; and he had never been convinced even of Cavendish's all-important discovery of the composition of water. The paper was afterwards published in Nicholson's *Journal* (xxvi.), and the dry column described in it was constructed by various experimental philosophers. Many other of his papers on subjects kindred to those already mentioned are to be found in the *Transactions* and in the *Philosophical Magazine*. See *Philosophical Magazine*, Novemb 1817.

DELUGE, a submersion of the world, related by variou nations as having taken place in a primitive age, and i which all, or nearly all, living beings are said to hav perished. By this definition we exclude all partial flood and also the theory which would account for deluge-stori as exaggerations of traditions of local inundations. Upo low level of culture, as Von Hahr has shown, the memo of the most striking events is hardly preserved ev for a few generations. It is best therefore to regard [illegible] story of the deluge as a subdivision of the primitive m cosmogony. The problem with which he had to deal [illegible] a complicated one,—given the eternity of matter to acco for the origin of the world. The best solution which [illegible] sented itself (and that only to the shrewder races) wa represent creation as having taken place repeatedly, [illegible] the world as having passed through a series of demolit and reconstructions. (See COSMOGONY). This expl the confusion between the creation and the deluge not by various travellers, *e.g.*, among the Iroquois and [illegible] Santals—a confusion, however, which is only apparent, [illegible] the deluge is, when thoroughly realized, practically a se creation. Thus Manui the hero of the Indian flood-st was, by permission of Brahma, the creator of the pr human race. Noah is called by Arabic writers “[illegible] second Adam,” and Maui might with as good a righ [illegible] called the Noah as the Adam of New Zealand. We, in [illegible] adult age of the world, have renounced those myth forms of expression, but we still retain much of the fe which prompted them. The wonder of creation is eve us constantly renewed in spring; to primitive man it [illegible] renewed in a special sense in each of the great world-cy of mythology. We may lay it down, then, as a cano the outset, that the various deluge-stories must be vie in combination, and explained on a common principle. [illegible] the same time we must be careful not to confound diffe “deposits” of tradition, and must regard primarily [illegible] earliest and most original forms of myths. As in the [illegible] of the cosmogonies, a few typical specimens will be al can here be described.

I. Among the Semitic races the seniority belongs t Babylonians. Till lately, the only version of their [illegible] known to us was that of Berosus (Müller, *Fragment* 501), who relates that the god Kronos appeare Xisuthrus, tenth king of Babylon [*cf.* Noah, tenth patr in a dream, and warned him of the coming deluge. [illegible] details remind us a good deal of the biblical narrativ cept that Xisuthrus is also accompanied by a steersman by his near friends. Even the thrice repeated lettin of the birds is mentioned. At last the ship (as it is called) grounded "on a certain mountain," where Xisuthrus erected an altar and sacrificed; after which both he and his companions disappeared [*cf.* the "translation" of Enoch]. The duration of the deluge is not stated, and its cause is left to be inferred from the special commendation of Xisuthrus for his piety. Berosus has evidently drawn from cuneiform sources, but those sources have not yet been discovered. Our most valuable authority for the Babylonian deluge-story is the portion of the 11th lay of the great mythological epic, discovered by Mr George Smith. It came from the library of King Assurbanipal, and dates from about 660 B.C., but the Accadian original from which it was translated may well (says the cautious Assyriologue, Dr Schrader) have been composed between 1000 and 2000 B.C., while the myths themselves will of course be much older. The hero of the deluge bears the name of Tam-zi ("the sun of life," *cf.* Tammuz), for so, with Mr Sayce, the signs should most probably be read. He is called the son of Ubara-tutu, an Accadian name meaning "the splendour of sunset" (Lenormant, Sayce). This version of the story differs in several respects from that of Berosus. The deity who warns Tamzi is Hea (god of knowledge and of the waters), who orders him to build a ship, and to put into it his household and his wealth and the beasts of the field. All this is related by Tamzi to the (solar) hero "Izdubar." He tells how he coated the ship within and without with bitumen (*cf.* Gen. vi. 14), how he intrusted all to a "seaman," how Samas, the sun-god, and other gods (Hea is not now mentioned) sent rain, and how the rain-flood "destroyed all life from the face of the earth." (Why the deluge was sent is a little uncertain, owing to the mutilated condition of the tablets.) On the seventh day there was a calm, and the ship stranded on the mountain Nizir. Another seven days, and Tamzi let out "a dove" (?), then a swallow, both of which returned, and a raven which did not return. Then he left the ship and made a libation; Mr Smith's "altar" is uncertain. Finally, Hea intercedes with Bel that there be no second deluge, after which "Tamzi and his wife, and the people, were carried away to be like the gods." Such are the leading authentic features of the Babylonian narrative, or rather narratives, for its inconsistencies and repetitions are such as to force upon us the hypothesis that two documents originally existed, which have been welded together by an editor.

II. The Jewish narrative, like the Babylonian, has been thought to consist of two documents, an Elohistic and a Yahvistic, which have been connected by an editor. They appear to differ in various details,—*e.g.*, in the duration of the flood (the Elohist extends it to a whole solar year), and in the description of the introduction of the animals into the ark (the Elohist alludes to the legal distinction between clean and unclean). But they have certainly the same origin, for they entirely coincide in the main outlines (*e.g.*, in ascribing the flood to the depravity of mankind, in the mode of Noah's rescue, and in the promise that the catastrophe should not recur), and even in not a few expressions, among which are the names for the flood and the ark. They agree, further, in this important point, that some expressions point to a universal deluge, others to one which only affected a level inland region like that of Mesopotamia. We naturally ask, therefore, are the former involuntary exaggerations? or "survivals" of a primeval myth? Both views are held by respectable critics; but the latter is more favoured by analogy and by the remarkable parallelism between both the biblical narratives (especially the Yahvistic) and the Babylonian.

These two—the Babylonian and the Jewish—are the only fully developed deluge-stories told by any of the Semitic nations. In what relation, then, do they stand to each other? Was the Babylonian borrowed from the Jewish (or from some earlier form of the story, of which the Jewish is an abridgment), or *vice versa?* On the one hand, the Babylonian story as a whole perhaps produces an impression of greater originality than the Jewish; for (not to mention other points) in the former the order in which the birds are sent out is much more natural. On the other, the "ark," or rather "chest," of the Jewish narrative sounds more archaic than the "ship" of the Babylonian. The word for "deluge" in Genesis is also evidently archaic, as appears from the facts that it only occurs once again (Psalm xxix. 3), and that the editor in Genesis needed to explain it by the word "water" (Gen. vi. 17, "the flood, viz., water"). It is possible, therefore, to hold that the Jewish story is a distinct offshoot of a common Semitic tradition. Bolder critics will maintain that the account in Genesis must be taken in connection with the other narratives which can be explained by, and are therefore possibly dependent upon, parallel Babylonian narratives. (See BABYLONIA and COSMOGONY). They will urge that "chest" may have been substituted for "ship" to avoid an anachronism, mankind in Noah's time not having perhaps reached the sea; and that the archaic word for "deluge" does not prove the antiquity of a developed deluge-story; also that there are traces in Genesis (see iv. 17–24, vi. 1–3) of another and presumably native Hebrew view, according to which the moral degeneration of man was explained without a deluge. The question is a large one, but may perhaps be reduced to this—Can the Yahvistic narrative in Genesis be safely broken up into several? There is some evidence, both internal and (see the prophetic references to Genesis) external to show that it can, but it would be premature in this place to pronounce whether the evidence is sufficient. It will hardly be possible, however, to derive the Yahvistic flood-story from Babylonia, and not the Elohistic, as has been suggested; for though the former is nearest to the Babylonian story (*e.g.*, it ascribes the flood entirely to a rain-storm, whereas the latter introduces also the waters below the firmament), the latter agrees with it in all essential points, and even in the minor point of the bitumen. Let it be remarked in passing that, even if the material of the biblical narratives be taken from the Babylonian, the former have received a peculiar and original stamp, both by their monotheism and by the moral significance so emphatically given to the catastrophe, just as by the addition of the lovely story of the rainbow the Elohist has produced a conclusion far superior, artistically speaking, to that of his Babylonian predecessor.

III. Another of the great countries by which the Israelites might have been influenced was Egypt; but in this, even more than in a former, case a direct Egyptian influence is out of the question. The deluge-story was entirely unknown in the Nile-valley. It is commonly said, but erroneously, that this was owing to the absence of *sudden* catastrophes of the nature of an inundation. But if the terrestrial deluge is really (see below) only a transformation of the celestial, there is no reason why the story should not have grown up in Egypt, if the imagination of its inhabitants had invited such a development; for the germs of the deluge-story certainly existed in Egypt. The *Book of the Dead* constantly refers to the sun-god, Ra, as voyaging in a boat on the celestial ocean; and a story in an inscription of the archaic period (Seti I.) embodies a conception altogether analogous to that of the narrative in Genesis. According to this myth—which is described by M. Naville—Ra, the creator, being disgusted with the insolence of mankind, resolves to exterminate them. The massacre causes human blood to flow to Heliopolis, upon which Ra repents, and swears with uplifted hand not to destroy mankind again.

IV. The deluge-story exists in several forms in Indian literature. It does not, however, appear to be a genuine Aryan myth, for there is no clear reference to it in the *Rig Veda*. The *'Satapatha Brahmana*, where it first occurs, was written (Weber) not long before the Christian era. Another version, in which the lacunæ of the earlier one are filled up, is given in the *Mahâbhârata*, but this poem, though it existed in part before the Christian era, did not assume its present form till long afterwards. A third version, still more decidedly Indian in character, is given in the *Bhâgavata Purâna*, but the earliest possible date of this work is the 12th century A.D., which deprives its account of the deluge of all claim to originality. It is worth noticing, however, that it agrees with the biblical narrative in two subordinate points—the introduction of animals into the ark or box, and the interval of seven days between the warning and its fulfilment. The principal feature of the oldest flood-story is the part assigned to the fish, which warns Manu of the deluge, and ultimately saves him by drawing his ship to a northern mountain. The selection of the fish (which is clearly divine) is so out of character with the most genuine portions of Aryan mythology that it proves the foreign origin of the Indian narrative, perhaps we may even say, the Semitic origin. Not that the fish-god is peculiar to the Semitic world, but that he is un-Indian, and can so easily have reached India from a Semitic source. If the Indians sent apes, sandal-wood, and purple (both names and things) to Assyria, why should not the flood-story have been sent in exchange with other products of Mesopotamia? True, the fish does not appear in the present form of the Mesopotamian story, but it probably did appear in the original myth, for among the titles of the god who warned Tamzi (see above) are "fish of the abyss," "beneficent, saviour fish." We admit the strong local colouring of the Indian story, which deceived even Weber (but not Burnouf), but this is exactly paralleled by the Hottentot colouring (Bleek) of several South African stories of Christian origin. Whether the early Iranians had a flood-story is perhaps uncertain, since the *Avesta* gives but little information respecting mythology, and it has not come down to us complete. But none was known to the Persians about 1000 A.D. (al-Biruni).

V. In Greece there appear to have been several floating flood-stories, which in time became localized and attached to the names of heroes. They all represent the flood as destroying all but a few men, and even in their least original forms they still contain many peculiar features which can only have arisen from an independent exercise of the mythopœic faculty. The most famous of them is that of Deucalion, and of this the earliest and simplest form is in Pindar (*Olymp.* ix. 64), who identifies the mountain where Deucalion and Pyrrha landed, and where without marriage they "gat themselves a race from stones" (not a late Greek etymological fancy, for it recurs among American tribes), with Mount Parnassus. Apollodorus (about 100 B.C.) has infused fresh life into this story, perhaps from a Semitic source; he extends the range of the flood to "most parts of Greece," and states that Deucalion (like Noah and Xisuthrus) offered sacrifice after the flood. Lucian (160 A.D.), laughing in his sleeve, gives a still more conspicuously Semitic account (*De dea Syria*, c. 12, 13), in which we hear for the first time of a "great box," and of "children and wives," "swine and horses, and the kinds of lions and serpents, &c., all by pairs," as entering the ark. It was a confusion of this kind which led to the charge of Celsus, that the *authors* of the books of Moses had "put a new stamp on the story of Deucalion;"—reason sufficient for confining ourselves as much as possible to primitive versions of mythic narratives.

VI. America, which abounds in cosmogonies, is naturally not deficient in deluge-stories. Mr Catlin says, that "amongst 120 different tribes that he has visited in North and South and Central America, not a tribe exists that has not related to him distinct or vague traditions of such a calamity, in which one, or three, or eight persons were saved above the waters on the top of a high mountain" (*Okeepa*, p. 2). It is extremely difficult to tell how far Christian influences may have determined the form of these stories. When, for instance, we find such a peculiar point as the sending out of the birds to see whether the flood had abated, we are disinclined to build any argument on the circumstance. We do find, it is true, strange points of agreement between the Greek and the Polynesian myths, yet considering the vast extent of Christian missionary activity in America, we are bound to special caution.

In addition to this, the American deluge-stories convey an impression that they have lost much of their original accuracy. The Polynesian myths, on the contrary, are still almost as transparent as ever. But we shall have occasion to speak of these presently.

Instead of proceeding further with a detailed examination of myths, let us briefly touch on three general questions arising out of the subject. (1.) Is the deluge-story found among all nations? The Egyptians and (probably) the Persians had none; and it is doubtful whether it exists in non-Mahometan Africa. Probably, too, large deductions should be made from the myths of savage tribes, on the ground of Christian influences, even when related by well-informed travellers. (2.) Was the deluge-story propagated from a single centre? An affirmative answer has often been returned, *e.g.*, by Hugh Miller, *Testimony of the Rocks*, p. 282. It is impossible, however, to justify this from the mere fact of the superficial resemblance of the different narratives. These may be accounted for (on the ordinary historical theory of the flood-story) from the similarity of the circumstances of partial floods everywhere; or (if we regard it as based on a nature-myth) from the fact that, by a fundamental law of psychology, the universal wonders of nature everywhere receive (within certain limits) a similar mythic expression. Granting, therefore, in its fullest extent the non-originality of many deluge-stories, we maintain that the evidence points on the whole to the existence of several independent centres from which these stories were propagated. (3.) Restricting ourselves to the consideration of the non-biblical forms of the narrative, we now inquire, what was their original significance? A provisional answer, it is true, has already been given, but one which does not account for the peculiar details of the most original deluge-stories. The only explanation of these which has yet been offered is derived from comparative mythology. It is agreed by mythologists that the exclusive subjects of really primitive traditional stories are frequently recurring natural phenomena. Consequently the elementary mythic descriptions or pictures of these phenomena were the most available material when, at a later period of mental growth, the attempt was made to construct a rude cosmogonical theory. Those "demolitions and reconstructions" of the world of which we spoke at the outset could only be narrated on the basis of these earliest, simplest, most primitive myths. What then was the natural phenomenon which, in a mythic dress, formed the substratum of the deluge-stories? Not merely an annually recurring river-flood, such as those of the Euphrates, for the phenomenal basis of myths must be something strikingly wonderful as well as frequently recurring. This the inundations of a river are not, neither could they be regarded as calamities. But the phenomena of the sky and especially of the sun are, to the primitive man, daily miracles. Hence the theory (Schirren and Gerland) that the deluge of the stories we are considering has been transferred from the sky to the earth, that it is in a word an ether-myth. This mode of explanation is not set aside by referring to quasi-historical details in the deluge-stories. For as soon as the mythic stage begins to be outgrown, rationalism appears. In this transitional period (commonly of long duration) the old nature-myths are modified. 'Some mythic elements remain, others are turned into prose. The attempt to explain the existence of the world on the basis of an ether-myth was an early symptom of the denaturalization of which we have spoken. At a still more advanced stage of the process, the flood often ceased to be universal, and was restricted to the home of those who related the story, or to the region from which they supposed themselves to have migrated. At last the shrewder intellects (*e.g.*, among the Tahitians and some of the American Indians) even clutched at phenomena like those of fossil-shells found on hills to prove the literal truth of their deluge.

The most plausible arguments for the celestial deluge-theory are derived from the Polynesian mythology. In the flood-story of Raiatea, given by Ellis (*Polynesian Researches*, ii. 58–9), the flood rose "as the sun approached the horizon;" and the island where the fisherman found refuge is called Toa-marama, *i.e.*, moon-tree (tree reaching up into the moon), which reminds us of the Teutonic world-ash-tree, Yggdrasil, and the mythic mountain of the Babylonians (see below) and other nations. At Hawaii the flood was even called "flood of the moon," and at New Zealand "flood of day's eye" (*i.e.*, the sun). Schirren explains all these myths as pictures of sunset, just as he derives the cosmogonies from myths of sunrise. But most of them are more easily explained, with Gerland, as ether-myths. The sun and moon were imagined as peaks emerging out of a flood—sometimes as canoes, sometimes as a man and his wife—the sole survivors (except perhaps the stars, their children) from the inundation. There was, however, no fixity of meaning. The stars were sometimes regarded as ships; but so too were the clouds, "Tangaloa's ships." The Babylonian story, as represented in the 11th Izdubar lay, suggests a similar theory. The names of the hero and his father mean "the (morning) sun" and "the evening-glow." The flood is a rain-flood, and the "father of the rain" (*cf.* Job xxxviii. 28) is the celestial ocean, which in the original myth must have been itself the deluge; and the "ship" is like that in which the Egyptian sun-god voyages in the sea of ether. The mountain on which the survivors come to land was originally (as in Polynesia) the great mythic mountain (*cf.* the Accadian *kharsak kurra*, "mountain of the east"), which joins the sky to the earth, and serves as an axis to the celestial vault. Traces of an ether-myth have also been discovered in the Indian deluge-story, as indeed is only natural if it be based on the Babylonian. In the *Mahâbhârata*, the divine fish has a horn issuing from his head, which reminds us of other horned deities, whose solar origin is admitted, such as Baal and the Berosian Oannes. (See also Schirren, *Wanderungen der Neuseeländer*, p. 193, who is, however, too fanciful to be a safe guide).

Two points should be mentioned in conclusion. (1.) Though a moral significance is by no means always attributed to the deluge, it is more common than might have been expected. In the *Mahâbhârata* (line 12,774) it takes the form not of retribution but of purification, which agrees with Plato's view (*Timæus*, p. 22). We find it in America among the Quichés, but this may perhaps be a later addition, as is certainly the case in one of the forms of the Tahitian myth (Waitz, vi. 271). And (2.) the deluge is not always the last of those periodical destructions alluded to at the beginning of this article. A few races suppose the last link in the series to be a great fire which swept every living thing from the earth, except (as some American Indians say) a few who took refuge in a deep cave. This last feature, however, has a slightly suspicious resemblance to Gen. xix. 29, and, to say the least, the conflagration is not a myth of such proved antiquity and spontaneity as the deluge. It is too suggestive of artificial systems like that of the Stoics.

Authorities.—Babylonian story: Mr George Smith's papers in *Transactions of Biblical Archæological Soc.*, ii. 213–34, iii. 530–96: Lenormant. *Les premières civilisations*, tom. ii. 3–146; Delitzsch. *George Smith's Chald. Genesis*, 318–21. Biblical narrative: Commentaries on Genesis, by Knobel and Dillmann, Delitzsch, Kalisch; Ewald, *Biblische Jahrbücher*. vii. 1–23. Indian: Muir *Sanskrit Texts*, i. 196–201; Burnouf, *Bhâgavata Purâna*, ii. 191, Weber, *Indische Studien*. i. 161–232; Turnour. *Mahavanso*, i. 131 (referring to a local flood in its present form). Greek: Preller, *Aufsätze*, 165–7. Vogul (Altaic): Hunfalvy, summarized by L. Adam, *Revue de philologie*, i. 9–14. Lap: Friis, *Lappisk Mythologie*, reviewed in *Lit. Centralblatt*, March 1, 1873. America: Bancroft, *Native Races*, &c., v. 12–16; Schoolcraft, *Notes on the Iroquois*, p. 358. Polynesia: Schirren, *Wanderungen der Neuseeländer* (Riga, 1856); Gerland, Waitz's *Anthropologie*, vi. 296–73. General works: Pictet, *Origines Indo-europeennes*, ii. 620, &c.; Lüken, *Die Traditionen des Menschengeschlechts* (Munster, 1869). (T.K.C.)

DEMADES, an orator and demagogue who flourished in the 4th century B.C. He was originally of humble position, and was employed at one time as a common sailor, but he rose partly by his eloquence and partly by his unscrupulous character to a prominent position at Athens. He espoused the cause of Philip in the war against Olynthus, and was thus brought into bitter and life-long enmity with Demosthenes. Notwithstanding his sympathies he fought against the Macedonians in the battle of Chæronea, after which he was instrumental in procuring a treaty of peace between Macedon and Athens through his influence with Philip. He continued to be a favourite of Alexander, and, prompted by a bribe, saved Demosthenes and the other obnoxious Athenian orators from his vengeance. His conduct in supporting the Macedonian cause, yet receiving any bribes that were offered by the opposite party, caused him to be heavily fined more than once; and his flagrant disregard of law and honour ultimately led the citizens of Athens to pass upon him the sentence of atimia. This was recalled in 322 on the approach of Antipater, to whom the citizens sent Demades and Phocion as ambassadors. Before setting out he persuaded the citizens to pass sentence of death upon Demosthenes and his followers who had fled from Athens. Harpalus and Antipater both succeeded in bribing him to their cause; but the latter, discovering while Demades was with him on another embassy in 318 a correspondence which showed him to have been at the same time in communication with Perdiccas, put him to death along with his son Demeas. A fragment of a speech bearing his name is to be found in the *Oratores Attici*, but its genuineness is exceedingly doubtful.

DEMERARA, or DEMERARY, a river and county of British Guiana. See GUIANA.

DEMETER. See CERES, vol. v. p. 345.

DEMETRIA, a festival in honour of Demeter, held at seed-time, and lasting ten days. It appears to be the same as that generally called *Thesmophoria*.

DEMETRIUS I., king of Macedonia, a son of Antigonus and Stratonice, surnamed *Poliorcetes*, or the Besieger. Both father and son play an important part in the vicissitudes of the Macedonian empire after the death of Alexander the Great. Demetrius grew up to be a beautiful young man, reared in the fulness of the new Macedonian life, devoted to Greek science, and inspired with an eager ambition to rival the ancient heroes of his race. He united with these lofty aims a love of Oriental magnificence which formed at once the chief splendour and the principal weakness of his Macedonian prototype. At the age of twenty-two he was sent by his father against Ptolemy, who had invaded Syria; he was totally defeated near Gaza, but soon repaired his loss by a victory which he obtained over Cilles, in the neighbourhood of Myus. After conducting an expedition against Babylon, and engaging in several campaigns against Ptolemy on the coasts of Cilicia and Cyprus, Demetrius sailed with a fleet of 250 ships to Athens, and restored the Athenians to liberty, by freeing them from the power of Cassander and Ptolemy, and expelling the garrison which had been stationed there under Demetrius Phalereus. After this successful expedition he besieged and took Munychia, and defeated Cassander at Thermopylæ. His reception at Athens, after these victories, was attended with the greatest servility; and under the title of "The Preserver" the Athenians worshipped him as a tutelary deity. In the next campaign he defeated Menelaus by land, and completely destroyed the naval power of Ptolemy. After an interval spent at Cyprus, he endeavoured to punish the Rhodians for having deserted his cause; and his ingenuity in devising new instruments of siege, in his unsuccessful attempt to reduce the capital, gained him the appellation of Poliorcetes. He returned a second time to Greece as liberator. But traces of Oriental despotism showed themselves, and the licentiousness and extravagance of Demetrius made the Athenians regret the government of Cassander. He soon, however, roused the jealousy of the successors of Alexander; and Seleucus, Cassander, and Lysimachus united to destroy Antigonus and his son. The hostile armies met at Ipsus, 301 B.C. Antigonus was killed in the battle, and Demetrius, after sustaining a severe loss, retired to Ephesus. This reverse of fortune raised him many enemies; and the Athenians, who had lately adored him as a god, refused even to admit him into their city. But he soon afterwards ravaged the territory of Lysimachus, and effected a reconciliation with Seleucus, to whom he gave his daughter Stratonice in marriage. Athens was at this time oppressed by the tyranny of Cassander; but Demetrius, after a protracted blockade, gained possession of the city, and pardoned the inhabitants their former misconduct. The loss of his possessions in Asia recalled him from Greece; and he established himself on the throne of Macedonia by the murder of Alexander, the son of Cassander, 294 B.C. But here he was continually threatened by Pyrrhus, who took advantage of his occasional absence to ravage the defenceless part of his kingdom; and at length the combined forces of Pyrrhus, Ptolemy, and Lysimachus, assisted by the disaffected among his own subjects, obliged him to leave Macedonia after he had sat on the throne for seven years. He passed into Asia, and attacked some of the provinces of Lysimachus with varying success; but famine and pestilence destroyed the greater part of his army, and he retired to the court of Seleucus to seek support and assistance. Here he met with a kind reception; but, nevertheless, hostilities soon broke out; and after he had gained some advantages over his son-in-law, Demetrius was totally forsaken by his troops in the field of battle, and became an easy prey to the enemy. His son Antigonus offered Seleucus all his possessions, and even his person, in order to procure his father's liberty; but all proved unavailing, and Demetrius died in the fifty-fourth year of his age, after a confinement of three years, 284 B.C. His remains were given to Antigonus, honoured with a splendid funeral at Corinth, and thence conveyed to Demetrias. His posterity remained in possession of the Macedonian throne till the time of Perseus, who was conquered by the Romans. See MACEDONIA.

DEMETRIUS II., king of Macedonia, son of Antigonus Gonnatas, who was a son of Demetrius Poliorcetes. He occupied the throne for ten years, but little is known of him. His reign coincided with the period of the Achæan league, which was then strengthened by an alliance with the Œtolians. Only a fragment of Macedonian power remained in Greece; a few towns in the Peloponnesus were held by Macedonian governors. Demetrius offered a slight opposition to the two patriotic leagues, and wrested Bœotia from the Œtolians. At his death in 232 B.C. Antigonus Doson undertook the government for his son Philip, who was under age.

DEMETRIUS I., named *Soter*, king of Syria, was sent to Rome as a hostage during the reign of Antiochus Epiphanes. He contrived, however, to escape from confinement, partly through the assistance of the historian Polybius, and established himself on the throne. He acquired his surname from the Babylonians on account of the expulsion of Heraclides from their capital, and is famous in Jewish history for his contests with the Maccabees. Demetrius fell in battle against the usurper Balas, about 150 B.C.

DEMETRIUS II., surnamed *Nicator*, the son of the preceding, lived in exile during the usurpation of Balas. At the head of a body of Cretan mercenaries, and with the assistance of Ptolemy Philometer, whose daughter he married, he regained the throne of Syria. His cruelties and vices, however, ultimately procured his expulsion from the kingdom; and Antiochus, the infant son of Balas, was proclaimed king in his stead. After ten years' captivity in Parthia he succeeded in establishing himself once more upon the throne; but his wife Cleopatra, indignant at his subsequent marriage with a daughter of the Parthian king, procured his assassination (126 B.C.).

DEMETRIUS III., called *Eucerus*, also Euergetes and Philometor, king of Syria, was the fourth son of Antiochus Grypus. By the assistance of Ptolemy Lathyrus he recovered part of his Syrian dominions from Antiochus Eusebes, and held his court at Damascus. He assisted the Jews against Alexander Jannæus. In attempting to dethrone his brother Philip he was defeated by the Arabs and Parthians and taken prisoner. He was kept in confinement in Parthia by king Mithridates until his death.

DEMETRIUS, an orator and Peripatetic philosopher, surnamed *Phalereus*, from the Attic demos of Phalerus, where he was born. He was the son of a poor man named Phanostratus, and was a scholar of Theophrastus. He governed the city of Athens as representative of Cassander for ten years, and 360 statues were erected to his honour. On the restoration of the old democracy by Demetrius Poliorcetes, he was obliged to leave the city, and escaped into Egypt, where he was protected by Ptolemy Lagus. This king, it is said, having asked his advice concerning the succession of his children to the throne, was advised by Demetrius to leave his crown to the children of Eurydice, rather than to Philadelphus, the son of Berenice. This displeased Philadelphus so much, that when his father died he banished Demetrius; and the unfortunate exile put an end to his life by the poison of an asp (282 B.C.) Demetrius composed more works in prose and verse than any other Peripatetic of his time. His writings treated principally of poetry, history, politics, rhetoric, and accounts of embassies; but none are extant. The treatise περὶ ἑρμηνείας, which is often ascribed to him, is probably the work of a later Alexandrian of the same name.

DEMETRIUS, a Cynic philosopher, was a disciple of Apollonius of Tyana, to whom he afterwards proved an able antagonist. He spent the greater part of his life at Corinth, and first became famous during the reign of Caligula. The emperor, wishing to gain the philosopher to his interest, sent him a large present; but Demetrius refused it with indignation, and said, "If Caligula wishes to bribe me, let him send me his crown." Vespasian was displeased with his insolence, and banished him; but the Cynic derided the punishment, and bitterly inveighed against the emperor. He lived to an advanced age; and Seneca observes that nature had brought him forth to show mankind how an exalted genius may live uncorrupted by the vices of the world.

DEMETRIUS, or Dmitri. See Russia.

DEMIDOFF, a Russian family honourably distinguished in various ways in the history of their country.

I. Demidoff, Nikita, the founder of the family, originally a blacksmith serf, was born about 1665. His skill in the manufacture of arms won him notoriety and fortune; and an iron foundry which he established for the Government became another source of wealth to him. Peter the Great, with whom he was a favourite, ennobled him in 1720.

II. Demidoff, Akinfij, son of the former, greatly increased the wealth he had inherited by the discovery (along with his son) of gold, silver, and copper mines, which they worked with permission of the Government for their own profit. He died about 1740.

III. Demidoff, Paul Grigorjevich, nephew of the preceding (born in 1738, died in 1821), was a great traveller, and devoted himself to scientific studies, the prosecution of which among his countrymen he encouraged by the establishment of professorships, lyceums, and museums. He founded the annual prize of 5000 roubles, adjudged by the Academy of Sciences to the author of the most valuable contribution to Russian literature.

IV. Demidoff, Nikolay Nikititch, nephew of the preceding, was born in 1774, and died at Florence in 1828. During the invasion of Napoleon he commanded a regiment equipped at his own expense. He also greatly increased his resources as a capitalist by successful mining operations, and like his uncle used his wealth to multiply facilities for the scientific culture of the inhabitants of Moscow. The erection of four bridges at St Petersburg was mainly due to his liberality. In 1830 a collection of his pamphlets, *Opuscules d'Économie Politique et Privée*, was published at Paris.

V. Demidoff, Anatoli, son of Paul, was born at Florence in 1812, and died at Paris in 1870. Educated in France, his life was chiefly spent in that country and in Italy. After his marriage with the daughter of Jerome Bonaparte, he lost for a time the favour of the Emperor Nicholas on account of provision having been made in the contract for the education of his children as Roman Catholics. During the Crimean war he was a member of the Russian diplomatic staff at Vienna. Like other members of his house, he expended large sums to promote education and to ameliorate the physical condition of his fellows. His munificence as a patron of art gave him European celebrity. The superb work, *Voyage dans la Russie méridionale et la Crimée, par la Hongrie, la Valachie, et la Moldavie*, was conjointly written and illustrated by him and the French scholars and artists who accompanied him. It has been translated into several European languages; the English version was published in 1853.

DEMISE. See Lease.

DEMMIN, a town of Prussia, at the head of a circle in the government of Stettin, is situated on the Peene, which in the immediate neighbourhood receives the Trebel and the Tollense, 72 miles W.N.W. of Stettin. It has manufactures of woollen cloths, linens, hats, and hosiery, besides breweries, distilleries, and tanneries, and an active trade in corn and timber. Demmin is a town of Slavonian origin and of considerable antiquity, and was a place of importance in the time of Charlemagne. It was besieged by a German army in 1148, and captured by Henry the Lion in 1164. In the Thirty Years' War it was the object of frequent conflicts, and even after the Peace of Westphalia was taken and retaken in the contest between the electoral prince and the Swedes. It passed to Prussia in 1720, and its fortifications were destroyed in 1759. In 1807 several engagements took place in the vicinity between the French and Russians. Population in 1875, 9856.

DEMOCRITUS, one of the founders of the Atomic philosophy, was born at Abdera, a Thracian colony, the inhabitants of which were notorious for their stupidity. Nearly all the information that we possess concerning his life consists of traditions of very doubtful authenticity. He was a contemporary of Socrates; but the date of his birth has been fixed variously from 494 to 460 B.C. His father (who is called by no less than three names) was a man of such wealth as to be able to entertain Xerxes and his army on their return home after the battle of Salamis. On coming into his inheritance, Democritus, there is good reason to believe, devoted several years to travel. He visited the East, and is supposed with great probability to have spent a considerable time in Egypt. The intensity of his thinking was figured by the ancients in the story that he put out his eyes in order that he might not be diverted from his meditations. But of the way in which he obtained the vast learning for which he was famed, and of his intercourse with other philosophers, even with Leucippus, we have no certain information. According to one very doubtful tradition, he was so honoured in his native city that, his patrimony being all spent, the incredible sum of 500 talents was voted him by his fellow-citizens, together with the honour of a public funeral; but, according to another tradition, his countrymen regarded him as a lunatic and sent for Hippocrates to cure him. All are agreed that he lived to a great age; Diodorus Siculus states that he was ninety at his death, and others assert that he was nearly twenty years older. He left, according to Diogenes Laertius, no less that 72 works, treating of almost every subject studied in his time, and written in Ionic Greek, in a style which for poetic beauty Cicero deemed worthy of comparison with that of Plato. But of all these works nothing has come down to us beyond small fragments.

The cosmical theory propounded by Democritus—which in part at least was adopted from the doctrines of Leucippus—is of all the materialistic explanations of the universe put forth by the Greeks the one which has held the most permanent place in philosophical thought. All that exists is vacuum and atoms. The atoms are the ultimate material of all things, including spirit. They are uncaused, and have existed from eternity. They are invisible, but extended, heavy, and impenetrable. They vary in shape; though whether Democritus held that they vary also in density is debated. And, lastly, these atoms are in motion. This motion, like the atoms themselves, Democritus held to be eternal. According to some, he explained it as caused by the downward fall of the heavier atoms through the lighter, by which means a lateral whirling motion was produced; but whether this explanation was given by Democritus is extremely doubtful. Another principle also is said by some to have been used by Democritus to explain the concurrence of the atoms in certain ways, viz., that there is an innate necessity by which similar atoms come together. However this may be, he did declare that by the motion of the atoms the world was produced with all that it contains.

Soul and fire are of one nature; the atoms of which they consist are small, smooth, and round; and it is by inhaling and exhaling such atoms that life is maintained. It follows that the soul perishes with, and in the same sense as, the body. There is, in fact, no distinction made between the principle of life and the higher mental faculties.

The Atomic theory of perception was as follows. From every object εἴδωλα (or images) of the object are continually being given off in all directions; these enter the organs of sense, and give rise to sensation. The rest of the theory remarkably anticipates certain famous modern theories of perception (1) by its reduction of all sensation, on the objective side, to touch, and (2) by the distinction which it involves between the qualities of extension and resistance, which are said to be the only qualities that really belong to objects of sense, and the other (or secondary) qualities, which are said to exist only through the action of the organs of sense modifying the εἴδωλα.

Sensation, Democritus appears to have taught, is our only source or faculty of knowledge; indeed his first principles admit the existence of no mental faculty of a nature distinct from sensation. He was classed among the most extreme sceptics of antiquity, and tradition attributes to him such sayings as—"There is nothing true, and if there is, we do not know it," "We know nothing, not even if there is anything to know."

The system of Democritus was altogether anti-theological. He denied that the creation of the world was in any way due to reason. He also rejected all the popular mythology; but, according to one account, he taught that, as men were produced by the motion of the atoms, so was produced a race of grander beings, of similar form, and, though longer-lived, still mortal, who influence human affairs, some benevolently, some malevolently, and who appear to men in dreams.

The moral system of Democritus is strikingly like the negative side of the system of Epicurus. The *summum bonum* is placed in an even tranquillity of mind. Fear, and too strong desire, and all that is likely to bring sorrow or even care, are to be avoided, as, for example, notably marriage, to which Democritus cherished the strongest objections. This habit of mind Democritus is said to have himself so well attained that the merry spirit with which he regarded all that happened earned him the title of "the laughing philosopher." Another version, however, asserts that he received the name on account of the scorn which he poured on human ignorance and weakness.

See Mullach, *Democriti Abderitae operum fragmenta*, Berlin, 1843; Franck, "Fragments qui subsistent de Démocrite," in the *Mémoires de la Société royale de Nancy*, 1836; Ritter, *Geschichte der Philosophie*, vol. i.; Brandis, *Rhein. Museum*, vol. iii., and *Geschichte der Griech und Röm Philosophie*, vol. i.; H. Stephanus, *Poesis Philos.*; Burchardt, *Commentaria critica de Democriti de sensibus philosophia*, 1830; and *Fragmente der Moral des Democrit*.

DEMOIVRE, Abraham (1667–1754), an eminent mathematician, was born at Vitry, in Champagne, May 26, 1667 He belonged to a French Protestant family, and was compelled to take refuge in England at the revocation of the Edict of Nantes, in 1685. Having laid the foundation of his mathematical studies in France, he prosecuted them further in London, where he read public lectures on natural philosophy for his support. The *Principia Mathematica* of Newton, which chance threw in his way, made him comprehend at once how little he had advanced in the science which he professed; but he pursued his studies with vigour, and soon became distinguished among first-rate mathematicians. He was among the intimate personal friends of Newton, and his eminence and abilities secured his admission into the Royal Society of London, and afterwards into the Academies of Berlin and Paris. His merit was so well known and acknowledged by the Royal Society that they judged him a fit person to decide the famous contest between Newton and Leibnitz. The life of Demoivre was quiet and uneventful. His old age was spent in obscure poverty, his friends and associates having nearly all passed away before him. He died at London, November 27, 1754. The *Philosophical Transactions* of London contain several of his papers, all of them interesting. He also published some excellent works, such as *Miscellanea Analytica de Seriebus et Quadraturis*, 1730, in 4to. This then contained some elegant and valuable improvements on then existing methods, which have themselves, however, long been superseded. But he has been more generally known by his *Doctrine of Chances, or Method of Calculating the Probabilities of Events at Play*. This work was first printed in 1618, in 4to, and dedicated to Sir Isaac Newton. It was reprinted in 1738, with great alterations and improvements; and a third edition was afterwards published with additions. He also published a *Treatise on Annuities*, 1724, in 8vo, dedicated to Lord Carpenter.

DEMONOLOGY. The word *demon* (or *dæmon*) is the Greek δαίμων, the etymology of which is too doubtful to explain its original signification (see Pott, *Etym. Forsch.*, ii. 1, 947). Setting aside the use of the word in the general sense of deity (as in *Iliad*, i. 222), we find it employed in classic Greek literature with the more specific meaning under which it becomes an important term in the science of religion. Among the most instructive passages are those in which Hesiod tells how the men of the golden race became after death demons, guardians or watchers over mortals (Hesiod, *Op. et Dies*, 109, &c.; see Welcker, *Griech. Götterlehre*, vol. i. p. 731), and where the doctrines of Empedocles, Plato, and other philosophers are set forth, showing how the demons came to be defined as good and evil beings intermediate between gods and men (Plutarch, *De Defect. Orac.*, *De Isid. et Osir.*, *De Vitand. Ær. Alien.*, &c.; Plato, *Symposion*, 28; Diog. Laert., *Vit. Pythag.*; see Grote, *History of Greece*, vol. i. chaps. 2, 17). The religions of the world usually recognize an order of spiritual beings, below the rank of governing deities, and distinguished from nature-spirits such as elves and nymphs by being especially concerned with living men and their affairs; these beings, very often themselves considered to be ghosts of dead men, are the demons. The earlier and wider notion of demons includes the whole class of such spirits, who may be friendly or hostile, good or evil, persecuting and tormenting man or acting as his protecting and informing patron-spirits; while, when they are mediators or ministers of some higher deity, they will be, like the god himself, kindly or ill-disposed. A narrower definition was introduced in Christian theology, where the ideas of a good demon and guardian genius were merged in the general conception of good "angels," while the term demon was appropriated to evil spirits, or "devils." For scientific purposes, it is desirable to use the term in the wider sense. Demonology, the branch of the science of religion which relates to demons, is much obscured in the treatises of old writers by their taking the evidence too exclusively from among civilized nations, and neglecting what is to be learnt from barbarous tribes, whose ideas of demons, being nearer their primitive state, are comparatively clear and comprehensible. When savage notions of the nature and functions of these spirits are taken as the starting-point, the demon appears as only a more or less modified human soul—whether it is still actually considered to be a human ghost, or whether part of the human quality has fallen away, so that only traces are left to show that man's soul furnished the original model. But when such early and natural animistic conceptions were carried on into higher stages of culture, their original use as explaining natural phenomena was gradually superseded by the growth of knowledge, and they came to be maintained as broken-down and confused superstitions, only to be understood by comparison with their earlier forms. Such comparison, however, is facilitated by the primitive demon-ideas cropping up anew even in civilized life, as in the so-called "spirit-manifestations" of the present day. The following details will show the main purposes which the doctrine of demons served in the philosophy of the primitive and savage world, as well as its large contribution to civilized superstition. The authorities, when not mentioned, will mostly be found referred to in Tylor, *Primitive Culture*, chaps. xiv. xv. Other cases are given in Spencer, *Principles of Sociology*, vol. i., and every reader may supplement them with similar instances from the works of travellers and missionaries. Prof. Adolf Bastian's *Der Mensch in der Geschichte* and *Beiträge zur Vergleichenden Psychologie* are of great value to students.

Among races of low culture, the conception of a ghost-soul being made to account for the phenomena of life (see article ANIMISM) readily leads to a corresponding theory of morbid states of body and mind. As the man's proper soul causes the functions of normal life by its presence, while its more or less continued absence induces sleep, trance, and at last death, so the abnormal phenomena of disease have a sufficient explanation at hand in the idea that some other soul or soul-like spirit is acting on or has entered into the patient. Among the cases which most strongly suggest this are—first, such derangements as hysteria, epilepsy, and madness, where the raving and convulsions seem to bystanders like the acts of some other being in possession of the patient's body, and even the patient is apt to think so when he "comes to himself," and, second, internal diseases where severe pain or wasting away may be ascribed to some unseen being wounding or gnawing within. The applicability of demoniacal possession as a theory to explain disease in general is best proved by the fact that it is so often thus applied by savage races. Especially, reasoning out the matter in similar ways, rude tribes in different countries have repeatedly arrived at the conclusion that diseases are caused by the surviving souls or ghosts of the dead, who appear to the living in dreams and visions, thus proving at once their existence after death, and their continued concern with mankind. This notion being once set on foot, it becomes easy to the savage mind to identify the particular spirit, as when the Tasmanian ascribes a gnawing disease to his having unwittingly pronounced the name of a dead man, who thus summoned has crept into his body, and is consuming his liver; or when the sick Zulu believes that some dead ancestor he sees in a dream has caused his ailment, wanting to be propitiated with the sacrifice of an ox; or when the Samoan persuades himself that the ancestral souls, who on occasion reveal themselves by talking through the voices of living members of the family, are the same beings who will take up their abode in the heads or stomachs of living men and cause their illness and death. Here, then, the demon appears in what seems its original character of a human ghost. We may notice in the last example the frequent case of the man's mind being so thoroughly under the belief in a spirit possessing him that he speaks in the person of that spirit, and gives its name; the bearing of this on oracular possession will appear presently. In many, perhaps in most cases, however, the disease-demon is not specially described as a human ghost; for instance, some Malay tribes in their simple theory of diseases are content to say that one kind of demon causes small-pox, another brings on swellings, and so on. The question is whether in such cases the human character has merely dropped away, and this seems likely from the very human fashion in which the demons are communicated with; they are talked to with entreaties or threats, enticed out with offerings of food, or driven away with noises and blows, just as though they were human souls accessible to the same motives as when they were in the body. Thus the savage theory of demoniacal possession has for its natural result the practice of exorcism or banishment of the spirit as the regular means of cure, as where, to select these from hundreds of instances, the Antilles Indians in Columbus's time went through the pretence of pulling the disease off the patient and blowing it away, bidding it begone to the mountain or the sea, or where the Patagonians till lately, believing every sick person to be possessed by an evil demon, drove it away by beating at the bed's head a drum painted with figures of devils.

That such modern savage notions fairly represent the doctrine of disease-possession in the ancient world is proved by the records of the earliest civilized nations. The very charms still exist by which the ancient Egyptians resisted the attacks of the wicked souls who, become demons, entered the bodies of men to torment them with diseases and drive them to furious madness. The doctrine of disease among the ancient Babylonians was that the swarming spirits of the air entered man's body, and it was the exorcist's duty to expel by incantations "the noxious neck-spirit," "the burning spirit of the entrails which devours the man," and to make the piercing pains in the head fly away "like grasshoppers" into the sky. (See *Records of the Past*, vols. i., iii., &c.; Birch's trans. of the Egyptian *Book of the Dead*, see below; Maspero, *Histoire Ancienne des Peuples de l'Orient*, p. 41; Lenormant, *La Magie chez les Chaldéens*, &c.) The transition-stage of the ancient belief in the classical period of Greece and Rome is particularly interesting. The scientific doctrine of medicine was beginning to encroach upon it, but it was still current opinion that a fit was an attack by a demon (ἐπίληψις = "seizure," hence English *epilepsy*), that fury or madness was demoniacal possession (δαιμονάω = to be possessed by an evil spirit, hence English *dæmoniac*, &c.), that madmen were "larvati," *i.e.*, inhabited by ghosts, &c. No record shows the ancient theory more clearly than the New Testament, from the explicit way in which the symptoms of the various affections are described, culminating in the patient declaring the name of his possessing demon, and answering in his person when addressed. The similarity of the symptoms with those which in barbarous countries are still accounted for in the ancient way may be seen from such statements as the following, by a well-known missionary (Rev. J. L. Wilson, *Western Africa*, p. 217):—"Demoniacal possessions are common, and the feats performed by those who are supposed to be under such influence are certainly not unlike those described in the New Testament. Frantic gestures, convulsions, foaming at the mouth, feats of supernatural strength, furious ravings, bodily lacerations, gnashing of teeth, and other things of a similar character, may be witnessed in most of the cases." Among the early Christians the demoniacs or energumens (ἐνεργούμενοι) formed a special class under the control of a clerical order of exorcists, and a mass of evidence drawn from such writers as Cyril, Tertullian, Chrysostom, and Minutius Felix, shows that the symptoms of those possessed were such as modern physicians would class under hysteria, epilepsy, lunacy, &c. (See their works, and refs. in Bingham, *Antiquities of the Christian Church*; Maury, *La Magie et l'Astrologie*, part ii. ch. 2, &c.) Some theologians, while in deference to advanced medical knowledge they abandon the primitive theory of demons causing such diseases in our own time, place themselves in an embarrassing position by maintaining, on the supposed sanction of Scripture, that the same symptoms were really caused by demoniacal possession in the 1st century. A full statement of the arguments on both sides of this once important controversy will be found in earlier editions of the *Encyclopædia Britannica*, but for our times it seems too like a discussion whether the earth was really flat in the ages when it was believed to be so, but became round since astronomers provided a different explanation of the same phenomena. It is more profitable to notice how gradual the change of opinion has been from the doctrine of demon-possession to the scientific theory of disease, and how largely the older view still survives in the world. Not only in savage districts, but in countries whose native civilization is below the European level, such as India and China, the curious observer may still see the exorcist expel the malignant ghost or demon from the patient afflicted with fever, dizziness, frenzy, or any unaccountable ailment. (See Ward, *History of the Hindoos*, vol. i. p. 155, vol ii. p. 183; Roberts, *Oriental Illustrations of the Scriptures*, p. 529; Doolittle, *Social Life of the Chinese*.) The unbroken continuance of the belief in mediæval Europe may be gathered from such works as the excellent treatise by Maury, *La Magie et l'Astrologie dans l'Antiquité et au Moyen Age*, already referred to. Even in the 18th century was published with ecclesiastical approval a regular exorcist's manual, the *Fustis et Flagellum Dæmonum, Auctore R.P.F. Hieronimo Mengo* (1727), which among its curious contents gives instructions how to get the better of those cunning demons who hide in the bodies of men and vex them with diseases, and which are apt when expelled to take refuge in the patient's hair. The gradual shifting of opinion is marked by the attempt to reconcile the older demonology with the newer medicine. This argument, which appears among the early Christian fathers, is worked out most elaborately in that curious museum of demonology, the *Disquisitiones Magicæ* of Martin Delrio, published as late as 1720. While inveighing against those physicians who maintain that all diseases have natural causes, this learned Jesuit admits that men may be dumb, epileptic, or lunatic without being obsessed; but what the demons do is that, finding the disposition of epileptics suitable, they insinuate themselves into them; also they attack lunatics, especially at full moon, when their brains are full of humours, or they introduce diseases by stirring up the black bile, sending blacks into the brain and cells of the nerves, and setting obstructions in the ears and eyes to cause deafness and blindness. Looking at the date of this celebrated work, we cannot wonder that in benighted districts of Europe the old diabolical possession and its accompanying exorcism may still now and then be met with, as in 1861 at Morzine in Savoy.[1] (See A. Constans, *Relation sur une Epidémie d'Hystéro-Démonopathie*, Paris, 1863.) One of the last notable cases of this kind in England was that of George Lukins of Yatton, a knavish epileptic out of whom seven devils were exorcised by seven clergymen, at the Temple Church at Bristol, on June 13, 1788. (See *Encyc. Brit.* 3d to 6th editions, art. "Possession").

The derivation of the ideas of demons from the phantoms seen in dreams has already been instanced where the apparition is that of a dead man, but there are peculiar kinds of demons which are to be considered specially from this point of view. In savage animism, as among the Australians, what we call a *nightmare* is of course recognized as a demon; and though we have long learnt to interpret it subjectively as arising from some action of the sleeper's brain, it is interesting to remember that its name remains proof of the same idea among our ancestors (Anglo-Saxon *mær* = spirit, elf, &c., compare old German *mar* = elf, demon, *nahtmar* = nightmare,—see Grimm, *Deutsche Mythologie*, p. 433). The *vampires*, or drinkers (Old Russian *upir*), well known in Slavonic regions, are a variety of the nightmare, being witch-souls or ghosts who suck the blood of living victims, thus accounting for their becoming pale and bloodless, and falling into decline. (See Grohmann, *Aberglauben aus Böhmen*, p. 24; Ralston, *Songs of the Russian People*, p. 410.) From dreams are avowedly formed the notions of *incubi* and *succubi*, those nocturnal demons who consort with women and men in their sleep. From the apparent distinctness of their evidence, these beings are of course well known in savage demonology, and in connection with them there already arises among uncultured races the idea that children may be engendered between spirits and human mothers. (See Martin, *Mariner's Tonga Islands*, vol. ii. p. 119). For an ancient example of the general belief in this class of demons, no better could be chosen than that of the early Assyrians, whose name for a succubus, *lilit*, evidently gave rise to the Rabbinical tale of Adam's demon-wife *Lilith*. (See Lenormant, *op. cit.* p. 36.) The literature of mediæval sorcery abounds in mentions of this belief, of which the absurd pseudo-philosophical side comes well into view in the chapter of Delrio (lib. ii. quæst. 15), "An sint unquam dæmones incubi et succubæ, et an ex tali congressu proles nasci queat?" But its serious side is shown by the accusation of consorting with such demons being one of the main charges in the infamous bull of Innocent VIII., which brought judicial torture and death upon so many thousands of wretched so-called witches. (See Roskoff, *Geschichte des Teufels*, vol. ii. p. 222.) It further throws light on demonology that the frightful spectres seen in such affections as delirium tremens have of course been interpreted as real demons. It is needless to give instances from among savage tribes, for the connection between such phantoms and the doctrine of demoniacal possession is shown in its most primitive state in modern Europe. In the *Fustis Dæmonum*, p. 42, it is mentioned that demons before entering human bodies are apt to appear in some terrible form or deformity, human or bestial, and while they seem to the patients suddenly to vanish, then they enter into their bodies. By this supposition the disappearance of the phantom and the accompanying illness of the delirious patient are ingeniously accounted for at one stroke.

Though the functions ascribed to demons in savage philosophy are especially connected with disease, they are by no means exclusively so, but the swarming host of spirits pervading the world is called on to account for any events which seem to happen by some unseen but controlling influence. Some cause must lead the wild man to find game one day and come back empty another, to stumble and hurt himself in the dusk, to lose his way and become bewildered in the dark forest, where the cries of animals and other sounds seem to him spirit-voices misleading or mocking him. For all such events requiring explanation savages find personal causes in intervening demons, who are sometimes ghosts, as when an American Indian falling into the fire will say that an angry ancestral spirit pushed him in; or they may be simply spirits of undefined origin, like those whom the Australians regard as lurking everywhere, ready to do harm to the poor black-fellow. To compare this state of thought with that of the classic world, we have but to remember the remark of Hippocrates about the superstitious who believed themselves infested day and night by malicious demons, or the Romans' fear of those harmful ghost-demons the lemures, whom they got rid of by the quaint ceremonies of the annual Lemuralia. How permanent these demon-ideas have been from the infancy of culture, may be well shown by the permanence of the practice of holding at intervals such special ceremonies to expel them. In Siam the people first hunt the demons out of the houses, and then drive them with cannon-shots through the streets till they get them outside the walls into the forest. In Old Calabar they put puppets along the streets leading to the sea, to entice the demons into, and then at dead of night a sudden rush is made by the negroes with whips and torches to drive the spirits down into the sea. Not only do other barbaric regions, such as the South Sea Islands and Peru, furnish similar examples of the expulsion of demons, but it may still be seen among European peasantry. In Sweden, Easter-tide is the season for a general purging of the land from the evil spirits and trolls of the old heathendom; and in many parts of Germany unseen witches are to this day driven out on Walpurgis-night with crack of whip and blast of horn. (See a collection of cases in Bastian and Hartmann, *Zeitschrift für Ethnologie*, 1869, p. 189; also Hylten-Cavallius, *Wärend och Wirdarne*, part i. p. 178). In these cases it is generally unfavourable influences which are considered as due to the demons. But favourable events are even by savages often recognized as due to the intervention of some kindly spirit, and especially to a guardian or patron demon, whose help accounts for what among ourselves is often not much more rationally considered to be "luck." It is often a recognized ancestral soul which from natural affection undertakes this duty, as when a Tasmanian has been known to account for escape from danger by the idea that his father's soul was still watching over him. But it need not be so; and among the American Indians or West Africans, where each man lives in constant imaginary intercourse with his patron-spirit, talking with it, making it offerings, and trusting to its guidance in difficulty and protection from danger, this spirit may be revealed in a dream or vision, and is often connected with some object known as a "medicine" or "fetish," but is seldom identified with any particular ghost. In Greek literature this idea is best exemplified by the lines of Menander on the good demon whom every man has from birth as his guide through the mysteries of life (ap. Clem. Alex., *Stromat.* v.); the most popularly known example is the so-called "demon" of Socrates, but he himself did not give such personal definiteness to the divine or dæmonic influence (δαιμόνιον) which warned him by what he described as a voice or sign (see Zeller, *Socrates*, ch. 4). The primitive idea of the patron spirit is carried on in the Roman *genius*, whose name (even without the addition of "natalis") indicates that it is born with the person whom it accompanies through life. Its place very closely corresponds to that occupied in modern folklore by the guardian angel. There are districts in France where a peasant meeting another, salutes not only the man, but his "companion," the guardian angel who is supposed to be invisibly at his side.

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[1] The *Times*, in November 1876, contains an account in the casting out of devils by a priest in the Church of the Holy Spirit in Barcelona, during the preceding month. On one occasion the patient, a young woman of seventeen or eighteen, lay on the floor before the altar, writhing in convulsions with distorted features and foaming at the mouth, while the priest carried on a dialogue with the devil, whom he addressed by the name of Rusbel, the fiend's answers being of course spoken by the voice of the frantic girl herself. At last a number of demons were supposed to come out of the patient's body, and such scenes were repeated for days in the presence of many spectators till a riot arose, and the civil authorities intervening put a stop to the whole affair

Among attendant and patron demons, as recognized in the general belief of mankind, a specially important class is formed by the familiar spirits who accompany sorcerers, giving them mysterious knowledge, uttering oracular responses through their voices, enabling them to perform wonderful feats, bringing them treasure or injuring their enemies, and doing other spiritual services for them. From the descriptions of sorcerers among the lower nations, it is at once evident that their supposed intercourse with demons is closely connected with the symptoms of disease-possession. Thus among the Zulus, "the disease which precedes the power to divine" is distinctly hysterical, the patient's morbid sensitiveness and intensely vivid imagination of sights and voices fitting well with his persuasion that he is under the control of some ancestral ghost. So well is this connection recognized among races like the Patagonians and rude tribes of Siberia, that children with an hereditary tendency to epilepsy are brought up to the profession of magicians. Where the sorcerer has not naturally such symptoms of possession by a controlling demon, he is apt to bring them on by violent dancing and beating drums, or by drugs, or to simulate them by mere knavery; which latter is really the most convincing proof that the original notion of the demon of the magician did not arise from imposture, but from actual belief that the morbid excitement, hallucination, and raving consequent on mental disease were caused by spirits other than the man's own soul, in possession of his body. The primitive and savage theory of inspiration by another spirit getting inside the body is most materialistic, and cheating sorcerers accordingly use *ventriloquism* of the original kind, which (as its name implies) is supposed to be caused by the voice of a demon inside the body of the speaker, who really himself talks in a feigned human voice, or in squeaking or whistling tones thought suitable to the thin-bodied spirit-visitor. The familiar spirit may be a human ghost or some other demon, and may either be supposed to enter the man's body or only to come into his presence, which is somewhat the same difference as whether in disease the demon "possesses" or "obsesses" a patient, *i.e.*, controls him from inside or outside. Thus the Greenland *angekok*, or sorcerer, is described as following his profession by the aid of a *torngak*, or familiar spirit (who may be an ancestral ghost), whom he summons by drumming, and with whom he is heard by the bystanders to carry on a conversation within the hut, obtaining information which enables him to advise as to the treatment of the sick, the prospect of good or bad weather, and the other topics of the business of a soothsayer. Passing over the intermediate space which divides the condition of savages from that of mediæval or modern Europeans, we shall find, so far as the doctrine of familiar demons has survived, that it has changed but little in principle. In the witch trials a favourite accusation was that of having a familiar demon. Sir Walter Scott's *Demonology and Witchcraft* contains among others the case of Bessie Dunlop, whose familiar was the ghost of one Thome Reid, killed at the battle of Pinkie (1547), who enabled her to give answers to such as consulted her about the ailments of human beings or cattle, or the recovery of things lost or stolen. This miserable woman, chiefly on her own confession, was as usual "convict and burnt." Here the imagined demon was a human soul; but other spirits thus attended sorcerers and diviners, such as the spirit called Hudhart, who enabled a certain Highland woman to prophesy as to the conspiracy to murder James I. of Scotland. Dissertations on the art of raising demons for the sorcerers' service, and even the actual charms and ceremonies to be used, form a large part of the precepts of magical books. (See Ennemoser, *History of Magic;* Horst, *Zauberbibliothek*, and other works already cited.) Among the latest English books treating seriously of this "black art" is Sibly's *Illustration of the Occult Sciences*, of which a 10th edition, in 4to, bears date London, 1807. The statute of James I. of England enacts that all persons invoking any evil spirit, or consulting, covenanting with, entertaining, employing, feeding, or rewarding any evil spirit, should be guilty of felony, and suffer death. This was not repealed till the reign of George II. Educated public opinion has now risen above this level; but popular credulity is still to be worked upon by much the same means as those employed by savage sorcerers professing intercourse with familiar spirits. At "spiritualistic séances" the convulsive and hysterical symptoms (pretended or real) of the "medium" under the "control" of his "guiding spirit" are much the same as those which may be seen among the Fijians or the hill-tribes of Burmah, while the feigned voice, supposed to indicate that it is some Negro or Irish spirit speaking through the medium's organs, is often a clumsier performance than that of the New Zealand sorceress, producing in thin squeaking tones the voice of a family ghost. Many of the special "manifestations," such as thumping and drumming in the dark, are those usual in the performances of the Siberian shamans, who also, in common with the Greenland angekoks, impose on the bystanders by the miraculous performance of the "rope-trick;" the "planchette-writing," by the guiding hand of a familiar spirit, has long been done by an inferior class of magicians in China. The crowning incident in the English proceedings is the "materialization" of the familiar spirit in a dimly-seen figure which, when a rush is made to seize it, proves to be a doll or the medium himself in drapery.

Returning to the general theory of demonology, two important principles have to be brought together under notice. As the religions of the world become more complexly organized, the various kinds of spirits divide into orders or ranks of a hierarchy; while with the growth of dualism the class of demons further arrange themselves as it were in two opposite camps, under the presiding good and evil deities. The way in which such views may be developed is well seen in Bishop Callaway's *Religion of the Amazulu*, among whom the ancestral ghosts (amatongo) carry on after death their friendly or hostile character, so that in general the ghosts of a man's own family or tribe are friendly demons helping him and fighting on his side, while the ghosts of enemies remain hostile demons. In the religion of Congo, according to Magyar (*Reisen in Süd-Afrika*, 1849–57), the highest deity, Suku-Vakange, takes little interest in mankind, and the real government of the world belongs to the good and bad kilulu,—spirits or demons. When a man dies, according to his circumstances in life he becomes a friend or enemy of the living, and thus passes among the good or bad kilulu. But as there are more bad spirits who torment than good who favour, man's misery would be unbearable did not Suku-Vakange from time to time, enraged at the wickedness of the evil spirits, terrify them with thunder and smite the more obstinate with his bolts; then he returns to rest and leaves the demons to rule again. In the religion of the ancient Egyptians the dualistic system is worked out in the antagonism between the gods of light and the evil powers under the serpent Apap, whose long undulating form may be seen in those portions of the pictorial ritual of the dead which are painted on the mummy-cases. (See Birch's translation of the *Book of the Dead*, in vol. v. of Bunsen, *Egypt's Place in Universal History*.) In the ancient Babylonian system the demons were classified in orders, and the minuteness with which their functions as personal causes of evil are assigned to them is well shown by the following passage from a cuneiform inscription:—"They assail country after country: they make the slave set himself up above his place: they make the son of the house leave his father; they make the young bird fly out of its nest; they make the ox and the lamb run away—the evil demons who set snares" (Lenormant, p. 2[illegible].) In Brahmanism and Buddhism which sprang from it, as well as in the ancient Persian religion, the various orders of spirits who come under the general definition of demons have large place. The latter faith, as represented in the *Zend Avesta*, worked out to its extreme development the doctrines of the good and evil deities, Ahuramazda and Anramainyu (Ormuzd and Ahriman), each with his innumerable armies of spirits or demons, those of light, purity, and goodness being met in endless contention by the legions of darkness who seek to undo all good and
spread foulness and sin around them. This
system exercised strong influence on religion
civilization. The later Jewish or Talmudic
strongly leavened by it, and to it is in great m
the rise of the Manichæan doctrine. The dem
these systems may best be studied as part of th
doctrine, while their relation to the angel
demonology of Christianity belongs to Christian

Though in this short notice only a few illustr
are given as to the belief in demons, the gre
details of the kind in the various religions of
will be found to conform with them both as to
of demons being derived from the idea of the h
and as to their function in primitive philosoph
serve as personal causes of events. The pr
demonology thus form an interesting branch of i
history. But beside this, its names and formulas t
as they have been by the blind reverence of gen
magicians, preserve for the historical student so
relics of antiquity. As a pendant to the already-
Talmudic *Lilith*, the female nocturnal demon
Assyria, may be noticed *Asmodeus*, famous in
novel *Le Diable Boiteux*, who is not only to b
the book of Tobit and the Talmudic legend
Solomon (see Eisenmenger, *Entdecktes Judent*
may be traced back still farther to his real origin
daeva, one of the evil demons of the ancien
religion. The conjurations and formulas f
demons in the curious old book of magic which
name of Doctor Faustus (see reprint in Ho
wonderful medley of scraps from several religio
principal source, beside Christian invocations and
of ritual, is Hebrew, whether biblical or from
Rabbinical books; Aziel, Faust's own famili
because he can do his errands swift as thought, is
the fallen angel Azael of the Talmud, to whom
goes every day for wisdom; Michael, Raphael,
Gabriel guard the four quarters of a mystic de
while the names of Satan and Pluto, Ariel an
Petrus and Adonis, figure among incantations in
and good high Dutch, and a mass of words
gibberish beyond comprehension. The study o
logy also brings into view the tendency of hostil
to degrade into evil demons the deities of a r
The ancient schism between two branches of t
race, which separated the Zarathustrian religion
Vedic religion, now represented by Brahmanism,
better marked than in the fact that the *devas*,
gods of the Hindoo, have become the *devs* or ev
of the Persian. So the evil beings recognize
folk-lore of Christendom are many of them th
spirits, lares, and other deities of the earlier he
not discarded as imaginary, but lowered from
estate and good repute to swell the crowd
demons. (

DE MORGAN, AUGUSTUS (1806–1871), one o
eminent mathematicians and logicians of his time
June 1806, at Madura, in the Madras preside
father was Colonel John De Morgan, employe
East India Company's service, and his grandf
great-grandfather had served under Warren Hast
the mother's side he was descended from Jame
F.R.S., author of the *Antilogarithmic Canon*
mathematical works of merit, and a friend of De

Very shortly after the birth of Augustus, C
Morgan brought his wife, daughter, and infan
England, where he left them during a subseque
of service in India, dying in 1816 on his w
Augustus, then ten years of age, received his ea
tion in several private schools, and before the ag

ten years had learned Latin, Greek, and some Hebrew, in addition to acquiring much general knowledge. At the age of sixteen years and a half he entered Trinity College, Cambridge, and studied mathematics, partly under the tuition of Airy, subsequently the astronomer royal. In 1825 he gained a Trinity scholarship. De Morgan's attention was by no means confined to mathematics, and his love of wide reading somewhat interfered with his success in the mathematical tripos, in which he took the fourth place in 1827, before he had completed his twenty-first year. He was prevented from taking his M.A. degree, or from obtaining a fellowship, to which he would doubtless have been elected, by his conscientious objection to signing the theological tests then required from masters of arts and fellows at Cambridge. A strong repugnance to any sectarian restraints upon the freedom of opinion was one of De Morgan's most marked characteristics throughout life.

A career in his own university being closed against him, he entered Lincoln's Inn; but had hardly done so when the establishment, in 1828, of the university of London, in Gower Street, afterwards known as University College, gave him an opportunity of continuing his mathematical pursuits. At the early age of twenty-two years he gave his first lecture as professor of mathematics in a college which he served with the utmost zeal and success for a third of a century. His connection with the college, indeed, was interrupted in 1831, when a disagreement with the governing body caused De Morgan and some other professors to resign their chairs simultaneously. When, in 1836, his successor Mr White was accidentally drowned, De Morgan was requested to resume the professorship. It may be added that his choice of a literary and scientific career was made against the advice of his relatives and friends, who, on his entering Lincoln's Inn, confidently anticipated for him a distinguished and lucrative career at the bar.

In 1837 De Morgan married Sophia Elizabeth, daughter of William Frend, a Unitarian in faith, a mathematician and actuary in occupation, a notice of whose life, written by his son-in-law, will be found in the *Monthly Notices of the Royal Astronomical Society* (vol. v). Henceforward De Morgan's life is scarcely more than a record of his constant labours, and his innumerable publications. As in the case of many scholars, the even tenor of his life was unbroken by remarkable incidents. Surrounded by a growing family, ultimately seven in number, he sought happiness in his home, in his library, and in the energetic and vigorous discharge of his college duties. He seldom travelled or enjoyed relaxation, and could with difficulty be induced to remain many days from home.

As a teacher of mathematics De Morgan was unrivalled. He gave instruction in the form of continuous lectures delivered *extempore* from brief notes. The most prolonged mathematical reasoning, and the most intricate formulæ, were given with almost infallible accuracy from the resources of his extraordinary memory. De Morgan's writings, however excellent, give little idea of the perspicuity and elegance of his *viva voce* expositions, which never failed to fix the attention of all who were worthy of hearing him. Many of his pupils have distinguished themselves, and, through Mr Todhunter and Mr Routh, he has had an important influence on the modern Cambridge school. In addition to occasional extra courses, it was his habit to give two lectures on each of the six week days throughout the working session of thirty weeks or more. Each lecture was exactly one hour and a quarter in length, and at the close a number of questions and problems were always given, to which the pupils returned written answers. These were all corrected by the professor's own hand, and personal explanations given before or after the lecture.

Although the best hours of the day were thus given to arduous college work, his public labours in other directions were extensive. For thirty years he took an active part in the business of the Royal Astronomical Society, editing its publications, supplying obituary notices of members, and for 18 years acting as one of the honorary secretaries. His work for this society alone, it is said, would have been occupation enough for an ordinary man. He was also frequently employed as consulting actuary, a business in which his mathematical powers, combined with sound judgment and business-like habits, fitted him to take the highest place.

De Morgan's mathematical writings contributed powerfully towards the progress of the science. His memoirs on the "Foundation of Algebra," in the 7th and 8th volumes of the *Cambridge Philosophical Transactions*, contain some of the most important contributions which have been made to the philosophy of mathematical method; and Sir W. Rowan Hamilton, in the preface to his *Lectures on Quaternions*, refers more than once to those papers as having led and encouraged him in the working out of the new system of quaternions. The work on *Trigonometry and Double Algebra*, published by De Morgan in 1849, contains in the latter part a most luminous and philosophical view of existing and possible systems of symbolic calculus. But De Morgan's influence on mathematical science in England can only be estimated by a review of his long series of publications, which commence, in 1828, with a translation of part of Bourdon's *Elements of Algebra*, prepared for his students. In 1830 appeared the first edition of his well-known *Elements of Arithmetic*, which has been widely used in schools, and has done much to raise the character of elementary training. It is distinguished by a simple yet thoroughly philosophical treatment of the ideas of number and magnitude, as well as by the introduction of new abbreviated processes of computation, to which De Morgan always attributed much practical importance. Second and third editions were called for in 1832 and 1835, and more than 20,000 copies have been sold; the book is still in use, a sixth edition having been issued in 1876.

De Morgan's other principal mathematical works were *The Elements of Algebra*, 1835, a valuable but somewhat dry elementary treatise; the *Essay on Probabilities*, 1838, forming the 107th volume of *Lardner's Cyclopædia*, still much used, being probably the best simple introduction to the theory in the English language; and *The Elements of Trigonometry and Trigonometrical Analysis, preliminary to the Differential Calculus*, 1837.

Several of his mathematical works were published by the Society for the Diffusion of Useful Knowledge, of which De Morgan was at one time an active member. Among these may be mentioned the great *Treatise on the Differential and Integral Calculus*, 1842, which still remains the most extensive and complete English treatise on the subject; the *Elementary Illustrations of the Differential and Integral Calculus*, first published in 1832, but often bound up with the larger treatise; the valuable essay, *On the Study and Difficulties of Mathematics*, 1831; and a brief treatise on *Spherical Trigonometry*, 1834. By some accident the work on probability in the same series, written by Lubbock and Drinkwater-Bethune was attributed to De Morgan, an error which seriously annoyed his nice sense of bibliographical accuracy. For fifteen years he did all in his power to correct the mistake, and finally wrote to the *Times* to disclaim the authorship. (See *Monthly Notices* of the Royal Astronomical Society, vol. xxvi. p. 118.)

Two of his most elaborate treatises are to be found in the *Encyclopædia Metropolitana*, namely the articles on the

Calculus of Functions, and the Theory of Probabilities. The former article contains a profound investigation into the principles of symbolic reasoning; the latter is still the most complete mathematical treatise on the subject in the English language, giving as it does a resumé of Laplace's *Théorie Analytique des Probabilités*. De Morgan's minor mathematical writings are scattered over various periodicals: five papers will be found in the *Cambridge Mathematical Journal*, ten in the *Cambridge and Dublin Mathematical Journal*, several in the *Philosophical Magazine*, while others of more importance are printed in the *Cambridge Philosophical Transactions*. A list of these and other papers will be found in the *Royal Society's Catalogue*, which contains 42 entries under the name of De Morgan.

In spite of the excellence and extent of his mathematical writings, it is probably as a logical reformer that De Morgan will be best known to future times. In this respect he stands alongside of his great contemporaries Hamilton and Boole, as one of several independent discoverers of the all-important principle of the quantification of the predicate. Unlike most mathematicians, De Morgan always laid much stress upon the importance of logical training. In his admirable papers upon the modes of teaching arithmetic and geometry, originally published in the *Quarterly Journal of Education* (reprinted in *The Schoolmaster*, vol ii.), he remonstrated against the neglect of logical doctrine. In 1839 he produced a small work called *First Notions of Logic*, giving what he had found by experience to be much wanted by students commencing with *Euclid*.

In October 1846 he completed the first of his original investigations, in the form of a paper printed in the *Transactions of the Cambridge Philosophical Society* (vol. viii. No. [illegible]). In this paper the principle of the quantified predicate was referred to, and there immediately ensued a memorable controversy with Sir W. Hamilton regarding the independence of De Morgan's discovery, some communications having passed between them in the autumn of 1846. The details of this dispute will be found by those interested in the original pamphlets, in the *Athenæum* newspaper, or in the appendix to De Morgan's *Formal Logic*. Suffice it to say that the independence of De Morgan's discovery was subsequently recognized by Hamilton, and that those acquainted with De Morgan's character could never suppose that it was otherwise. Moreover, the eight forms of proposition adopted by De Morgan as the basis of his system partially differ from those which Hamilton derived from the quantified predicate. The general character of De Morgan's development of logical forms was wholly peculiar and original on his part.

Not a year passed before De Morgan, late in 1847, published his principal logical treatise, called *Formal Logic, or the Calculus of Inference, Necessary and Probable*. This contains a reprint of the *First Notions*, an elaborate development of the doctrine of the syllogism, and of the numerically definite syllogism, together with chapters of great interest on probability, induction, old logical terms, and fallacies. The severity of the treatise is relieved by characteristic touches of humour, and by quaint anecdotes and allusions furnished from his wide reading and perfect memory.

These followed at intervals, in the years 1850, 1858, [illegible] a series of four elaborate memoirs on the [illegible] printed in volumes ix and x. of the *Cambridge Philosophical Transactions*. These papers taken together constitute a great treatise on logic, in which he [illegible] systems of notation, and developed a new logic of relations, and a new onymatic system of logical expression. Apart, however, from their principal purpose, these memoirs are replete with acute remarks, happy illustrations, and abundant proofs of De Morgan's varied learning. Unfortunately these memoirs are accessible to few readers, otherwise they would form invaluable reading for the logical student. In 1860 De Morgan endeavoured to render their contents better known by publishing a *Syllabus of a Proposed System of Logic*, from which may be obtained a good idea of his symbolic system, but the more readable and interesting discussions contained in the memoirs are of necessity omitted. The article "Logic" in the *English Cyclopædia* (1860) completes the list of his logical publications.

Throughout his logical writings De Morgan was led by the idea that the followers of the two great branches of exact science, logic and mathematics, had made blunders,—the logicians in neglecting mathematics, and the mathematicians in neglecting logic. He endeavoured to reconcile them, and in the attempt showed how many errors an acute mathematician could detect in logical writings, and how large a field there was for discovery. But it may be doubted whether De Morgan's own system, "horrent with mysterious spiculæ," as Hamilton aptly described it, is fitted to exhibit the real analogy between quantitative and qualitative reasoning, which is rather to be sought in the logical works of Boole. (See BOOLE, vol. iv. p. 47.)

Perhaps the largest part, in volume, of De Morgan's writings remains still to be briefly mentioned; it consists of detached articles contributed to various periodical or composite works. During the years 1833–43, he contributed very largely to the first edition of the *Penny Cyclopædia*, writing chiefly on mathematics, astronomy, physics, and biography. His articles of various length cannot be less in number than 850, as may be ascertained from a signed copy in the British Museum, and they have been estimated to constitute a sixth part of the whole *Cyclopædia*, of which they formed perhaps the most valuable portion. He also wrote biographies of Newton and Halley for Knight's *British Worthies*, various notices of scientific men for the *Gallery of Portraits*, and for the uncompleted *Biographical Dictionary* of the Useful Knowledge Society, and at least seven articles in Smith's *Dictionary of Greek and Roman Biography*.

Some of De Morgan's most interesting and useful minor writings are to be found in the *Companions to the British Almanack*, to which he contributed without fail one article each year from 1831 up to 1857 inclusive. In these carefully written papers he treats a great variety of topics relating to astronomy, chronology, decimal coinage, life-assurance, bibliography, and the history of science. Most of them are as valuable now as when written.

Among De Morgan's miscellaneous writings may be mentioned his *Explanation of the Gnomonic Projection of the Sphere*, 1836, including a description of the maps of the stars, published by the Useful Knowledge Society; his *Treatise on the Globes, Celestial and Terrestrial*, 1845; and his remarkable *Book of Almanacks*, (second edition 1871), which contains a series of 35 almanacks, so arranged with indices of reference, that the almanack for any year, whether in old style or new, from any epoch, ancient or modern, up to 2000 A.D., may be found without difficulty, means being added for verifying the almanack and also for discovering the days of new and full moon from 2000 B.C. up to 2000 A.D. De Morgan expressly draws attention to the fact that the plan of this book was that of Francœur and Ferguson, but the plan was developed by one who was an unrivalled master of all the intricacies of chronology. The two best tables of logarithms, the small five-figure tables of the Useful Knowledge Society (1839 and 1857), and Shroen's Seven Figure-Table (5th ed. 1865), were printed under De Morgan's superintendence. Several works edited by him will be found mentioned in the *British Museum Catalogue*. His numerous anonymous contributions through a long series of years to the *Athenæum*, and to *Notes and Queries*, and his occasional articles in the *North British Review*, *Macmillan's Magazine*, &c., must be passed over with this bare mention.

Considerable labour was spent by De Morgan upon the subject of decimal money. He was a great advocate of the pound and mil scheme. His evidence on this subject was sought by the Royal Commission, and, besides constantly supporting the Decimal Association in periodical publications, he published several separate pamphlets on the subject.

One marked character of De Morgan was his intense and yet reasonable love of books. He was a true bibliophil, and loved to surround himself, as far as his means allowed, with curious and rare books. He revelled in all the mysteries of watermarks, title pages, colophons, catch-words, and the like; yet he treated bibliography as an important science. As he himself wrote, "the most worthless book of a bygone day is a record worthy of preservation; like a telescopic star, its obscurity may render it unavailable for most purposes; but it serves, in hands which know how to use it, to determine the places of more important bodies." His evidence before the Royal Commission on the British Museum in 1850, (Questions 5704*–5815,* 6481–6513, and 8966–8967), should be studied by all who would comprehend the principles of bibliography or the art of constructing a catalogue, his views on the latter subject corresponding with those carried out by Panizzi in the *British Museum Catalogue*. A sample of De Morgan's bibliographical learning is to be found in his account of *Arithmetical Books, from the Invention of Printing* (1847), and finally in his *Budget of Paradoxes*. This latter work consists of articles most of which were originally published in the *Athenæum*, describing the various attempts which have been made to invent a perpetual motion, to square the circle, or to trisect the angle; but De Morgan took the opportunity to include many curious bits gathered from his extensive reading, so that the *Budget* as reprinted by his widow (1872), with much additional matter prepared by himself, forms a remarkable collection of scientific *ana*. De Morgan's correspondence with contemporary scientific men was very extensive and full of interest. It remains unpublished, as does also a large mass of mathematical tracts which he prepared for the use of his students, treating all parts of mathematical science, and embodying some of the matter of his lectures. De Morgan's library was purchased by Lord Overstone, and presented to the university of London.

From the above enumeration it will be apparent that the extent of De Morgan's literary and scientific labours was altogether extraordinary; nor was quality sacrificed to quantity. On the contrary every publication was finished with extreme care and accuracy, and no writer can be more safely trusted in every thing which he wrote. It is possible that his continual efforts to attain completeness and absolute correctness injured his literary style, which is wanting in grace; but the estimation in which his books are held is shown by the fact that they are steadily rising in market price. Apart from his conspicuous position as a logical and mathematical discoverer, we may conclude that hardly any man of science in recent times has had a more extensive, though it may often be an unfelt influence, upon the progress of exact and sound knowledge.[1]

De Morgan has left no published indications of his opinions on religious questions, in regard to which he was extremely reticent. He seldom or never entered a place of worship, and declared that he could not listen to a sermon, a circumstance perhaps due to the extremely strict religious discipline under which he was brought up. Nevertheless there is reason to believe that he was of a deeply religious disposition. Like Faraday and Newton he entertained a confident belief in Providence, founded not on any tenuous method of inference, but on personal feeling. His hope of a future life also was vivid to the last.

In the year 1866 a life as yet comparatively free from trouble became clouded by the circumstances which led him to abandon the institution so long the scene of his labours. The refusal of the council to accept the recommendation of the senate, that they should appoint an eminent Unitarian minister to the professorship of logic and mental philosophy, revived all De Morgan's sensitiveness on the subject of sectarian freedom; and, though his feelings were doubtless excessive, there is no doubt that gloom was thrown over his life, intensified in 1867 by the loss of his son George Campbell De Morgan, a young man of the highest scientific promise, whose name, as De Morgan expressly wished, will long be connected with the London Mathematical Society, of which he was one of the founders. From this time De Morgan rapidly fell into ill-health, previously almost unknown to him, dying on the 18th March 1871. An interesting and truthful sketch of his life will be found in the *Monthly Notices of the Royal Astronomical Society*, for the 9th February 1872, vol. xxii. p. 112, written by Mr Ranyard, who says, "He was the kindliest, as well as the most learned of men—benignant to every one who approached him, never forgetting the claims which weakness has on strength." (W. S. J.)

DEMOSTHENES was born in 384 B.C. His father, who bore the same name, was an Athenian citizen belonging to the deme of Pæania. His mother, Cleobule, was the daughter of Gylon, a citizen who had been active in procuring the protection of the kings of Bosporus for the Athenian colony of Nymphæon in the Crimea, and whose wife was a native of that region. On these grounds the adversaries of Demosthenes, in after-days, used absurdly to taunt him with a traitorous or barbarian ancestry. The boy had a bitter foretaste of life. He was seven years old when his father died, leaving property (in a manufactory of swords, and another of upholstery) worth about £3500, which, invested as it seems to have been (20 per cent. was not thought exorbitant), would have yielded rather more than £600 a year. £300 a year was a very comfortable income at Athens, and it was possible to live decently on a tenth of it. Nicias, a very rich man, had property equivalent, probably, to not more than £4000 a year. Demosthenes was born, then, to a handsome, though not a great fortune. But his guardians—two nephews of his father, Aphobus and Demophon, and one Therippides—abused their trust, and handed over to Demosthenes, when he came of age, rather less than one-seventh of his patrimony, perhaps between £50 and £60 a year. Demosthenes, after studying with Isæus—then the great master of forensic eloquence and of Attic law, especially in will cases[2]—brought an action against Aphobus, and gained a verdict for about £2400. But it does not appear that he got the money; and, after some more fruitless proceedings against Onetor, the brother-in-law of Aphobus, the matter was dropped,—not, however, before his relatives had managed to throw a public burden (the equipment of a ship of war) on their late ward, whereby his resources were yet further straitened. He now became a professional writer of speeches or pleas for the law-courts, sometimes speaking himself. Biographers have delighted to relate how painfully Demosthenes made himself a tolerable speaker,—how, with pebbles in his mouth, he tried his lungs against the waves, how he declaimed as he ran up hill, how he shut himself up in a cell, having first guarded himself against a longing for the haunts of men by shaving one side of his head, how he wrote out Thucydides eight times, how he was derided by the Assembly and encouraged by a judicious actor who met him moping about the Peiræus. He certainly seems to have been the reverse of athletic (the stalwart Æschines upbraids him with never having been a sportsman), and he probably had some sort of defect or impediment in his speech as a boy. Perhaps the most interesting fact about his work for the law-courts is that he seems to have continued it, in some measure, through the most exciting parts of his great political career. The speech for Phormio belongs to the same year as the plea for Megalopolis. The speech for Bœotus "Concerning the Name" comes between the First Philippic and the First Olynthiac. The speech against Pantænetus comes between the speech "On the Peace" and the Second Philippic.

Early life.

Professional work for the law-courts.

This work kept up in later years.

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[1] In a notice of De Morgan's character it is impossible to omit a reference to his witty sayings, some specimens of which are preserved in Dr Sadler's most interesting *Diary of Henry Crabb Robinson* (1869), which also contains a humorous account of H. C. R. by De Morgan. It may be added that De Morgan was a great reader and admirer of Dickens; he was also fond of music, and a fair performer on the flute.

[2] In Jebb's *Attic Orators from Antiphon to Isæos*, vol. ii. p. 267 *f.*, the traditions of the relation between Demosthenes and Isæus are examined in detail. It is there shown that the intercourse of the men can scarcely have been either intimate or prolonged, but that Demosthenes undoubtedly learned from Isæus the art of grappling with a forensic adversary in close and strenuous argument.

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The political career of Demosthenes, from his first direct contact with public affairs in 355 B.C. to his death in 322, has an essential unity. It is the assertion, in successive forms adapted to successive moments, of unchanging principles. Externally, it is divided into the chapter which precedes and the chapter which follows Chæronea. But its inner meaning, the secret of its indomitable vigour, the law which harmonizes its apparent contrasts, cannot be understood unless it is regarded as a whole. Still less can it be appreciated in all its large wisdom and sustained self-mastery if it is viewed merely as a duel between the ablest champion and the craftiest enemy of Greek freedom. The time indeed came when Demosthenes and Philip stood face to face as representative antagonists in a mortal conflict. But, for Demosthenes, the special peril represented by Philip, the peril of subjugation to Macedon, was merely a disastrous accident. Philip happened to become the most prominent and most formidable type of a danger which was already threatening Greece before his baleful star arose. As Demosthenes said to the Athenians, if the Macedonian had not existed, they would have made another Philip for themselves. Until Athens recovered something of its old spirit, there must ever be a great standing danger, not for Athens only, but for Greece,—the danger that sooner or later, in some shape, from some quarter—no man could foretell the hour, the manner, or the source—barbarian violence would break up the gracious and undefiled tradition of separate Hellenic life.

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What is the true relation of Athens to Greece? The answer which he gave to this question is the key to the life of Demosthenes. Athens, so Demosthenes held, is the natural head of Greece. Not, however, as an empress holding subject or subordinate cities in a dependence more or less compulsory. Rather as that city which most nobly expresses the noblest attributes of Greek political existence, and which, by her pre-eminent gifts both of intellect and of moral insight, is primarily responsible, everywhere and always, for the maintenance of those attributes in their integrity. Wherever the cry of the oppressed goes up from Greek against Greek, it is the voice of Athens which should first remind the oppressor that Hellene differs from barbarian in postponing the use of force to the persuasions of equal law. Wherever a barbarian hand offers wrong to any city of the Hellenic sisterhood, it is the arm of Athens which should first be stretched forth in the holy strength of Apollo the Averter. Wherever among her own children the ancient loyalty is yielding to love of pleasure or of base gain, there, above all, it is the duty of Athens to see that the central hearth of Hellas is kept pure. Athens must never again seek "empire" in the sense which became odious under the influence of Cleon and Hyperbolus,—when, to use the image of Aristophanes, the allies were as Babylonian slaves grinding in the Athenian mill. Athens must never permit, if she can help it, the re-establishment of such a domination as Sparta exercised in Greece from the battle of Ægospotami to the battle of Leuctra. Athens must aim at leading a free confederacy, of which the members shall be bound to her by their own truest interests. Athens must seek to deserve the confidence of all Greeks alike.

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Such, in the belief of Demosthenes, was the part which Athens must perform if Greece was to be safe. But reforms must be effected before Athens could be capable of such a part. The evils to be cured were different phases of one malady. Athens had long been suffering from the profound decay of public spirit. It was of the essence of a Greek commonwealth that the citizen, while perfectly free in his social life, should constantly set his duty to the city above private interests. If the state needs his service in war, he must not hire an inferior substitute to do the work. If the state requires funds, he must not grudge the money which in quiet times might have been spent on the theatre or the banquet. He must ever remember that, in the phrase of Sophocles, the state is the ship that bears us safe. It does not profit the passenger that his cabin is comfortable if the ship is going down.

Since the early years of the Peloponnesian war, the separation of Athenian society from the state had been growing more and more marked. The old type of the eminent citizen, who was at once statesman and general, had become almost extinct. Politics were now managed by a small circle of politicians. Wars were conducted by professional soldiers whose troops were chiefly mercenaries, and who were usually regarded by the politicians either as instruments or as enemies. The mass of the citizens took no active interest in public affairs. But, though indifferent to principles, they had quickly sensitive partialities for men, and it was necessary to keep them in good humour. Pericles had introduced the practice of giving a small bounty from the Treasury to the poorer citizens, for the purpose of enabling them to attend the theatre at the great festivals,—in other words, for the purpose of bringing them under the concentrated influence of the best Attic culture. A provision eminently wise for the age of Pericles easily became a mischief when the once honourable name of "demagogue" began to mean a flatterer of the mob. Before the end of the Peloponnesian War the festival-money ("theoricon") was abolished. A few years after the restoration of the democracy it was again introduced. But until 354 B.C. it had never been more than a gratuity, of which the payment depended on the Treasury having a surplus. It had never been treated as an annual charge on the revenue, or guaranteed to the citizens as a dividend which they could claim by constitutional right. In 354 B.C. Eubulus became steward of the Treasury. He was an able man, with a special talent for finance, free from all taint of personal corruption, and sincerely solicitous for the honour of Athens, but enslaved to popularity, and without principles of policy. He sought to manage the citizens by humouring to the top of its bent their disinclination for personal sacrifice, and their preference for public show to public strength. More than any other one man, Eubulus represents that new, easy-going, improvident Athens in which the vigilant civic spirit was dead. His first measure was to make the festival-money a permanent item in the budget. Thenceforth this bounty was in reality very much what Demades afterwards called it,—the cement (κόλλα) of the democracy.

Years before the danger from Macedon was urgent, Demosthenes had begun the work of his life,—the effort to lift the spirit of Athens, to revive the old civic loyalty, to rouse the city into taking that place and performing that part which her own welfare as well as the safety of Greece prescribed. His formally political speeches must never be considered apart from his forensic speeches in public causes. The Athenian procedure against the proposer of an unconstitutional law—*i.e.*, of a law incompatible with existing laws—had a direct tendency to make the law-court, in such cases, a political arena. The same tendency was indirectly exerted by the tolerance of Athenian juries (in the absence of a presiding expert like a judge) for irrelevant matter, since it was usually easy for a speaker to make capital out of the adversary's political antecedents. But the forensic speeches of Demosthenes for public causes are not only political in this general sense. They are documents, as indispensable as the Olynthiacs or Philippics, for his own political career. Only by taking them along with the formally political speeches, and regarding the whole as one unbroken series, can we see clearly the full scope of the task which he set before him,—a task in which his long resistance to Philip was only the most dramatic incident, and in which his real achievement is not to be measured by the event of Chæronea.

A forensic speech, composed for a public cause, opens the political career of Demosthenes with a protest against a signal abuse. In 355 B.C., at the age of twenty-nine, he wrote the speech "Against Androtion." This combats on legal grounds a proposal that the out-going Senate should receive the honour of a golden crown. In its larger aspect, it is a denunciation of the corrupt system which that Senate represented, and especially of the manner in which the Treasury had been administered by Aristophon. In 354 B.C. Demosthenes composed and spoke the oration "Against Leptines," who had effected a slender saving for the state by the expedient of revoking those hereditary exemptions from taxation which had at various times been conferred in recognition of distinguished merit. The descendants of Harmodius and Aristogeiton alone had been excepted from the operation of the law. This was the first time that the voice of Demosthenes himself had been heard on the public concerns of Athens, and the utterance was a worthy prelude to the career of a statesman. He answers the advocates of the retrenchment by pointing out that the public interest will not ultimately be served by a wholesale violation of the public faith. In the same year he delivered his first strictly political speech. The Athenians, irritated by the support which Artaxerxes had lately given to the revolt of their allies, and excited by rumours of his hostile preparations, were feverishly eager for a war with Persia. Demosthenes urges that such an enterprise would at present be useless; that it would fail to unite Greece; that the energies of the city should be reserved for a real emergency; but that, before the city can successfully cope with any war, there must be a better organization of resources, and, first of all, a reform of the navy. The scheme of naval reform which he propounds has characteristic exactness of detail. We see how closely he has thought out the question. The same practical and luminous precision is a striking trait in every speech of Demosthenes which recommends a course of action.

Two years later he is found dealing with a more definite question of foreign policy. Sparta, favoured by the depression of Thebes in the Phocian war, was threatening Megalopolis. Both Sparta and Megalopolis sent embassies to Athens. Demosthenes supported Megalopolis. The ruin of Megalopolis would mean, he argued, the return of Spartan domination in the Peloponnesus. Athenians must not favour the tyranny of any one city. They must respect the rights of all the cities, and thus promote unity based on mutual confidence. In the same year Demosthenes wrote the speech "Against Timocrates," to be spoken by the same Diodorus who had before prosecuted Androtion, and who now combated an attempt to screen Androtion and others from the penalties of embezzlement. The speech "Against Aristocrates," also of 352 B.C., reproves that foreign policy of feeble make-shifts which was now popular at Athens. The Athenian tenure of the Thracian Chersonese partly depended for its security on the good-will of the Thracian prince Cersobleptes. Charidemus, a soldier of fortune who had already played Athens false, was now the brother-in-law and the favourite of Cersobleptes. Aristocrates proposed that the person of Charidemus should be invested with a special sanctity, by the enactment that whoever attempted his life should be an outlaw from all dominions of Athens. Demosthenes points out that such adulation is as futile as it is fulsome. Athens can secure the permanence of her foreign possessions only in one way—by being strong enough to hold them.

Thus, between 355 and 352, Demosthenes had laid down the main lines of his policy. Domestic administration must be purified. Statesmen must be made to feel that they are responsible to the state. They must not be allowed to anticipate judgment on their deserts by voting each other golden crowns. They must not think to screen misappropriation of public money by getting partisans to pass new laws about state-debtors. Foreign policy must be guided by a larger and more provident conception of Athenian interests. When public excitement demands a foreign war, Athens must not rush into it without asking whether it is necessary, whether it will have Greek support, and whether she herself is ready for it. When a strong Greek city threatens a weak one, and seeks to purchase Athenian connivance with the bribe of a border-town, Athens must remember that duty and prudence alike command her to respect the independence of all Greeks. When it is proposed, by way of insurance on Athenian possessions abroad, to flatter the favourite of a doubtful ally, Athens must remember that such devices will not avail a power which has no army except on paper, and no ships fit to leave their moorings.

Athens and Philip.

But the time had gone by when Athenians could have tranquil leisure for domestic reform. A danger, calling for prompt action, had at last come very near. For six years Athens had been at war with Philip on account of his seizure of Amphipolis. Meanwhile he had destroyed Potidæa and founded Philippi. On the Thracian coasts he had become master of Abdera and Maronea. On the Thessalian coast he had acquired Methone. In a second invasion of Thessaly, he had overthrown the Phocians under Onomarchus, and had advanced to Thermopylæ, to find the gates of Greece closed against him by an Athenian force. He had then marched to Heræon on the Propontis, and had dictated a peace to Cersobleptes. He had formed an alliance with Cardia, Perinthus, and Byzantium. Lastly, he had begun to show designs on the great Confederacy of Olynthus, the more warlike Miletus of the North. The First Philippic of Demosthenes was spoken in 351 B.C. The Third Philippic—the latest of the extant political speeches—was spoken in 341 B.C. Between these he delivered eight political orations, of which seven are directly concerned with Philip. The whole series falls into two great divisions. The first division comprises those speeches which were spoken against Philip while he was still a foreign power threatening Greece from without. Such are the First Philippic and the three orations for Olynthus. The second division comprises the speeches spoken against Philip when, by admission to the Amphictyonic Council, he had now won his way within the circle of the Greek states, and when the issue was no longer between Greece and Macedonia, but between the Greek and Macedonian parties in Greece. Such are the speech "On the Peace," the speech "On the Embassy," the speech "On the Chersonese," the Second and Third Philippics.

The Philippic speeches.

First group.

Second group.

351 B.C. First Philippic.

The First Philippic, spoken early in 351 B.C., was no sudden note of alarm drawing attention to an unnoticed peril. On the contrary, the Assembly was weary of the subject. For six years the war with Philip had been a theme of barren talk. Demosthenes urges that it is time to do something, and to do it with a plan. Athens fighting Philip has fared, he says, like an amateur boxer opposed to a skilled pugilist. The helpless hands have only followed blows which a trained eye should have taught them to parry. An Athenian force must be stationed in the north, at Lemnos or Thasos. Of 2000 infantry and 200 cavalry at least one quarter must be Athenian citizens capable of directing the mercenaries.

351 B.C. For the Rhodians

Later in the same year Demosthenes did another service to the cause of national freedom. Rhodes, severed by its own act from the Athenian Confederacy, had since 355 been virtually subject to Mausolus, prince (δυνάστης) of Caria, himself a tributary of Persia. Mausolus died in 351, and was succeeded by his widow Artemisia. The democratic party in Rhodes now appealed to Athens for help in throwing off the Carian yoke. Demosthenes supported their application. No act of his life was a truer proof of statesmanship. He failed. But at least he had once more warned Athens that the cause of political freedom was everywhere her own, and that, wherever that cause was forsaken, there a new danger was created both for Athens and for Greece.

Next year an Athenian force under Phocion was sent to Eubœa, in support of Plutarchus, tyrant of Eretria, against the faction of Clitarchus. Demosthenes protested against spending strength, needed for greater objects, on the local quarrels of a despot. Phocion won a victory at Tamynæ. But the "inglorious and costly war" entailed an outlay of more than £12,000 on the ransom of captives alone, and ended in the total destruction of Athenian influence throughout Eubœa. That island was now left an open field for the intrigues of Philip. Worst of all, the party of Eubulus not only defeated a proposal, arising from this campaign, for applying the festival-money to the war-fund, but actually carried a law making it high treason to renew the proposal. The amusement of the citizens was thus officially declared to be more important than the protection of their properties or lives, and the expression of a different opinion was henceforth to be a crime. The degree to which political enmity was exasperated by the Eubœan war may be judged from the incident of Midias, an adherent of Eubulus, and a type of that opulent rowdyism which shows how curiously loose the hold of the state had now become on men who were not restrained by regard for their purses or their characters. Demosthenes was choragus of his tribe, and was wearing the robe of that sacred office at the great festival in the theatre of Dionysus, when Midias struck him on the face. The affair was eventually compromised. The speech written by Demosthenes for the trial was neither spoken nor completed, and remains, as few will regret, a sketch.

It was now three years since, in 352, the Olynthians had sent an embassy to Athens, and had made peace with their only sure ally. In 350 a second Olynthian embassy had sought and obtained Athenian help. The hour of Olynthus had indeed come. In 349 Philip opened war against the Chalcidic towns of the Olynthian League. The First and Second Olynthiacs of Demosthenes were spoken in that year. "Better now than later," is the thought of the First Olynthiac. "The fight must come. Better that it should be fought in Macedonia than in Attica. Everything favours us now. Send one force to defend Olynthus, and another to attack Philip." The Second Olynthiac argues that Philip's strength is overrated. "He is weak in so far as he is selfish and unjust. He is strong only because he is energetic. Let us be energetic too, and our just cause will prevail." The Third Olynthiac—spoken in 348—carries us into the midst of action. It deals with practical details. The festival-fund must be used for the war. The citizens must serve in person. A few months later, Olynthus and the thirty-two towns of the Confederacy were swept from the earth. Men could walk over their sites, Demosthenes said seven years afterwards, without knowing that such cities had existed. It was now certain that Philip could not be stopped outside of Greece. The question was, What point within Greece shall he be allowed to reach?

Eubulus and his party, with that versatility which is the privilege of political vagueness, now began to call for a congress of the allies to consider the common danger. They found a brilliant interpreter in Æschines, who, after having been a tragic actor and a clerk to the assembly, had entered political life with the advantages of a splendid gift for eloquence, a fine presence, a happy address, a ready wit, and a facile conscience. While his opponents had thus suddenly become warlike, Demosthenes had become pacific. He saw that Athens must have time to collect strength. Nothing could be gained, meanwhile, by going on with the war. Macedonian sympathizers at Athens, of whom Philocrates was the chief, also favoured peace. Eleven envoys, including Philocrates, Æschines, and Demosthenes, were sent to Philip in February, 346 B.C. After a debate at Athens, peace was concluded with Philip in April. Philip on the one hand, Athens and her allies on the other, were to keep what they respectively held at the time when the peace was ratified. But here the Athenians made a fatal error. Philip was bent on keeping the door of Greece open. Demosthenes was bent on shutting it against him. Philip was now at war with the people of Halus in Thessaly. Thebes had for ten years been at war with Phocis. Here were two distinct chances for Philip's armed intervention in Greece. But if the Halians and the Phocians were included in the peace, Philip could not bear arms against them without violating the peace. Accordingly Philip insisted that they should not be included. Demosthenes insisted that they should be included. They were not included. The result followed speedily. The same envoys were sent a second time to Philip for the purpose of receiving his oaths in ratification of the peace. It was late in June before he returned from Thrace to Pella—thus gaining, under the terms, all the towns that he had taken meanwhile. He next took the envoys with him through Thessaly to Thermopylæ. There—at the invitation of Thessalians and Thebans—he intervened in the Phocian war. Phalæcus surrendered. Phocis was crushed. Philip took its place in the Amphictyonic Council, and was thus established as a Greek power in the very centre, at the sacred hearth, of Greece. The right of precedence in consultation of the oracle (προμαντεία) was transferred from Athens to Philip. While indignant Athenians were clamouring for the revocation of the peace, Demosthenes upheld it. It ought never to have been made on such terms, he said. But, having been made, it had better be kept. "If we went to war now, where should we find allies? And after losing Oropus, Amphipolis, Cardia, Chios, Cos, Rhodes, Byzantium, shall we fight about the shadow of Delphi?"

During the eight years between the peace of Philocrates and the battle of Chæronea, the authority of Demosthenes steadily grew, until it became first predominant and then paramount. He had, indeed, a melancholy advantage. Each year his argument was more and more cogently enforced by the logic of facts. In 344 he visited the Peloponnesus for the purpose of counteracting Macedonian intrigue. Mistrust, he told the Peloponnesian cities, is the safeguard of free communities against tyrants. Philip lodged a formal complaint at Athens. Here, as elsewhere, the future master of Greece reminds us of Napoleon on the eve of the First Empire. He has the same imperturbable and persuasive effrontery in protesting that he is doing one thing at the moment when his energies are concentrated on doing the opposite. Demosthenes replied in the Second Philippic. "If," he said, "Philip is the friend of Greece, we are doing wrong. If he is the enemy of Greece, we are doing right. Which is he? I hold him to be our enemy, because everything that he has hitherto done has benefited himself and hurt us." The prosecution of Æschines for malversation on the embassy, which was brought to an issue in the following year, marks the moral strength of the position now held by Demosthenes. When the gravity of the charge and the complexity of the evidence are considered, the acquittal of Æschines by a narrow majority must be deemed his condemnation. The speech "On the "Affairs of the Chersonese," and the Third Philippic, were the crowning efforts of Demosthenes. Spoken in the same year, 341 B.C., and within a short space of each other, they must be taken together. The speech "On the Affairs of the Chersonese" regards the situation chiefly from an Athenian point of view. "If the peace means," argues Demosthenes, "that Philip can seize with impunity one Athenian possession after another, but that Athenians shall not on their peril touch aught that belongs to Philip, where is the line to be drawn? We shall go to war, I am told, when it is necessary. If the necessity has not come yet, when will it come?" The Third Philippic surveys a wider horizon. It ascends from the Athenian to the Hellenic view. Philip has annihilated Olynthus and the Chalcidic towns. He has ruined Phocis. He has frightened Thebes. He has divided Thessaly. Eubœa and the Peloponnesus are his. His power stretches from the Adriatic to the Hellespont. Where shall be the end? Athens is the last hope of Greece. And, in this final crisis, Demosthenes was the embodied energy of Athens. It was Demosthenes who went to Byzantium, brought the estranged city back to the Athenian alliance, and snatched it from the hands of Philip. It was Demosthenes who, when Philip had already seized Elatea, hurried to Thebes, who by his passionate appeal gained one last chance, the only possible chance, for Greek freedom, who broke down the barrier of an inveterate jealousy, who brought Thebans to fight beside Athenians, and who thus won at the eleventh hour a victory for the spirit of loyal union which took away at least one bitterness from the unspeakable calamity of Chæronea.

But the work of Demosthenes was not closed by the ruin of his cause. During the last sixteen years of his life he rendered services to Athens not less important, and perhaps more difficult, than those which he had rendered before. He was now, as a matter of course, foremost in the public affairs of Athens. In January 337, at the annual winter Festival of the Dead in the Outer Cerameicus, he spoke the funeral oration over those who had fallen at Chæronea. He was member of a commission for strengthening the fortifications of the city (τειχοποιός). He administered the festival-fund. During a dearth which visited Athens between 330 and 326 he was charged with the organization of public relief. In 324 he was chief (ἀρχιθέωρος) of the sacred embassy to Olympia. Already, in 336, Ctesiphon had proposed that Demosthenes should receive a golden crown from the state, and that his extraordinary merits should be proclaimed in the theatre at the Great Dionysia. The proposal was adopted by the Senate as a bill (προβούλευμα); but it must be passed by the Assembly before it could become an act (ψήφισμα). To prevent this, Æschines gave notice, in 336, that he intended to proceed against Ctesiphon for having proposed an unconstitutional measure. For six years Æschines avoided action on this notice. At last, in 330, the patriotic party felt strong enough to force him to an issue. Æschines spoke the speech "Against Ctesiphon," an attack on the whole public life of Demosthenes. Demosthenes gained an overwhelming victory for himself and for the honour of Athens in the most finished, the most splendid, and the most pathetic work of ancient eloquence—the immortal oration "On the Crown."

In the winter of 325–4 Harpalus, the receiver-general of Alexander in Asia, fled to Greece, taking with him 8000 mercenaries, and treasure equivalent to about a million and a quarter sterling. On the motion of Demosthenes he was warned from the harbours of Attica. Having left his troops and part of his treasure at Tænarum, he again presented himself at the Peiræus, and was now admitted. He spoke fervently of the opportunity which offered itself to those who loved the freedom of Greece. All Asia would rise with Athens to throw off the hated yoke. Fiery patriots like Hyperides were in raptures. For zeal which could be bought Harpalus had other persuasions. But Demosthenes stood firm. War with Alexander would, he saw, be madness. It could have but one result,—some indefinitely worse doom for Athens. Antipater and Olympias presently demanded the surrender of Harpalus. Demosthenes opposed this. But he reconciled the dignity with the loyalty of Athens by carrying a decree that Harpalus should be arrested, and that his treasure should be deposited in the Parthenon, to be held in trust for Alexander. Harpalus escaped from prison. The amount of the treasure, which Harpalus had stated as 700 talents, proved to be no more than 350. Demosthenes proposed that the Areopagus should inquire what had become of the other 350. Six months, spent in party intrigues, passed before the Areopagus gave in their report (ἀπόφασις). The report inculpated nine persons. Demosthenes headed the list of the accused. Hyperides was among the ten public prosecutors. Demosthenes was condemned, fined fifty talents, and, in default of payment, imprisoned. After a few days he escaped from prison to Ægina, and thence to Trœzen. Two things in this obscure affair are beyond reasonable doubt. First, that Demosthenes was not bribed by Harpalus. The hatred of the Macedonian party towards Demosthenes, and the fury of those vehement patriots who cried out that he had betrayed their best opportunity, combined to procure his condemnation, with the help, probably, of some appearances which were against him. Secondly, it can hardly be questioned that, by withstanding the hot-headed patriots at this juncture, Demosthenes did heroic service to Athens.

Death of Alexander 323 B.C.

Next year Alexander died. Then the voice of Demosthenes, calling Greece to arms, rang out like a trumpet. Early in August 322, the battle of Crannon decided the Lamian war against Greece. Antipater demanded, as the condition on which he would refrain from besieging Athens, the surrender of the leading patriots. Demades moved the decree of the Assembly by which Demosthenes, Hyperides, and some others were condemned to death as traitors. On the 20th of Boedromion (September 16) 322, a Macedonian garrison occupied Munychia. It was a day of solemn and happy memories, a day devoted, in the celebration of the Great Mysteries, to sacred joy,—the day on which the glad procession of the Initiated returned from Eleusis to Athens. It happened, however, to have another association, more significant than any ironical contrast for the present purpose of Antipater. It was the day on which, thirteen years before, Alexander had punished the rebellion of Thebes with annihilation.

322 B.C. End of Lamian war.

Demosthenes is condemned.

His flight.

The condemned men had fled to Ægina. Parting there from Hyperides and the rest, Demosthenes went on to Calauria, a small island off the coast of Argolis. In Calauria there was an ancient temple of Poseidon, once a centre of Minyan and Ionian worship, and surrounded with a peculiar sanctity as having been, from time immemorial, an inviolable refuge for the pursued. Here Demosthenes sought asylum. Archias of Thurii, a man who, like Æschines, had begun life as a tragic actor, and who was now in the pay of Antipater, soon traced the fugitive, landed in Calauria, and appeared before the temple of Poseidon with a body of Thracian spearmen. Plutarch's picturesque narrative bears the marks of artistic elaboration. Demosthenes had dreamed the night before that he and Archias were competing for a prize as tragic actors; the house applauded Demosthenes; but his chorus was shabbily equipped, and Archias gained the prize. Archias was not the man to stick at sacrilege. In Ægina, Hyperides and the others had been taken from the shrine of Æacus. But he hesitated to violate an asylum so peculiarly sacred as the Calaurian temple. Standing before its open door, with his Thracian soldiers around him, he endeavoured to prevail on Demosthenes to quit the holy precinct. Antipater would be certain to pardon him. Demosthenes sat silent, with his eyes fixed on the ground. At last, as the emissary persisted in his bland persuasions, he looked up and said,—"Archias, you never moved me by your acting, and you will not move me now by your promises." Archias lost his temper, and began to threaten. "Now," rejoined Demosthenes, "you speak like a real Macedonian oracle; before you were acting. Wait a moment, then, till I write to my friends." With these words, Demosthenes withdrew into the inner part of the temple,—still visible, however, from the entrance. He took out a roll of paper, as if he was going to write, put the pen to his mouth, and bit it, as was his habit in composing. Then he threw his head back, and drew his cloak over it. The Thracian spearmen, who were watching him from the door, began to gibe at his cowardice. Archias went in to him, encouraged him to rise, repeated his old arguments, talked to him of reconciliation with Antipater. By this time Demosthenes felt that the poison which he had sucked from the pen was beginning to work. He drew the cloak from his face, and looked steadily at Archias. "Now you can play the part of Creon in the tragedy as soon as you like," he said, "and cast forth my body unburied. But I, O gracious Poseidon, quit thy temple while I yet live; Antipater and his Macedonians have done what they could to pollute it." He moved towards the door, calling to them to support his tottering steps. He had just passed the altar of the god, when he fell, and with a groan gave up the ghost.

is death ct. 322 c.)

is olitical aracter.

As a statesman, Demosthenes needs no epitaph but his own words in the speech "On the Crown." *I say that, if the event had been manifest to the whole world beforehand, not even then ought Athens to have forsaken this course, if Athens had any regard for her glory, or for her past, or for the ages to come.* The Persian soldier in Herodotus, following Xerxes to foreseen ruin, confides to his fellow-guest at the banquet that the bitterest pain which man can know is πολλὰ φρονέοντα μηδενὸς κρατέειν,—complete, but helpless, prescience. In the grasp of a more inexorable necessity, the champion of Greek freedom was borne onward to a more tremendous catastrophe than that which strewed the waters of Salamis with Persian wrecks and the field of Platæa with Persian dead: but to him, at least, it was given to proclaim aloud the clear and sure foreboding that filled his soul, to do all that true heart and free hand could do for his cause, and, though not to save, yet to encourage, to console, and to ennoble. As the inspiration of his life was larger and higher than the mere courage of resistance, so his merit must be regarded as standing altogether outside and above the struggle with Macedon. The great purpose which he set before him was to revive the public spirit, to restore the political vigour, and to re-establish the Panhellenic influence of Athens,—never for her own advantage merely, but always in the interest of Greece. His glory is, that while he lived he helped Athens to live a higher life. Wherever the noblest expressions of her mind are honoured, wherever the large conceptions of Pericles command the admiration of statesmen, wherever the architect and the sculptor love to dwell on the masterpieces of Ictinus and Phidias, wherever the spell of ideal beauty or of lofty contemplation is exercised by the creations of Sophocles or of Plato, there it will be remembered that the spirit which wrought in all these would have passed sooner from among men, if it had not been recalled from a trance, which others were content to mistake for the last sleep, by the passionate breath of Demosthenes.

The orator in whom artistic genius was united, more perfectly than in any other man, with moral enthusiasm and with intellectual grasp, has held in the modern world the same rank which was accorded to him in the old; but he cannot enjoy the same appreciation. Macaulay's ridicule has rescued from oblivion the criticism which pronounced the eloquence of Chatham to be more ornate than that of Demosthenes, and less diffuse than that of Cicero. Did the critic, asks Macaulay, ever hear any speaking that was less ornamented than that of Demosthenes, or more diffuse than that of Cicero? Yet the critic's remark was not so pointless as Macaulay thought it. Sincerity and intensity are, indeed, to the modern reader, the most obvious characteristics of Demosthenes. His style is, on the whole, singularly free from what we are accustomed to regard as rhetorical embellishment. Where the modern orator would employ a wealth of imagery, or elaborate a picture in exquisite detail, Demosthenes is content with a phrase or a word. Burke uses, in reference to Hyder Ali, the same image which Demosthenes uses in reference to Philip. "Compounding all the materials of fury, havoc, desolation, into one black cloud, he hung for a while on the declivity of the mountains. Whilst the authors of all these evils were idly and stupidly gazing on this menacing meteor, which darkened all their horizon, it suddenly burst, and poured down the whole of its contents upon the plains of the Carnatic." Demosthenes forbears to amplify. "The people gave their voice, and the danger which hung upon our borders went by like a cloud." To our modern feeling, the eloquence of Demosthenes exhibits everywhere a general stamp of earnest and simple strength. But it is well to remember the charge made against the style of Demosthenes by a contemporary Greek orator, and the defence offered by the best Greek critic of oratory. Æschines reproached the diction of Demosthenes with excess of elaboration and adornment (περιεργία). Dionysius, in reply, admits that Demosthenes does at times depart from simplicity,—that his style is sometimes elaborately ornate and remote from the ordinary usage. But, he adds, Demosthenes adopts this manner where it is justified by the elevation of his theme. The remark may serve to remind us of our modern disadvantage for a full appreciation of Demosthenes. The old world felt, as we do, his moral and mental greatness, his fire, his self-devotion, his insight. But it felt also, as we can never feel, the versatile perfection of his skill. This it was that made Demosthenes unique to the ancients. The ardent patriot, the far-seeing statesman, were united in his person with the consummate and unapproachable artist. Dionysius devoted two special treatises to Demosthenes,—one on his language and style (λεκτικὸς τόπος), the other on his treatment of subject-matter (πραγματικὸς τόπος). The latter is lost. The former is one of the best essays in literary criticism which antiquity has bequeathed to us. The idea which it works out is that Demosthenes has perfected Greek prose by fusing in a glorious harmony the elements which had hitherto belonged to separate types. The austere dignity of Antiphon, the plain elegance of Lysias, the smooth and balanced finish of that middle or normal character which is represented by Isocrates, have come together in Demosthenes. Nor is this all. In each species he excels the specialists. He surpasses the school of Antiphon in perspicuity, the school of Lysias in nerve, the school of Isocrates in variety, in felicity, in symmetry, in pathos, in power. Demosthenes has at command all the discursive brilliancy which fascinates a festal audience. He has that power of concise and lucid narration, of terse reasoning, of persuasive appeal, which is required by the forensic speaker. His political eloquence can worthily image the majesty of the state, and enforce weighty counsels with lofty and impassioned fervour. A true artist, he grudged no labour which could make the least part of his work more perfect. Isocrates spent ten years on the *Panegyricus*. After Plato's death, a manuscript was found among his papers with the first eight words of the *Republic* arranged in several different orders. What wonder, then, asks the Greek critic, if the diligence of Demosthenes was no less incessant and minute? "To me," he says, "it seems far more natural that a man engaged in composing political discourses, imperishable memorials of his power, should neglect not even the smallest details, than that the veneration of painters and sculptors, who are darkly showing forth their manual tact and toil in a corruptible material, should exhaust the refinements of their art on the veins, on the feathers, on the down of the lip, and the like niceties." It may be surmised that much of the admiration professed for Demosthenes in modern times has been conventional. The clumsiest and coarsest forgeries which bear his name long received among general readers their share of the eulogy. A soundly critical study of his text is not yet sixty years old. To this day popular books occasionally show traces of the notion that everything which the manuscripts ascribe to him was written by him. But modern study has long since learned to recognise the surest traits of his style; not, indeed, with the exquisite perception of his old Greek critics, yet sufficiently, as a rule, for the discrimination of genuine work from false, and on a firmer diplomatic basis. The modern world can never catch again the finer tones of that great music as they still echoed on the ear of Greece in her calm after-time—

> when all the winds were laid,
> And every height came out, and jutting peak
> And valley, and the immeasurable heavens
> Brake open to their highest;

but men can still hear the voice of a prophet whose resonant warnings rise above confused sounds of strife; they can still feel the energy, the anguish, the indignation which vibrate through his accents; and they can acknowledge, with an admiration undiminished by the lapse of twenty centuries, the power of his words to quicken the sense of honour in craven hearts, to raise the votaries of selfish luxury to the loyalty of prolonged self-sacrifice, to nerve irresolute arms for an inevitable struggle, and, when all has been lost, to sustain the vanquished with the thought that, though a power above man has forbidden them to prevail, yet their suffering has saved the lustre of a memory which they were bound to guard, and has left them pure before the gods.

More than half of the sixty-one speeches extant under the name of Demosthenes are certainly or probably spurious. Much difference of opinion still exists in particular cases, especially as regards two or three of the private speeches. The results to which the preponderance of opinion now leans are given in the following table. Those marked *a* were already rejected or doubted in antiquity; those marked *m*, first in modern times:—

I. DELIBERATIVE SPEECHES.

GENUINE.

	Or. 14.	On the Navy Boards	354	B.C.
	Or. 16.	For the People of Megalopolis	352	,,
	Or. 4.	First Philippic	351	,,
	Or. 15.	For the Rhodians	351	,,
	Or. 1.	First Olynthiac	349	,,
	Or. 2.	Second Olynthiac	349	,,
	Or. 3.	Third Olynthiac	348	,,
	Or. 5.	On the Peace	346	,,
	Or. 6.	Second Philippic	344	,,
	Or. 8.	On the Affairs of the Chersonese	341	,,
	Or. 9.	Third Philippic	341	,,

SPURIOUS.

(a)	Or. 7.	On Halonnesus (by Hegesippus)	342	B.C.

Rhetorical Forgeries.

(a)	Or. 17.	On the Treaty with Alexander.		
(a)	Or. 10.	Fourth Philippic.		
(m)	Or. 11.	Answer to Philip's Letter.		
(m)	Or. 12.	Philip's Letter.		
(m)	Or. 13.	On the Assessment (σύνταξις).		

II. FORENSIC SPEECHES.

A. IN PUBLIC CAUSES.

GENUINE.

	Or. 22.	In (κατά) Androtionem	355	B.C.
	Or. 20.	Contra (πρός) Leptinem	354	,,
	Or. 24.	In Timocratem	352	,,
	Or. 23.	In Aristocratem	352	,,
	Or. 21.	In Midiam	349	,,
	Or. 19.	On the Embassy	343	,,
	Or. 18.	On the Crown	330	,,

SPURIOUS.

(a)	Or. 58.	In Theocrinem	339	,,
(a)	Or. 25, 26.	In Aristogitona I. and II. (Rhetorical forgeries).		

B. IN PRIVATE CAUSES.

GENUINE.

	Or. 27, 28.	In Aphobum I. et II.	364	B.C.
(m)	Or. 30, 31.	Contra Onetora I. et II.	362	,,
	Or. 41.	Contra Spudiam	?	
(m)	Or. 55.	Contra Calliclem	?	
	Or. 54.	In Cononem	356	B.C.?
	Or. 36.	Pro Phormione	352	,,
(m)	Or. 39.	Contra Bœotum de Nomine	350	,,
	Or. 37.	Contra Pantænetum	346-5	,,
(m)	Or. 38.	Contra Nausimachum et Diopithem	?	

SPURIOUS.

(*The first eight of the following are given by Schäfer to Apollodorus.*)

(m)	Or. 52.	Contra Callippum	369–8	B.C.
(a)	Or. 53.	Contra Nicostratum	after 368	,,
(a)	Or. 49.	Contra Timotheum	362	,,
(m)	Or. 50.	Contra Polyclem	357	,,
(a)	Or. 47.	In Evergum et Mnesibulum	356	,,
(m)	Or. 45, 46.	In Stephanum I. et II.	351	,,
(a)	Or. 59.	In Neæram	349	,,
(m)	Or. 51.	On the Trierarchic Crown (by Cephisodotus?)	360–359	,,
(m)	Or. 43.	Contra Macartatum	?	
(m)	Or. 48.	In Olympiodorum	after 343	,,
(m)	Or. 44.	Contra Leocharem	?	
(a)	Or. 35.	Contra Lacritum	341	,,
(a)	Or. 42.	Contra Phænippum	?	
(m)	Or. 32.	Contra Zenothemin	?	
(m)	Or. 34.	Contra Phormionem	?	
(m)	Or. 29.	Contra Aphobum pro Phano.		
(a)	Or. 40.	Contra Bœotum de Dote	347	,,
(m)	Or. 57.	Contra Eubulidem	346-5	,,
(m)	Or. 33.	Contra Apaturium	?	
(a)	Or. 56.	In Dionysodorum	not before 322–1	,,

Or. 60 (ἐπιτάφιος) and Or. 61 (ἐρωτικός) are works of rhetoricians. The six epistles are also forgeries; they were used by the composer of the twelve epistles which bear the name of Æschines. The 56 προοίμια, exordia or sketches for political speeches, are by various hands and of various dates. They are valuable as being compiled from Demosthenes himself, or from other classical models.

Literary history of Demosthenes.

The ancient fame of Demesthenes as an orator can be compared only with the fame of Homer as a poet. Cicero, with generous appreciation, recognizes Demosthenes as the standard of perfection. Dionysius, the closest and most penetrating of his ancient critics, exhausts the language of admiration in showing how Demosthenes united and elevated whatever had been best in earlier masters of the Greek idiom. Hermogenes, in his works on rhetoric, refers to Demosthenes, as ὁ ῥήτωρ, *the* orator. The writer of the treatise On Sublimity knows no heights loftier than those to which Demosthenes has risen. From his own younger contemporaries, Aristotle and Theophrastus, who founded their theory of rhetoric in large part on his practice, down to the latest Byzantines, the consent of theorists, orators, antiquarians, anthologists, lexicographers, offered the same unvarying homage to Demosthenes. His work busied commentators such as Xenon, Minucian, Basilicus, Ælius Theon, Zosimus of Gaza. Arguments to his speeches were drawn up by rhetoricians so distinguished as Numenius and Libanius. Accomplished men of letters, such as Julius Vestinus and Ælius Dionysius, selected from his writings choice passages for declamation or perusal, of which fragments are incorporated in the miscellany of Photius and the lexicons of Harpocration, Pollux, and Suidas. It might have been anticipated that the purity of a text so widely read and so renowned would, from the earliest times, have been guarded with jealous care. The works of the three great dramatists had been thus protected, about 340 B.C., by a standard Attic recension. But no such good fortune befell the works of Demosthenes. Alexandrian criticism was chiefly occupied with poetry. The titular works of Demosthenes were, indeed, registered, with those of the other orators, in the catalogues (*ῥητορικοὶ πίνακες*) of Alexandria and Pergamus. But no thorough attempt was made to separate the authentic works from those spurious works which had even then become mingled with them. Philosophical schools which, like the Stoic, felt the ethical interest of Demosthenes, cared little for his language. The rhetoricians who imitated or analyzed his style cared little for the criticism of his text. Their treatment of it had, indeed, a direct tendency to falsify it. It was customary to indicate by marks those passages which were especially useful for study or imitation. It then became a rhetorical exercise to recast, adapt, or interweave such passages. Sopater, the commentator on Hermogenes, wrote on *μεταβολαὶ καὶ μεταποιήσεις τῶν Δημοσθένους χωρίων*, "adaptations or transcripts of passages in Demosthenes." Such manipulation could not but lead to interpolations or confusions in the original text. Great, too, as was the attention bestowed on the thought, sentiment, and style of Demosthenes, comparatively little care was bestowed on his subject-matter. He was studied more on the moral and the formal side than on the real side. An incorrect substitution of one name for another, a reading which gave an impossible date, insertions of spurious laws or decrees, were points which few readers would stop to notice. Hence it resulted that, while Plato, Thucydides, and Demosthenes were the most universally popular of the classical prose-writers, the text of Demosthenes, the most widely used perhaps of all, was also the least pure. His more careful students at length made an effort to arrest the process of corruption. Editions of Demosthenes based on a critical recension, and called Ἀττικιανά (*ἀντίγραφα*), came to be distinguished from the vulgates, or *δημώδεις ἐκδόσεις*.

Manuscript

Among the extant manuscripts of Demosthenes—upwards of 170 in number—one is far superior, as a whole, to the rest. This is *Parisinus* Σ 2934, of the 10th century. A comparison of this MS. with the extracts of Ælius, Aristides, and Harpocration from the Third Philippic favours the view that it is derived from an Ἀττικιανόν, whereas the *δημώδεις ἐκδόσεις*, used by Hermogenes and by the rhetoricians generally, have been the chief sources of our other manuscripts. The collation of this manuscript by Immanuel Bekker first placed the textual criticism of Demosthenes on a sound footing. Not only is this manuscript nearly free from interpolations, but it is the sole voucher for many excellent readings. Among the other MSS., some of the most important are—*Marcianus* 416 F, of the 10th century, the basis of the Aldine edition; *Augustanus* I. (N 85), derived from the last, and containing scholia to the speeches on the Crown and the Embassy, by Ulpian, with some by a younger writer, who was perhaps Moschopulus; *Parisinus* Y; *Antverpiensis* Ω—the last two comparatively free from additions. The fullest authority on the MSS. is Th. Voemel, *Notitia codicum Demosth.*, and Prolegomena Critica to his edition published at Halle (1856–7), pp. 175–178.

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The extant scholia on Demosthenes are for the most part poor. Their staple consists of Byzantine erudition; and their value depends chiefly on what they have preserved of older criticism. They are better than usual for the Περὶ Στεφάνου, Κατὰ Τιμοκράτους; best for the Περὶ Παραπρεσβείας. The Greek commentaries ascribed to Ulpian are especially defective on the historical side, and give little essential aid. Editions:—*Scholia et Ulpiani commentarii in Demosth.*, ed. C. Müller, in *Oratt. Att.*, Par., 1846–7; *Scholia Græca in Demosth. ex codd. aucta et emendata*, Oxon, 1851.

Editions and Commentaries.—In the vast literature of Demosthenes, only a few books can be named here as specially notable or useful for the English student. *Editio princeps*, Aldus, Venice, 1504; *Aldina posterior* (more correct), 1527; Jerome Wolf, Basel, 1549, chief ed., 1572; J. Taylor, Cambridge, 1748; J. Reiske (with notes of J. Wolf, J. Taylor, J. Markland, &c.), Leipsic, 1770–5; revised ed. of Reiske by G. H. Schäfer, Lond., 1823–6; I. Bekker, in *Orat. Att.* (the first edition which was based on Codex Σ, see above), Leipsic, 1823–1828; G. H. Dobson, in *Oratores Attici*, Lond. 1828; Baiter and Sauppe, in *Oratt. Attici*, 1850; Dindorf (in Teubner), 1867; Whiston, with English notes, 1859–1868.

Particular Speeches.—*De Falsa Legatione*, R. Shilleto (3d ed.), 1864; G. H. Heslop, 1872. *De Corona*, A. Holmes, 1871; G. A. and W. H. Simcox (with *Æschines In Ctesiph.*), 1872. *In Midiam*, A. Holmes (after Buttmann), 1868; *Olynthiacs and Philippics*, G. H. Heslop, 1868. *Select Private Orations* [Part I. Contra Phormionem, Lacritum, Pantænetum, Bœotum de Nomine, id. de Dote, Dionysodorum: as to the last two, see list of speeches above. Part II. Pro Phormione, Contra Stephanum I. II., Nicostratum, Cononem, Calliclem], F. A. Paley and J. E. Sandys, Cambridge, 1874–5.—*Indices to Demosthenes*, Reiske, ed. Schäfer, Lond. 1823.

Illustrative Literature.—Arnold Schäfer, *Demosthenes und seine Zeit*, 3 vols. Leipsic, 1856–8, a masterly and exhaustive historical work; K. G. Böhnecke, *Demosthenes, Lykurgus, Hyperides, und ihr Zeitalter*, Berl. 1864; Bouillé, *Histoire de Démosthène*, ed. Par. 1868; T. Forsyth, *Hortensius*, 1874; Brodribb, *Demosthenes* (in Classics for English Readers), 1877; Nicolai, *Griechische Literaturgeschichte* (esp. for bibliography of Demosthenes). C. R. Kennedy's *Translations* (5 vols., Bohn) are models of scholarly finish, and the appendices on Attic law, &c., are of great value. *Translations of the Speech on the Crown*, by W. Brandt, (1870), and Sir R. Collier, (1876). (R. C. J.)

DEMOTICA, a town of European Turkey in the province of Adrianople and sanjak of Gallipoli, situated 25 miles south of the provincial capital, at the foot of a conical hill which rises on the right bank of the Maritza near its junction with the Kizildeli. It is the seat of a Greek archbishop; and, besides the ancient citadel and palace on the top of the hill, it possesses several Greek churches, a mosque, and public baths. Charles XII. of Sweden resided at Demotica for more than a year after the battle of Pultowa. The town was in great part burned down in 1845.

DEMPSTER, THOMAS (1579–1625), a Scottish scholar, was born at Cliftbog, Aberdeenshire, and was the twenty-fourth of twenty-nine children of the same mother. From his earliest years he gave promise of the learned attainments which gained him contemporary celebrity and posthumous fame. At a very early age, qualified by the tuition of Thomas Cargill, his classical master in Aberdeen—of whom he speaks in his *Historia Ecclesiastica* as *vir literatissimus*—he entered Pembroke Hall, Cambridge. After having studied there for some time, he went to Paris, but did not continue his studies, on account of a contagious disease which closed the schools and prostrated himself. On his recovery he hastened to Louvain, where he was selected, along with other young Scotchmen, to go to Rome for the furtherance of his education. Through the kindness of Cardinal Cajetan, he became a student in the Roman seminary; but he had hardly begun the art of Latin versification when serious illness required that he should leave Rome for change of climate. By way of Switzerland, he travelled to the Netherlands, and made a short stay at Tournay, to which he returned to teach humanity after a period of study at the university of Douai, where he distinguished himself in poetical and philosophical competitions, and took the degree of M.A. As his prospects in Tournay were discouraging, he went back to Paris, graduated as doctor of canon law, and became a regent in the college of Navarre, while yet, as he himself states, in his seventeenth year. Destined to be a wanderer through life, he soon quitted Paris to settle in Toulouse, where his stay was shortened by certain influential individuals, whose resentment he had excited by his advocacy of university rights. At Nîmes, his next resting-place, he was, by twenty-three of the twenty-four judges, chosen to the professorship of eloquence in the Protestant university or academy, which circumstance colours in some degree the conjecture of Bayle, that his zeal for the Romish faith had somewhat cooled. Having retained his chair for little more than the two years of litigation into which he had been dragged by one of the unsuccessful candidates who had libellously assailed him, and against whom the Parliament of Toulouse decided, Dempster made a journey into Spain, whence, after a brief engagement as preceptor to a son of the famous Saint-Luc, he departed for his native land. As he did not experience a favourable reception either from his relatives or from the clergy, he remained but a short time, and again betook himself to Paris. There he spent seven years with advantage to his reputation and purse, as regent in different colleges. His connection with that of Beauvais, over which he presided for a time, was brought to a close by a high-handed procedure illustrative of his fierce courage, and suggestive of his fitness for other than literary contests. In the year 1615 he accepted the invitation of King James to come to London, and was honoured and rewarded by that sovereign. But disappointed of preferment, which clerical and episcopal prejudices influenced the king to withhold, he again left England for Italy. On his arrival in Rome he was at first suspected of being a spy, but when his claims were ascertained, he was so fortunate as to receive letters of recommendation from the Pope and other influential personages to the duke of Tuscany, which issued in his appointment to the professorship of the Pandects in the university of Pisa. Writings of this date attest his competency for the chair. After his inaugural lecture his reputation and emoluments increased. In the following year, on a visit to England, his disputatious spirit brought him into collision with an English ecclesiastic, whose representation of the quarrel led the grand duke to require that Dempster should either apologize or leave the country. Rather than make the prescribed apology he quitted Florence with the intention of settling in Scotland; but he was prevailed upon by Cardinal Capponi to stay at Bologna, and in a few days, by the influence of the cardinal, was appointed to the chair of humanity, which he filled with the utmost efficiency and increase of fame. Honours, civil and literary, were bestowed upon him, and it seemed as if his wanderings and reverses had together come to an end. But the crowning calamity of his life then befell him. His light-headed wife (he married her in London in 1615), whose beauty had always been a snare to her, eloped with one of his students; and the mental distress and bodily fatigue consequent on his pursuit of the fugitives, during the dog days, predisposed him to fever, which attacked him and proved fatal. He died at Bologna in 1625, in his forty-sixth year. Morally his chief defect was the fierceness of his temperament, which involved him in many broils, and made his sword and pen alike formidable. His natural impetuosity, which so easily broke forth in ebullitions of violence, explains in large measure the looseness and recklessness of statement often found in his writings. His intellectual qualifications entitle him to be considered "one of the most learned men whom Scotland has produced." A vast memory, which was the receptacle of many books; an extraordinary familiarity with Greek and Latin, that enabled him to improvise verses in these tongues with the utmost rapidity; and a versatility which made versification, philological discussions, classical criticism, juridical expositions, biographical narratives, and historical annals congenial to him,—these endowments give him a high place among the learned. The defects of his writings were mainly due to the passionateness which often clouded his judgment, to a patriotic vanity that led to absurd exaggerations on Scotch subjects, and to the disturbing influence of a restless life. For list of his very numerous writings see Irving's *Lives of the Scottish Writers*.[1]

DEMURRAGE, in the law of merchant shipping, is the sum payable by the freighter to the shipowner for detention of the vessel in port beyond the number of days allowed for the purpose of loading or unloading. The contract between the parties generally specifies the amount per day to be paid as demurrage, and the number of days for which the ship may be detained at that rate. If it should be detained longer than the specified time of demurrage, the freighter will be entitled to damages, the measure of which will (in general, but not necessarily) be the sum agreed upon between the parties for demurrage. If no time is specified for unloading a ship, the "usual customary time" will be implied. But when there is positive contract that the goods are to be taken out by a fixed day, any delay beyond that time, not caused by the act of the shipowner himself, will make the freighter liable for demurrage, whether the delay is caused by him or not. So an agreement to load, not mentioning time, according to the customary manner, is an agreement to load within a reasonable time according to the usage of the port; and any delay beyond that time, though caused by circumstances beyond the control of the freighters, will make them liable. In calculating the number of *lay-days* (*i.e.*, the days allowed for loading, &c., and not chargeable with demurrage), Sundays will be taken into account, unless it is otherwise specified or there is a custom to the contrary. The contract to pay demurrage in a charter-party is between the freighters and the shipowner; but if demurrage is mentioned in the bill of lading, the consignee will be held to take the goods under an implied obligation to pay the demurrage, and the master may sue for it in his own name. See CHARTER-PARTY.

DEMURRER, in English law, is an objection taken to the sufficiency, in point of law, of the pleading or written statement of the other side. In equity pleading a demurrer lay only against the bill, and not against the answer; at common law any part of the pleading could be demurred to. And now in all cases any party may demur to any pleading of the opposite party, or to any part of a pleading setting up a distinct cause of action, ground of defence, set off, counter-claim, reply, or as the case may be, on the ground that the facts alleged therein do not show any cause of action or ground of defence, &c. (Judicature Act, 1875—Rules of Court, Order 28).

DENAIN, a town of France, in the department of Nord, and arrondissement of Valenciennes, 14 miles to the east of Douai, on the Scheldt Canal and the railway between Anzin and Somain. A mere village in the beginning of the present century, it has rapidly increased since 1850, and now, according to the census of 1872, possesses about 10,500 inhabitants, who are mainly engaged in coal mines, iron-smelting works, sugar factories, and distilleries. The village was the scene of the decisive victory gained, in

1712, by Marshal Villars over the allies commanded by Prince Eugene; and the battle-field is marked by a monolithic monument inscribed with the verses of Voltaire—

> Regardez dans Denain l'audacieux Villars
> Disputant le tonnerre à l'aigle des Césars.

DENBIGH, a maritime county of North Wales, is about 40 miles in its extreme length from N.W to S.E., by 36 at its greatest and 8 at its least width, where it is divided into two unequal portions. It embraces a superficial area of 392,005 statute acres, or 612½ square miles. The population in 1871 amounted to 105,102 persons, 52,866 males and 52,236 females; in 1861 it numbered 100,778, and in 1851, 92,583. The county was formed 27 Hen. VIII, out of the lordships of Denbigh, Ruthin, Rhos, and Rhyfoniog, corresponding roughly with the district called Perfeddwlad (or the midland between the Conway and the Clwyd), and the lordships of Bromfield, Yale, and Chirkland, which at an earlier period had been comprised in the possessions of Gruffydd ap Madoc, the lord of Dinas Bran. It is bounded on the W. in its northern division by the River Conway, from one of its ancient mouths in Llandrillo Bay to its source in the Migneint mountains, in the southern by the Berwyn chain, and on its extreme E. by the line of the Dee, the Ceiriog, and a portion of Offa's Dyke. The intervening surface is very irregular, and its physical character highly diversified. The N.W. portion is occupied by the bleak, bare table-land of the Hiraethog hills, which slope on the west to the valley of the Conway and on the east to the Vale of Clwyd, by which they are divided from the Clwydian range and the hills of Yale. On the N. it stretches along the bays of Colwyn and Abergele, and on the S. it is separated from Merionethshire by the Yspytty and Llangwm range. From this watershed flow tributaries of the Clwyd, the Conway, and the Dee—viz., the Elwy, the Aled, the Clywedog, the Merddwr, and the Alwen. The valleys along which some of these streams flow are, from their fertility and natural beauty, in striking contrast to their bleak surroundings. Among these may be specified the beautiful gorge of the Elwy and the broad fertile plain of the Vale of Clwyd. Of the other division, which extends from near Farndon Bridge in the N.E. to the Rhaiadr in Mochnant S.W., that portion which lies between the Rhuabon hills and the Dee is extremely rich in minerals as well as in agricultural produce; the other portion, from the Berwyn to Offa's Dyke, is comparatively wild and barren, save the pretty valley of the Tanat, the cup-like plain of Llansilin, and the lower reaches of the Ceiriog. One of the feeders of the Tanat rolls down a waterfall named Pistyll Rhaidr, which is 240 feet high; and another rises in the little lake of "Llyncaws," which nestles beneath Moel Sych, 2716 feet, the highest point in the Berwyn range, and indeed in the county. There are also a few lakes in the Hiraethóg district, the largest of which—Aled and Alwen—give rise to rivers of the same names.

Soil and Agriculture.—On the uplands the soil is too cold and poor, and the seasons too uncongenial to admit of good corn crops; but a more profitable investment is made in the rearing of mountain ponies and of sheep and black cattle, which are sold in great numbers to be fattened in the Midland Counties of England, for the London market. Less than a third of the surface is under cultivation; and the agricultural acreage was thus distributed in the years 1873 and 1876:—

	Corn Crops.	Green Crops.	Grass under rotation.
1873	65,488	15,461	41,699
1876	61,416	14,334	42,837

Of the corn crops, oats occupy much the largest amount of acreage, and of green crops, turnips.

The live stock of the county in the same years was distributed thus:—

	Cattle.	Sheep.	Pigs.	Horses.
1873.......	58,122	273,721	24,240	11,396
1876.......	56,975	258,464	24,438	11,789

In the valleys, and indeed far up the sunny slopes of the hills, the latest improvements in agriculture may be observed, and the reaping hook and the flail are fast disappearing before the reaping and the thrashing machines. This progress has been largely due to several Farmers' Clubs, such as the Denbighshire and Flintshire, the Vale of Conway, and the Cerrigydrudion. But the railways have done still more. The Vale of Llanrwst, the Vale of Clwyd, and the Denbigh and Chester lines have linked their respective districts to the great trunk line of the London and North Western; whilst the Denbigh, Ruthin, and Corwen, the Corwen and Rhuabon, the Wrexham and Connah's Quay, and yet again the Rhos-llanerchrugog and the Glyn Ceiriog tramways, have done the same for the Great Western,—thus opening all the main arteries of the county alike to external and internal communication, and vastly developing its resources. Down the picturesque Vale of Llangollen also runs the great Holyhead Road—in its day the principal means of communication between London and Ireland, and for engineering skill, excellency of workmanship, and beauty of scenery probably still unsurpassed in the United Kingdom.

The *geology* of the county is full of interest, as it develops all the principal strata that intervene between the Lower Silurian and the Triassic series. In the Lower Silurian district, which extends from the southern boundary to the Ceiriog, the Llandeilo formation of the eastern slopes of the Berwyn and the Bala beds of shelly sandstone are traversed east and west by bands of intrusive felspathic porphyry and ashes; northwards from the Ceiriog to the limestone fringe at Llandrillo, the Wenlock shale of the Upper Silurian covers the entire mass of the Hiraethog and Clwydian hills, but verging on its western slopes into the Denbighshire grit, which may be traced southward in a continuous line from the mouth of the Conway as far a Llanddewi Ystrad Enni in Radnorshire. On its eastern slope a narrow broken band of the Old Red crops up along the Vale of Clwyd and in Eglwyseg. Resting upon this the Carboniferous Limestone extends from Llanymynach, its extreme southern point, to the Cyrnybrain fault, and there forks into two divisions that terminate respectively in the Great Orme's Head and in Talargoch, and are separated from each other by the denuded shales of the Moel Famma range. In the Vale of Clwyd the limestone underlies the New Red Sandstone, and in the eastern division it is itself overlaid by the millstone grit of Rhuabon and Minera, and by a long reach of the coal measures which near Wrexham are 4½ miles in breadth. Eastward of these a broad strip of the Permian succeeds, and yet again between this and the Dee the ground is occupied—as in the Vale of Clwyd—by the New Red.

The *mineral resources* of the county under these conditions are naturally considerable. Paving flags are raised at Nantglyn; slates and slabs for ornamental purposes, on a large scale, on Rhiwfelen, near Llangollen; and slates at Glyn Ceiriog. The limestone is used largely, and exported extensively for building, fluxing, and agricultural purposes; and at Brymbo there is a fine layer of China stone. The sandstones of Cefn Rhuabon are wrought into grindstones, and the grit is used for millstones. The coal measures at Chirk, Rhuabon, and Brymbo are very productive, the number of collieries in 1875 being 61, and the quantity raised annually estimated at 1,379,560 tons. In close contiguity to the coal seams, ironstone is found; and the six furnaces in blast at Rhuabon and at Brymbo (where John Wilkinson was the first to introduce the industry) produced (together with one in Flintshire) in the same year 55,099 tons of pig iron, valued at £232,000. Lead ore is another and still more important item; the most productive mine has been the Great Minera, which yields profits of about £30,000 a year. The seven mines in the county produced, in 1875, 2600 tons of lead ore, 1954 tons of lead, and 10,873 ounces of silver. One of the latest industries introduced has been the manufacture of dynamite in the valley of the Ceiriog. At the village of Llansantffraid, and at Llangollen, there are woollen factories.

The *principal towns* are Wrexham (population 8576), the centre of the mining district, noted for its beautiful church tower, and recently selected as the military centre for North Wales; Denbigh, the nominal capital (4276), notable for its castle ruins and Howell's female orphan school; Ruthin (3298), where the assizes are held, famous for its grammar school and its fine castle lately rebuilt; Llangollen, with its beautiful scenery; Llanrwst, with its church monuments and rood-loft, its bridge, and salmon fishing; and Holt, with its ancient ruined castle.

As regards the *ownership of the land*, the county (in 1873) was divided among 5708 separate proprietors, whose total rental was estimated at £450,421. Of the owners 3436, or 60 per cent., held less than 1 acre, about the same proportion as in the neighbouring county of Flint; while the average of small proprietors in all England was 71 per cent. The average holding amounted to 61 acres, while that of all England was 34, and the average value per acre was £1, 5s. 3d., as against £3, 0s. 2d. for all England.

The following proprietors held more than 5000 acres in the above year—viz., Sir Watkin W. Wynn. 33,998 acres; J. L. Wynne, Coed Côch, 10,197; Lord Bagot, Pool Park, 9385; H. R. Hughes, Kinmel, 8561; C. W. Finch, Pentrefoelas, 8025; B. W. Wynne, Garthewin, 6435; C. S. Mainwaring, Galltfaenan, 6428; R. M. Biddulph, Chirk Castle, 5513; W. C. West, Ruthin Castle, 5457; and Sir Hugh Williams, Bodelwyddan, 5360.

For civil purposes, the county is divided into 6 hundreds, 9 petty sessional divisions, 3 police districts, 5 highway districts, and 9 lieutenancy subdivisions; and it forms a part of the North Wales circuit, with a winter assize. For parliamentary purposes the county is an undivided constituency, returning two representatives to Parliament, while the contributory boroughs of Denbigh, Ruthin, Wrexham, and Holt return one member. Ecclesiastically the county lies entirely within the diocese of St Asaph; the number of parishes and ecclesiastical districts is 61, comprised under 6 deaneries within the archdeaconry of St Asaph. In educational matters, the Latin or second-grade schools comprise the endowed grammar schools of Holt, founded in 1661; Denbigh, in 1726; Wrexham, in 1603; Rhuabon, by Vicar Robinson, in 1703; and Llanrwst, by Sir John Wynne of Gwydir, in 1610. The Greek, or highest grade, is supplied by that of Ruthin, founded in 1574 by Dr Gabriel Goodman, dean of Westminster, a native of the town and the refounder of its Christ's Hospital. This school has been the nursery of many eminent Welshmen.

Antiquities.—Of prehistoric remains, the caves in the limestone escarpments of Cefn, that overhang the valley of the Elwy, yield a noteworthy supply. They contain remains of the hippopotamus, elephant, rhinoceros, lion, hyena, bear, reindeer, &c. The glutton was found in the neighbouring cave of Plas Heaton, felstone implements in the adjoining Bont Newydd cave, and a polished stone-axe in a similar one at Rhosdigre,—all in the same range. Near Cefn, too, was discovered in 1869, on the opening of a carnedd in Tyddyn Bleiddyn, a chambered tomb containing skeletons, which, on comparison with a similar type found at Perthi Chwareu, gave rise to the title of the "Platycnemic Men of Denbighshire."

A writer in the *Archæologia Cambrensis*, 1855, p. 270, has given a summary of the antiquities of the county, most of which may be put down as British or at least Celtic. Traces of the Romans exist at Clawdd Coch (Mediolanum ?), Penygaer, Bwlch, Penbarras: and their roads passed from Deva (Chester) to Segontium (Carnarvon) and to Mons Heriri (Tomen-y-Mur) respectively. To the Romano-British period belong the inscribed stones at Gwytherin and Pentrevoelas. The Pillar of "Eliseg," near Valle Crucis, tells of Brochmael and the struggle against the invading Northumbrians under Ethelfrith, 613 A.D.; whilst the Dyke of "Offa" hands down the memory of the Mercian advance. Adjoining this last, and running side by side with it, is the similar but shorter earthwork called "Watt's Dyke," of debateable origin and purpose.

Of the earliest *castles* the ruins of "Dinas Bran" still crown the conical hill that overhangs Llangollen. Denbigh, which has been compared to Stirling for site and beauty—built in the time of Edward I. and destroyed in the civil wars—overlooks the Vale of Clwyd; Holt, on the banks of the Dee, probably the Caerlegion of Bede, shared the same fate. Ruthin, overthrown at the same time, has been twice rebuilt within this century. Chirk alone has weathered the storms of time and war, and is still occupied as a family residence.

Among the early *ecclesiastical buildings* and *remains* we may name the Cistercian abbey of Valle Crucis and the Carmelite chapel at Denbigh, both now in decay; the cloisters at Ruthin, and the old house of Brynyffynnon, sometimes called the nunnery at Wrexham; the collegiate churches of Wrexham and Ruthin; the beautiful rood-lofts and screens of Llanrwst, Gresford, and Derwen; the portrait brasses and monuments in the Gwydir Chapel, Llanrwst, and at Whitchurch, Denbigh; the churchyard cross at Derwen; and the stained glass at Gresford and Llanrhaiadr in Dyffryn Clwyd.

The principal *gentlemen's seats* of Tudor date comprise Gwydir (Lady Willoughby d'Eresby), Brynkinallt (Lord A. E. Hill-Trevor), Trefalyn (B. T. Boscawen Griffith), Llwyn Ynn (Colonel Heygarth), Cadwgan (in decay). Those of later erection include Llangedwyn and Wynnstay (Sir W. Williams Wynn, Bart.), Kinmel (H. R. Hughes), Pool Park (Lord Bagot), Havodunos (H. R. Sandbach), Voelas (Colonel Wynne Finch), Llanerch (Whitehall Dod), Gwrych Castle (R. B. Hesketh), Plas Power (T. Fitzhugh), Llandysilio Hall (C. F. Beyer), Acton Park (Sir R. H. Cunliffe, Bart.), Galltfaenan (T. Mainwaring), Eriviatt (J.J. Ffoulkes), Glanywern (P. S. Humberston), Gelligynan (J. Carstairs Jones).

Among the books bearing upon the history of the county are the following:—the *Archæologia Cambrensis*, or Journal of the Cambrian Archæological Association; Pennant's *Tours in Wales*; Lewis, *Topographical Dictionary*: Thomas, *History of the Diocese of St Asaph*; *Annals of Counties and County Families of Wales*, by Dr. Nicholas; Yorke's *Royal Tribes of Wales*; *Memoirs of the Gwydir Family*, by Sir John Wynne; *Memoirs of the Goodmans*, by R. Newcome; *Accounts of Denbigh and of Ruthin*, by the same; *Ancient and Modern Denbigh*, by John Williams; *Records of the Lordship of Denbigh*, by the same; *Handbook of the Vale of Clwyd*, by Davies; *Wrexham and its Neighbourhood*, by Jones. The village churches of the county have been well illustrated by Lloyd Williams and Underwood, architects, of Denbigh. (D. R. T.)

DENDERAH, an Arab village in Upper Egypt, about 28 miles north of Thebes, marking the site and preserving the name of the ancient city of Tentyra, which was the capital of the Tentyrite nome and the seat of a famous temple dedicated to Athor, the Egyptian Venus. The temple, which is remarkable as the first well-preserved and unencumbered building of the kind to be seen on a voyage up the Nile, lies about a mile and a half from the left bank of the river, within a square inclosure formed by four crude-brick walls, each 1000 feet in length, and entered by means of a stone-built gateway, adorned with sculptures representing Domitian and Trajan engaged in acts of worship. The portico of the temple is about 135 feet in width, and is architecturally one of the richest and most beautiful structures of its class. It is supported by 24 columns, four deep, nearly 50 feet in height, and having a diameter of more than 7 feet at the thickest part. The capitals have sculptured on each of their four sides a full face of Athor, crowned by a small shrine or temple. The sculptures, which are of less merit than the architecture, represent offerings made by some of the earlier Cæsars; and on the ceiling are various mystical subjects, probably of an astronomical import, and the famous quadrangular zodiac, which will be referred to again in the latter part of this article. Passing through the back wall of the portico (which was at one time the front wall of the temple) the visitor enters a hall supported by three columns on each side, with cup-shaped capitals beneath those formed by the temple-crowned faces of Athor; and thence, proceeding right onwards through two similar halls, he reaches the sanctuary, which is isolated by a passage running all round. On each side of the temple are many small apartments, and two entrance-ways from the exterior, as well as singular inclined passages in the walls, two of which are entered from the sides of the portico. All the chambers and passages, except the two last mentioned, are profusely covered with sculptures and inscriptions of a religious character, chiefly depicting and narrating the piety of the sovereigns by whom the temple was erected. The royal names have not always been filled in, but, where they have been sculptured, they are generally those of the last Cleopatra, and Cæsarion, her son by Julius Cæsar. A staircase on the left-hand side of the second chamber, behind the portico, conducts to the roof of the temple. Here are a sort of chapel and some small chambers, one of which is very interesting, because its sculptures relate to the story of Osiris. The exterior of the temple is as completely covered with sculptures as the interior. Among the figures represented there are those of Cleopatra and Cæsarion; but they cannot be supposed to bear any resemblance, since they belong not alone to a conventional art, but almost to its lowest period. There are two smaller temples within the same inclosure as the great temple of Athor, one dedicated to Isis in the thirty-first year of Augustus, and the other usually known as the *Typhonium*, from the representations of Typhon on the capitals of its columns, but probably connected with the worship of Athor.

The name Denderah, in Coptic *Tentore*, and in Greek *Tentyra* or *Tentyris*, used to be regarded as equivalent to *Thy-n-Athor*, "the abode of Athor;" but, according to an hypothesis started by Brugsch, and since proved by the investigations of Dümichen, it is now explained as "the Land of the Hippopotamus" (*Tan-ta-rer*), in allusion to the use of this animal as a symbol of the goddess Isis, who is regularly identified with Athor in the Denderah inscriptions. The sacred name was Aa, and a list is still extant of 136 substitutes or *epitheta ornantia*, such as the house of enlightened souls, the house of gladness, the house of the weeping and laughing of the sun-god Ra. Though, as already indicated, the present temples of Denderah belong to the latest period of Egyptian art, the original occupation of the site for sacred buildings dates from the earliest times. According to an inscription discovered and published by Dümichen, who spent three months in personal exploration of the ruins, a restoration of the temple was effected by Thothmes III. of the 18th dynasty, in keeping with an ancient plan belonging to the reign of Chufu, which had been found, in the time of Pheops, "in the interior of a wall of the Southern House."

The people of Tentyra were remarkable for their hostility to the crocodile and its worshippers; and in their attacks on the reptile they displayed so much audacity and skill that the Romans in the time of Strabo brought a number of them over to Italy as a new attraction for the amphitheatre. In modern times the name of Denderah has become especially famous on account of the two designs known respectively as the circular and the quadrangular zodiac, which have been the subject of the most elaborate discussion among Egyptologists. The former was discovered by General Desaix about the end of last century, and at length in 1820 removed by M. Lelorrain to Paris, where it was purchased by the Government for 150,000 francs, and deposited in the *Bibliothèque Impériale*; the latter, first observed by M. Dupuis, a member of the French commission, is still in its original position, as, instead of occupying a comparatively small and portable disk, it forms, as already indicated, the decoration of two extremities of the temple portico, and thus consists of two corresponding halves. Copies of both the zodiacs have frequently been made, and are easily accessible in F. C. Lauth's *Les Zodiaques de Denderah*, Munich, 1865, a memoir in which he maintains that both designs are commemorative calendars of the Greco-Roman period.

See also Wilkinson's *Ancient Egyptians*; Letronne, *Observations sur l'objet des représentations zodiacales de l'antiquité*, Paris, 1824; Halma, *Examen et explications des Zodiaques Égyptiennes*, 1822; Lepsius's *Zeitschrift für Ægyptische Sprache und Alterthumskunde*, *passim*; Chabas, *Sur l'antiquité de Denderah*; and especially Dümichen's *Neueste Mittheilungen aus Aegypten*, and *Bauurkunde der Tempelanlagen von Denderah*, 1864.

DENDERMONDE, in French *Termonde*, a town of Belgium, in the province of East Flanders, about 18 miles east of Ghent, so called from its situation at the mouth of the Dender, a right-hand affluent of the Scheldt. It is the seat of a court of primary instance, has a hospital, a lunatic asylum, two orphanages, an academy of architecture and design, a public library, and a picture gallery, and carries on the manufacture of woollens, linens, ropes, paper, tobacco, and various other branches of industry. In the old church of Notre Dame, which was raised to collegiate rank in 1106, there are two paintings by Vandyck—a Crucifixion and an Adoration of the Shepherds. Till 1264, when it passed into the possession of Robert Bethune, count of Flanders, Dendermonde was governed in direct dependence on the empire. Its name frequently occurs in the history of the various wars in the Low Countries, the most memorable occasions being in 1667, when it defended itself against Louis XIV. by laying the neighbourhood under water; in 1706, when it was besieged and captured by General Churchill; and in 1745, when it was taken by the French. The fortifications were dismantled by Joseph II. in 1784; but they were restored in 1822. The bridge over the Scheldt dates from 1825. Population in 1866, 8300.

DENHAM, SIR JOHN (1615–1668), a royalist poet, who has won a place among the foremost British authors more by a happy accident than by any decided genius, was the only son of Sir John Denham, lord chief baron of the Exchequer in Ireland, and was born in Dublin in 1615. In 1617 his father was promoted to the rank of baron of the Exchequer in England, and removed to London with his family. The future poet attended a grammar school in London, and in Michaelmas term 1631 was removed to Oxford, where he was entered a gentleman commoner of Trinity College. Having taken his degree of B.A., he began the study of the law at Lincoln's Inn in 1634; but the character he had maintained at Oxford, of being "a slow, dreaming young man," gave way to a scandalous reputation for gambling, by which he beggared himself and seriously embarrassed his father. We learn that, by way of penance, he wrote at this time an *Essay against Gaming*, whether in prose or verse is not recorded. After his father's death the habit became still more dominant, and he squandered a fortune. It was a surprise to every one, therefore, when in 1642 he suddenly, as Waller said, "broke out like the Irish rebellion, threescore thousand strong, when no one was aware, nor in the least expected it," by publishing in that year two most successful volumes of verse. The first of these was *The Sophy*, a tragedy in five acts, a thin folio, the theme of which was a Turkish tale of blood and intrigue, drawn from Sir Thomas Herbert's travels. This, Denham's only dramatic performance, is tame and correct, without passion, but free from the faults of some of the minor authors of the time. It was successful, but it enjoyed nothing of the unparalleled popularity of his simultaneous venture, the descriptive poem of *Cooper's Hill*, the first edition of which in quarto was anonymous. In this famous piece no entirely new style was attempted, for Ben Jonson had led the way in theme and Cowley in manner; but it had a smooth grace and a polished antithesis that were doubtful merits in poetry, but extremely dear to the rising generation. One quatrain, out of the three or four hundred lines of reflection and description, has been universally praised, and forms one of our most familiar quotations. Addressing the Thames, the poet says—

> "O could I flow like thee, and make thy stream
> My great example, as it is my theme!
> Though deep, yet clear; though gentle, yet not dull;
> Strong without rage, without o'erflowing full."

Brought into royal notice by his poems, Denham was appointed high sheriff for Surrey and governor of Farnham Castle; but he showed no military talent, and soon followed the king to Oxford. During the civil war he served the queen mother, and was intrusted with the letters in cipher that Cowley wrote to the king, which he managed to deliver into Charles's hands. Being detected, however, he was obliged to escape into France. In April 1648 he is said to have conveyed the young duke of York from St James's to Paris; it is certain that, later in that year, he was sent in company with Lord Crofts, as ambassador to Poland, to obtain money for the king, and he succeeded in bringing back £10,000. In 1652 he returned, a ruined man, to England, and resided as the guest of the earl of Pembroke at Wilton for a year. He now disappears until the Restoration. When Charles II. returned, Denham was made surveyor-general and Knight of the Bath, and seems to have been well provided for; but his subsequent life was far from happy, for his second wife, a young woman of great beauty, was seduced by the duke of York, and became his mistress. This catastrophe, which is abundantly noticed in the current literature of that day, shattered the old poet's reason; and he recovered from his insanity only to die, at his house near Whitehall, on the 10th of March 1668. He was buried in Westminster Abbey. In the same year, 1668, his works were collected in a single volume, entitled *Poems and Translations*. This included, besides *Cooper's Hill* and *The Sophy*, a fragment of an epic on the destruction of Troy, some beautiful lines on the death of Cowley, written a few months before his own decease, a didactic poem on the progress of learning, and some translations. Notwithstanding the fame of *Cooper's Hill*, which Pope imitated in his *Windsor Forest*, Denham's poems have not been edited in modern times. He was one of the very first to note the tendency towards rhetorical and gallicized forms in public taste, and to gratify the new fashion. But to speak of him, as was once customary, as a great reformer of metre and fashioner of language, is to fail to realize the limitations of his talent.

DENINA, Carlo Giovanni Maria (1731–1813), an Italian author, was born at Revello, Piedmont, in 1731, and was educated at Saluzzo and Turin. In 1753 he was appointed to the chair of humanity at Pignerol, but he was soon compelled by the influence of the Jesuits to retire from it. In 1756 he graduated as doctor in theology, and began authorship with a theological treatise. Promoted to the professorship of humanity and rhetoric in the college of Turin, he showed his literary activity in his great work *On the Revolutions of Italy*, and in other writings. Collegiate honours accompanied the issue of its successive volumes, which, however, at the same time, multiplied his foes and stimulated their hatred. In 1782 he repaired to Berlin, where he remained for many years, in the course of which he published various works. In 1804 he went to Paris as the imperial librarian, to which office he had been appointed by Napoleon, who was attracted to him at Metz. He died there on 5th December 1813. Denina's reputation is mainly founded on his *History of the Revolutions of Italy*, in which he combines a philosophic spirit and the habit of accurate narration.

DENIS, or Dionysius, St, the patron saint of France, flourished in the middle of the 3d century. What is known of his life rests chiefly on the not altogether trustworthy authority of Gregory of Tours, according to which he was the leader of a band of seven missionaries who came from Rome to Gaul, and founded churches in seven cities. Denis settled in Paris, where he made many converts, and became the first Christian bishop. In 272, during the persecution of Valerian, he was beheaded along with some of his companions. Another account places the date of the martyrdom between 286 and 290. The well-known legend, according to which St Denis after his decapitation walked two miles with his head in his hands, probably originated in a mistaken interpretation of pictures intended to indicate the manner of his death. It was not unusual to represent a martyr by decapitation bearing his head in his hands as an offering, and there are effigies of St Denis with the mitred head in its natural position and the head in the hands as well. The bodies of the three martyrs were thrown into the River Seine, but were afterwards recovered and honourably buried by a Christian lady named Catalla, not far from the place where they suffered. Over the tomb a chapel was built, which in the 5th century was replaced by a church. The famous abbey of St Denis was founded on the same spot by Dagobert in the 7th century. A later legend of the French church, following the tradition of the Greek Church, identified St Denis of Paris with Dionysius the Areopagite, who was converted by St Paul. One of the gravest charges brought against Abelard was the fact that he denied this identity on the authority of a passage in Bede. St Denis was gradually adopted as the patron saint of the French people, St Louis being the patron saint of the royal family. His festival is celebrated on the 9th October.

DENIZEN, an alien who obtains by letters patent (*ex donatione regis*) certain of the privileges of a British subject. He cannot be a member of the Privy Council or of Parliament, or hold any civil or military office of trust, or take a grant of land from the Crown. The Naturalization Act, 1870, provides that nothing therein contained shall affect the grant of any letters of denization by Her Majesty. See Naturalization.

DENMAN, Thomas, first Baron (1779–1854), one of the most distinguished of the chief-justices of England, was born at London, the son of a well-known physician, 23d July 1779. He received the rudiments of his educa tion at Palgrave School, near Diss, in Norfolk, at that time conducted by Mrs Barbauld. At ten years of age he was sent to Eton, and he afterwards was entered at St John's College, Cambridge, where he graduated in 1800. He took only an ordinary degree, having a positive distaste for mathematics. Soon after leaving Cambridge he married; and in 1806 he was called to the bar at Lincoln's Inn, and at once entered upon practice. His success was rapid, and in a few years he attained a position at the bar second only to that of Brougham and Scarlett. He distinguished himself by his eloquent defence of the Luddites; but his most brilliant appearance was as one of the counsel for Queen Caroline. His speech before the Lords was very powerful, and some competent judges even considered it not inferior to Brougham's. It contained one or two daring passages, which made the king his bitter enemy, and retarded his legal promotion. At the general election of 1818 he was returned M.P. for Wareham, and at once took his seat with the Whig opposition. In the following year he was returned for Nottingham, for which place he continued to sit till his elevation to the bench in 1832. His liberal principles had caused his exclusion from office till in 1822 he was appointed common serjeant by the corporation of London. In 1830 he was made attorney-general under Lord Grey's administration. Two years later he was made lord chief-justice of the King's Bench, and in 1834 he was raised to the peerage. As a judge he is most celebrated for his decision in the important privilege case of Stockdale *v.* Hansard; but he was never ranked as a profound lawyer. In 1850 he resigned the chief-justiceship of the Queen's Bench and retired into private life. He died September 26, 1854.

See Memoir of *Thomas, first Lord Denman*, by Sir Joseph Arnould, 2 vols. 1873.

DENMARK. The kingdom of Denmark, once a considerable power in Europe, but now confined within very narrow limits, comprises the peninsula of Jutland on the European continent and a group of islands in the Baltic. It lies between 54° 34′ and 57° 44′ 52″ N. lat., and between 8° 4′ and 12° 34′ E. long., with the exception of the Island of Bornholm, which lies between 14° 42′ and 15° 10′ E. long. It is bounded N. by the Skagerrack; E. by the Cattegat, the Sound, and the Baltic; S. by the Baltic, the Little Belt, and the German duchy of Schleswig; and W. by the North Sea. Its area amounts to 14,553 English square miles. With the exception of Bornholm, which is situated considerably to the east between Pomerania and Sweden, the islands all lie close to one another, and form a cluster that almost closes the entrance to the Baltic. The largest island, and the nearest to Sweden, is Zealand, or Sjælland; the next in size, Funen, or Fyen, is divided from Jutland by only a minute channel; Lolland, Bornholm, Falster, Langeland, Möen, Samsö, Ærö, Læsö, Taasinge, Anholt, are, in order of their importance, the other noticeable islands.

Coast and Surface.—The coasts of Denmark is generally low and sandy; the whole western shore of Jutland is a succession of sand-ridges and shallow lagoons, very dangerous to shipping. Skagen, or the Scaw, a long, low, sandy point, stretches far into the northern sea, dividing the Skagerrack from the Cattegat. On the eastern side the coast is not so inhospitable; on the contrary there are several excellent havens, especially on the islands. Nowhere, however, is the coast very high, except at one or two points in Jutland, and at the eastern extremity of Möen, where limestone cliffs exist. The long fjords, or firths, into which the proximity of the islands divides the coast, form a distinguishing feature. There is little variety in the surface of Denmark. It is uniformly low, the highest point in the whole country, Himmelbjerget in Jutland, being only 550 feet above the sea. Denm however, is nowhere low in the sense in which Holl is; the country is pleasantly diversified, and rise little at the coast even though it remains flat inl The landscape of the islands and the south-eas part of Jutland is rich in beech-woods, corn-fi and meadows, and even the minute islets are green fertile. In the western and northern districts of Jutl this gives place to a wide expanse of moorland, cov with heather, and ending at the sea in low, whitish- cliffs. There is a melancholy charm even about t monotonous tracts, and it cannot be said that Denmar wanting in natural beauty, though of a quiet order. I obvious that in such a country there can exist no riv The Gudenaa, the longest of the Danish streams, is li more than a brook. Nor are there any large lakes. Pi of water of considerable size, however, are numerous these the largest are the Arresö and the Esromsö in Zeal and the chain of lakes of various names near Silkebor Jutland. Many of these meres, overhung with thick be woods, are extremely beautiful.

The *climate* presents no remarkable features. country lies at the division between Eastern and Wes Europe, and partakes of the characteristics of both. climate differs from that of Scotland (which is in same latitude) less in the nature of the seasons tha the rapidity of their transitions. The following are mean annual temperature (Fahr.):—

	Copenhagen.	Frederikshavn
Winter	32·9	32·
Spring	43·7	43·02
Summer	63·05	60·65
Autumn	49·1	48·65
Whole year	47·18	46·00

Snow falls on an average on thirty days in the year, westerly winds are more prevalent than easterly in the r of 16 to 10. Storms of wind and rain are exceedin frequent, particularly in July and August. In the dist of Aalborg, in the north of Jutland, a cold and dry N. wind called *skai* prevails in May and June, and is exce ingly destructive to vegetation; while along the west co of the peninsula similar effects are produced by a salt m which carries its influence from 15 to 30 miles inland.

The *fauna* of Denmark presents no peculiarity. The w animals and birds are those of the rest of Central Euro The larger quadrupeds are all extinct; even the deer—which was formerly so abundant that in a sin hunt in Jutland in August 1593 no less than 1600 head deer were killed—is now only to be met with in preser In the kjökken-möddings and elsewhere, however, are fo vestiges which prove that the urochs, the wild boar, beaver, the bear, and the wolf have all existed since arrival of man. The usual domestic animals are abunda found in the Denmark of to-day, with the exception of goat, which is very uncommon.

In her *flora*, Denmark presents greater variety t would have been anticipated from so low and monoton a country. The ordinary forms of the north of Eur grow with great luxuriance in the mild air and prote soil of the islands and the eastern coast; while on heaths and along the sandhills on the Atlantic side t flourish a great variety of unusual species.

The Danish forest is almost exclusively made up of be a tree which thrives better in Denmark than in any o country of Europe. The oak and ash are now rare, thoug ancient times both took a prominent place in clothing Danish islands. The almost universal predominance of beech dates from about two centuries ago. In the r of Christian IV. the oak was still the characteristic Da tree. No conifer grows in Denmark, except under ca

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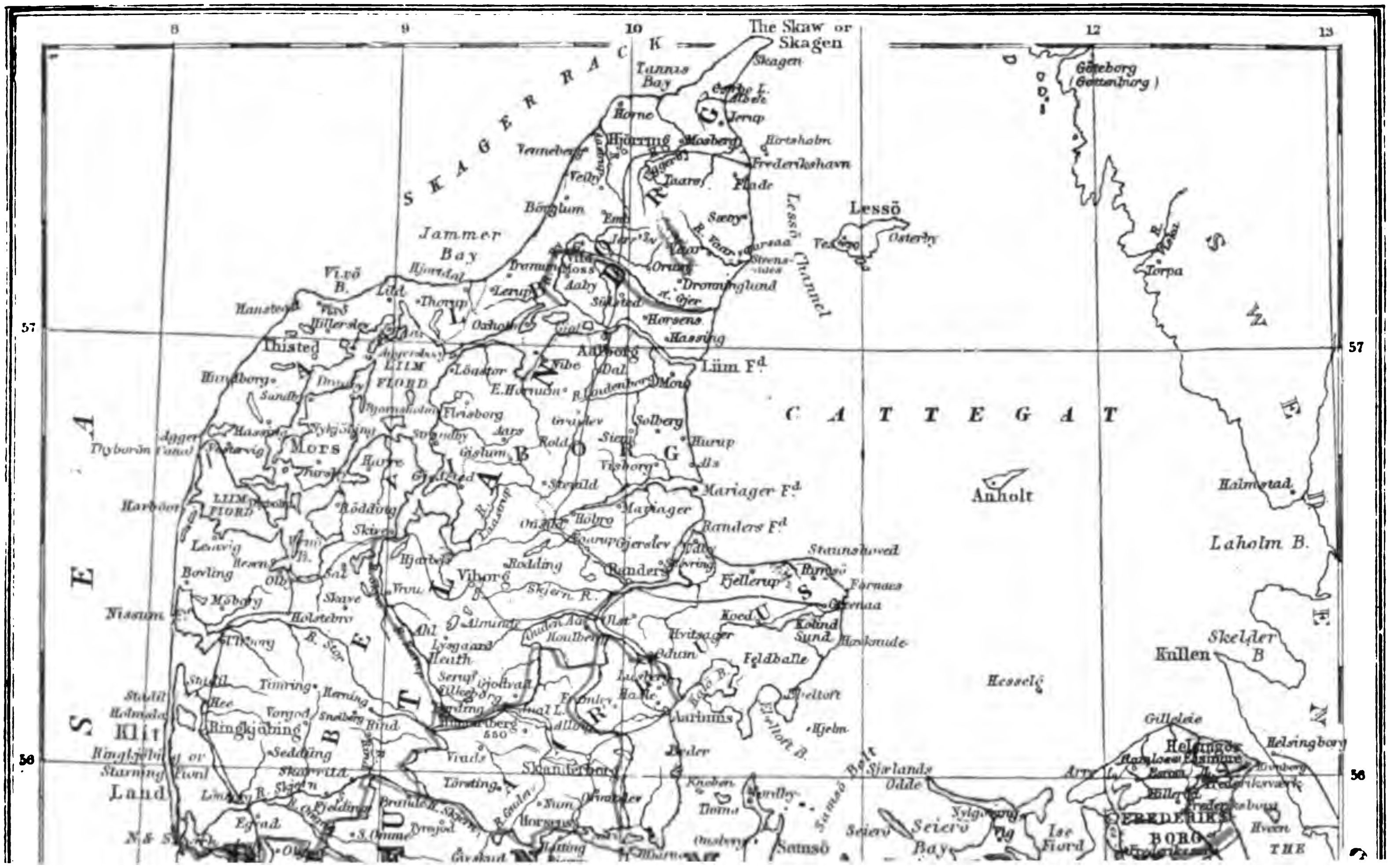
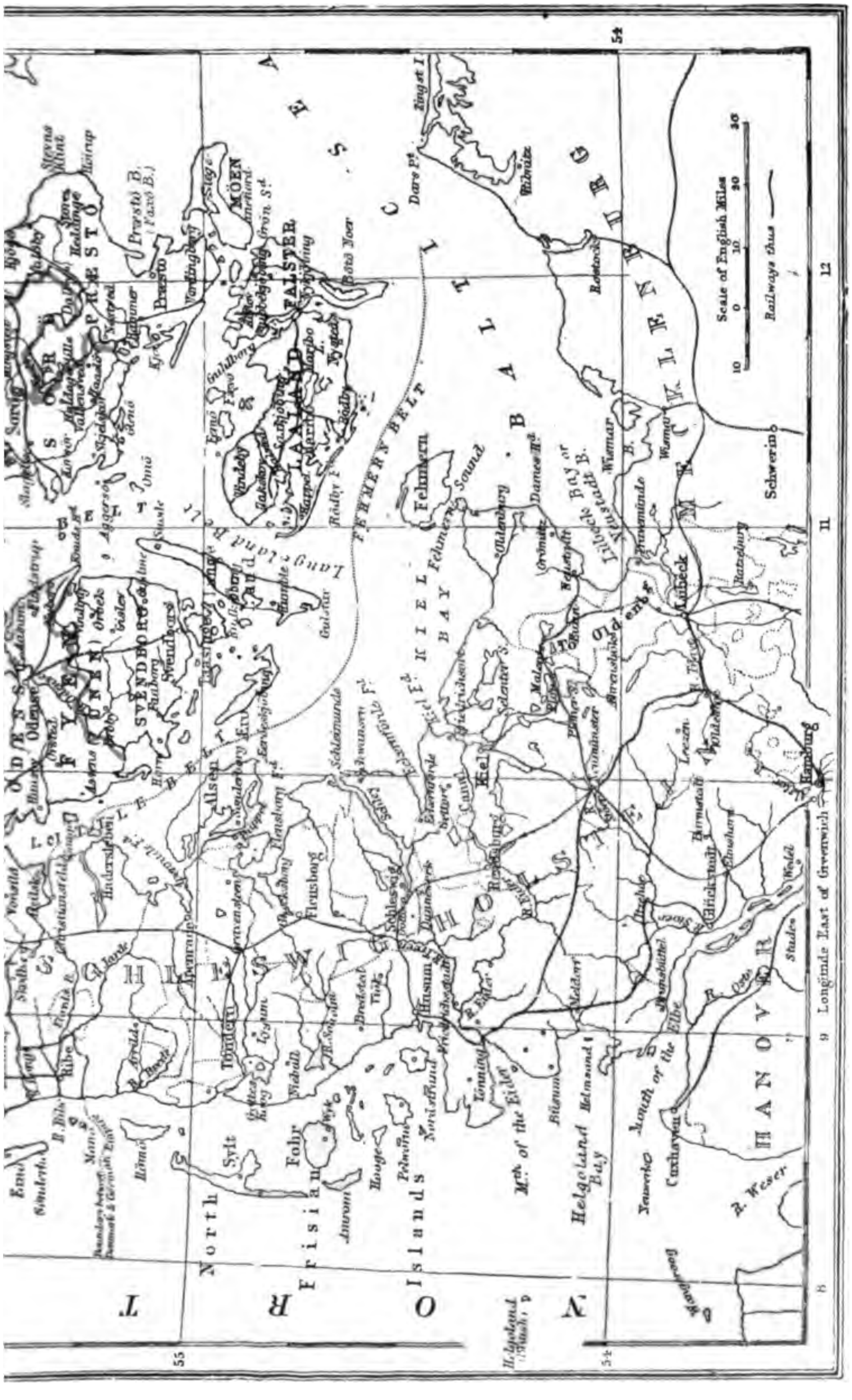
DENMARK

PLATE I.





N o r t h
F r i s i a n
I s l a n d s
Sylt
Fohr
Amrom
Helgoland Bay
Mth. of the Eider
Mouth of the Elbe
H A N O V E R
Cuxhaven
Stade
R. Weser
R. Oste
Tondern
Ribe
Husum
Tönning
Friedrichstadt
Apenrade
Hadersleben
Flensburg
Sonderburg
Alsen
Schleswig
Eckernförde
Kiel
Rendsburg
Itzehoe
Glückstadt
Pinneberg
Hamburg
Altona
Elmshorn
Neumünster
Segeberg
Oldesloe
Plön
Eutin
Lübeck
Ratzeburg
Travemünde
Neustadt
Oldenburg
Heiligenhafen
Fehmern
Fehmern Sound
FEHMERN BELT
KIEL BAY
Lübeck Bay or Neustadt B.
Wismar
Schwerin
Rostock
Ribnitz
M E C K L E N B U R G
B A L T I C   S E A
Dars Pt.
Zingst I.
Langeland
Langeland Belt
Rudkjöbing
SVENDBORG
Svendborg
Faaborg
FYEN
FUNEN
Odense
Nyborg
Aerö
Aeröskjöbing
LAALAND
Nakskov
Maribo
Nysted
Rödby
FALSTER
Nykjöbing
Gjedser
MÖEN
Stege
Vordingborg
Prestö
Præstö B. (Faxö B.)
PRESTÖ
SORÖ
Skjelskör
Korsör
Stevns Klint
Kiöge
Omö
Femö
Fejö
Askö
Gulden
Sprogö
Great Belt
Little Belt
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Heligoland (Brit.)

cultivation. In Bornholm, it should be mentioned, the flora is more like that of Sweden; not the beech, but the pine, birch, and ash are the most abundant trees.

Agriculture.—Denmark is pre-eminently a corn land, and the cereals grown are all the usual European varieties; in the light and sandy soils buckwheat takes the place of rye, wheat, barley, and oats. The potato is largely cultivated, as well as pease, clover, vetches, and turnips. The usual North European fruit-trees and bushes produce good crops, and even peaches and apricots ripen well in sheltered places. The nectarine, however, is not known as a hardy fruit. The produce of grass is not very large, the fertility of the ground tempting the farmers to use it all for grain. In relation to its size there is no country in Europe, except Belgium and England, that can compete with Denmark as a corn-producer. According to the official returns of 1871, there were in that year 11,367,310 acres under some sort of crop, fallow, or in grass, or about 65 per cent. of the total area of the country; 5,894,495 acres more were in woods and forests. The following table will show the distribution of the crops, in English statute acres:—

Wheat	128,858	Carrots, turnips, cabbage, &c.	12,753
Barley	689,734	Rape and other oil seeds	3,937
Oats	810,435	Flax and hemp	17,686
Rye	561,607	Bare fallow	538,354
Beans and pease	80,366	Grass under rotation.	307,460
Buckwheat	45,180	Permanent pasture	2,433,356
Mixed corn	123,606		
Potatoes	97,317		

Of the actual production of the above crops no estimate has been furnished by the Statistical Bureau. The land in Denmark is minutely subdivided, owing partly to the state of the law, which interdicts the union of small farms, and encourages in various ways the parcelling out of landed property.

The large estates of the nobles are generally in the hands of farmers; but the greater part of the land is possessed by the peasantry, who maintain an hereditary attachment to their ancestral farms. Below these are the small peasant estates (generally capable of supporting from 10 to 15 cows); there is also a class of cottar freeholders called *junsters*, with land sufficient to keep one or two cows. The most remarkable feature in the Danish husbandry is, that greater value is attached to the produce of the dairy than to that of the soil, and that much of the horse power is withdrawn from the fields and employed in the work of the dairy. Independently of the stock maintained in the large dairy farms, this branch of industry has given rise to a distinct class of men, hiring cows by the year. Notwithstanding the great extent of pasture, the country produces more grain than is required for its own consumption.

The *mineral products* of Denmark are too unimportant to require enumeration. It is one of the poorest countries of Europe in this particular. It is rich, however, in clays, while it should be stated that in the island of Bornholm there are quarries of freestone and marble. There is but little coal yet discovered in the country.

Manufactures are not carried on to any great extent. The most notable Danish manufacture is the fabrication of porcelain. The nucleus of this important industry was a factory started in 1772, by F. H. Müller, for the making of china out of Bornholm clay. In 1779 it passed into the hands of the state, and has remained there ever since. Originally the Copenhagen potters imitated the Dresden china made at Meissen, but they are now famous for very graceful designs of their own invention, and their porcelain has a distinct character of its own. The inventions of Thorwaldsen have been very largely repeated and imitated in this charming ware. Besides the royal works, there are private factories employing a large number of men. Terra cotta and faience are also manufactured in Copenhagen. The iron-works of Denmark have made very considerable progress since the separation of Norway, and they are largely supplied with raw material imported from England. There are many iron foundries around Copenhagen, and in that city there are small manufactories of locomotives, and of machinery of various kinds.

The woollen, linen, and cotton manufactures of Denmark are for the most part domestic, and carried on purely for local consumption. Linen is the principal article of domestic industry in Zealand. The woollen manufacture occupies about 2000 men. The sugar refineries, of which the largest are at Copenhagen, prepare most of the sugar required for domestic consumption. Cherry brandy is also prepared in that city, and largely exported. The making of paper and distillation are carried on at different parts of the country to some extent.

Commerce.—Formerly the commercial legislation of Denmark was to such a degree restrictive that imported manufactures had to be delivered to the customs, where they were sold by public auction, the proceeds of which the importer received from the custom-houses after a deduction was made for the duty. To this restriction, as regards foreign intercourse, was added a no less injurious system of inland duties impeding the commerce of the different provinces with each other. The want of roads also, and many other disadvantages, tended to keep down the development of both commerce and industry. Within the present century, however, several commercial treaties were concluded between Denmark and the other powers of Europe, which made the Danish tariff more regular and liberal.

Of no less importance were the regulations made from time to time concerning the Sound toll, a question which in the 17th century led to many hostilities between Denmark, Sweden, and Holland. Having formerly possessed both sides of the entrance to the Baltic, the Danish Crown looked upon the Sound as exclusively her own, refusing to admit any foreign vessels without payment of a certain duty, and this right was never successfully contested by the other powers. An exception, however, was made in favour of Sweden, and of late the toll has been entirely abolished.

The principal ports of Denmark are Copenhagen, Helsingör, Korsöi, Aarhuus, Aalborg, and Frederikshavn.

The total value of the goods imported into Denmark in 1874 was £12,859,000; and of the goods exported, £9,574,000.

The following tables show the quantities of the principal articles imported and exported in the same year. We give them in the original figures, premising that a *tönde* of corn equals 3·8 imperial bushels, a *tönde* of coal 4·6775 bushels, and a *pund* 1·102 ℔ avoirdupois

IMPORTS.

Chicory	8,561,354	pund.
Coals	3,610,085	tönder.
Coffee	23,668,775	pund.
Corn—oats	32,274	tönder.
,, rye	218,537	,,
,, wheat	134,141	,,
Glass wares	4,605,533	pund.
Hides and skins, raw	5,837,858	,,
Cotton manufactures	1,468,192	,,
Woollen ,,	3,672,834	,,
Metals, iron wrought and unwrought	96,938,041	,,
ore	23,320,340	,,
Oil, of all kinds	15,112,611	,,
Rice	17,690,787	,,
Salt	40,877,099	,,
Sugar	54,353,700	,,
Tea	772,396	,,
Tobacco	5,955,629	,,

EXPORTS.

Oxen and Cows	66,986	head.
Swine	175,921	,,
Bones, whole or ground	3,759,509	pund.
Butter	23,144,128	,,
Corn—barley	1,001,969	tönder.
,, barley meal	6,308,424	pund.
,, oats	575,408	tönder.
,, rye	390,065	,,
,, rye meal	13,824,151	pund.
,, wheat	361,840	tönder.
,, wheat flour	49,510,702	pund.
Hides and skins, undressed	4,568,111	,,
Meat—ham and bacon	12,087,109	,,
,, tongues, sausages	2,338,814	,,
Oilcake	7,258,413	,,
Rags	3,546,365	,,
Wool	3,515,101	,,

The decimal system of coinage is in use in Denmark, the unit being the öre, 7½ of which are equivalent to an English penny; 100 öre make 1 krone, equal to about 1s. 1¼d. sterling.

Government.—In early times the government of Denmark was far from despotic; the succession to the Crown was even elective until the revolution of 1660. It then became entirely without constitutional check upon the will of the king. This singular change is to be explained by supposing, on the part of the nation, not so much an indifference to free institutions as a resentment of the overbearing conduct of the nobility, and a consciousness of the perpetual uncertainties of an elective Government. The court found it thus a matter of little difficulty to unite the clergy and commons against the aristocracy; and the power of the Crown has since continued without a parliament or any constitutional check. But when Frederick VII. came to the throne he promised to resign the nearly absolute power which had hitherto been connected with the Crown. Accordingly a charter was drawn up by an assembly elected for that purpose in 1849, and signed by the king in 1850, which acknowledged the principle of limited monarchy, the king sharing his power with a diet of two houses, both of which are elective. The first, called Folksthing, has the privilege of discussing the budget and other public questions; while the other is confined to the local affairs of the provinces. The liberty of religion and of the press, and the inviolability of person and property, were amply guaranteed by the new constitution. This great charter received a further revision on the 28th of July 1866, according to which the second chamber, called the Landsthing, consists of 66 members, 12 of whom are nominated for life by the king, and the others elected for 8 years—7 by the city of Copenhagen, 45 by the electoral districts of the towns and country, 1 by Bornholm, and 1 by the Faroe Islands. The Folksthing is composed of one representative for every 16,000 inhabitants, elected for three years. In 1875 it contained 102 members. The privy council consists of the king, the crown prince, and the ministers.

The financial state of the kingdom will best appear from the following net estimates contained in the budget for 1876–77, given in *kroner* (1s. 1¼d. sterling):—

RECEIPTS.

Domains		937,450
Forests		796,872
State surplus		4,834,494
Direct duties		8,385,050
Indirect duties		29,297,000
Posts		379,941
Telegraphs		20,930
Lotteries		850,000
Receipts from the Faroes		39,513
,, from the West Indies		25,000
Various receipts		1,187,772
Drawback, &c		1,331,880
	(£2,671,441)	48,085,952 kroner.

EXPENDITURE.

Civil list		1,000,000
Royal apanage		442,544
Privy Council		94,616
Rigsdag		200,000
National debt		12,596,782
Civil pensions		2,738,239
Military pensions		694,350
Foreign affairs		383,512
Religion, education, &c		932,698
Legal		2,260,414
Home department		1,509,226
War ,,		8,593,247
Marine ,,		4,774,302
Finance ,,		2,960,708
Administration of Iceland		109,200
Extraordinary expenses		2,906,007
Public works		3,718,550
Subventions, &c		780,726
	(£2,594,170)	46,695,071 kroner.

The national debt amounted in 1875 to 100,805,939 kr. (£5,600,330).

Army and Navy.—The army is regulated according to the principles fixed by the law of the 6th of July 1867. Conscription is practised. The service begins at the age of twenty-two years, and continues eight years for the line and the reserve (first grade); the second grade goes on to the age of thirty-eight years. The following table shows the condition of the Danish army according to the latest statistics:—

	Regular Army		Army of Reserve	
	Officers.	Rank and File	Officers.	Rank and File.
Infantry	730	26,750	287	12,127
Cavalry	126	2,122	...	...
Artillery	139	6,523	37	2,391
Engineers	36	580	22	740
Total	1031	35,975	346	15,258

The staff of the army was composed, at the same time, of 25 commissioned and 37 non-commissioned officers. The navy of Denmark comprised, at the commencement of September 1875, 6 iron-clads, 12 unarmoured vessels, 7 gun-boats, and 5 paddle steamers,—the whole carrying a total of 286 guns. The navy is recruited by conscription from the coast population. It was manned in September 1875 by 911 men, and officered by 1 admiral, 15 commanders, and 81 captains and lieutenants. In March 1875 the mercantile fleet of Denmark comprised 2846 vessels, of an aggregate burden of 212,600 tons.

The fortifications of Copenhagen have within the last few years been entirely razed, but the city is still protected by some forts in the Sound. The castle of Kronborg, near Helsingör, interesting to Englishmen as the scene of *Hamlet*, is in good preservation, and well-manned. The port of Frederikshavn, in the extreme north of Jutland, is also strongly fortified.

Religion and Education.—The established religion of Denmark is the Lutheran, which was introduced as early as 1536, the church revenue being at that time seized and retained by the Crown. In no country of Europe was the Reformation introduced in a more bloodless and easy way than in Denmark. During the earliest Christian times the whole of Denmark was under the jurisdiction of the archbishop of Hamburg. King Erik Eiegod, after a personal visit to the Pope, contrived to place his kingdom under a Scandinavian prelate and his own subject, the archbishop of Lund in Skaania, which then belonged to the Danish dominions. After the cession of Skaania to Sweden, Roeskilde became the metropolitan see. At present (1877) there are six bishops, besides the metropolitan, viz., the bishops of Funen, of Lolland and Falster, of Aarhuus, of

Aalborg, of Viborg, and of Ribe. They have no political function by reason of their office, although they may, and often do, take a prominent part in politics. Dissent is comparatively unknown, or at least it has not yet become a serious danger to the national church. The Mormon apostles for a considerable time made a special raid upon the Danish peasantry, but the emigration to Great Salt Lake City is now but small. Roman Catholics were until lately hardly existent in Scandinavia, where their presence was not tolerated. The following statistics will show the proportion of religious bodies at the census of 1870:—Lutherans, 1,770,000; Jews, 4300; Baptists, 3200; Mormons, 2200; Roman Catholics, 1800; Irvingites, 350. Complete toleration is now enjoyed in Denmark.

The educational institutions of Denmark have reached a very high degree of perfection; indeed few countries, if any, can compete with Denmark in this respect. Most of the peculiar advantages in the Danish system seem to arise from this, that all schools, both grammar and other, have been put in a state of dependence on the university of Copenhagen, and under its control, while the university itself is particularly well managed. All educational institutions of the country are now managed by a royal college, consisting of three or four assessors and a president, called the royal commission for the university and grammar schools. This commission has no superior but the king, and reports to him directly. It appoints all professors in the university of Copenhagen, all rectors, co-rectors, and other teachers of grammar schools, and also promotes these functionaries from lower to higher grades. Education is compulsory. Poor parents pay a nominal sum weekly for the education of their children at the Government schools, so that almost all the lower class can read and write. Confirmation is also compulsory, and till that rite has been received, the youth of both sexes are in *statu pupillari*. Certificates of baptism, confirmation, and vaccination are indispensable before entering on service, apprenticeship, or matrimony.

Territorial divisions.—These consist of provinces, amts, and parishes. The provinces are seven, and correspond to the episcopal sees above mentioned. Of these provinces three are in the islands:—Zealand, which includes Bornholm and Möen; Lolland and Falster, comprising those two islands; and Funen, which also includes Langeland, Ærö, and Taasinge. Four provinces are on the mainland:—Aarhuus, occupying the south-east of Jutland; Aalborg, the north; Viborg, the centre; and Ribe, the south-west of the same. Each of these provinces is divided into several amts, answering very much to the English hundreds.

The only large city in Denmark is Copenhagen in Zealand, which was estimated in February 1876 to have a population of 199,000, and, with its suburbs, of 233,000. Thirteen other towns contain 5000 inhabitants and upwards—viz., Odense (Funen), 17,000; Aarhuus (Jutland), 15,000; Randers and Aalborg (Jutland), 12,000 each; Horsens (Jutland), 11,000; Helsingör (Zealand), 9000; Fredericia (Jutland), 7000; Viborg (Jutland), Svendborg (Funen), and Veile (Jutland), 6000 each; Rönne (Bornholm), Slagelse (Zealand), Kolding (Jutland), and Roeskilde (Zealand), 5000 each.

Communication both by land and water is well provided for in Denmark. A railway from the Schleswig frontier proceeds to Fredericia, from whence one branch passes to the extreme north of Jutland, another crosses the island of Funen from Middelfart to Nyborg. This is the direct route from Germany to Copenhagen. From Nyborg a packet crosses the Great Belt to Korsör, and thence another line runs through Zealand to Copenhagen. There is also a south Zealand line, from Roeskilde to Vordingborg, which is continued through the island of Falster, besides a short line in Lolland. The only canal is the Thyborön, a short canal which connects the Liim Fjord (the arm of the sea which penetrates so far into the north of Jutland) with the German Ocean. This is a natural canal, formed after the Agger channel (a passage opened by the storm of the 3d of February 1825) had become choked with sand. The canal can only be used by vessels of very small burden.

Dependencies.—The colonial possessions of Denmark are the Faroe Islands, Iceland, Greenland, and the Danish West Indies. The Faroe Islands are an archipelago nearly midway between Shetland and Iceland. They are considered as an out-lying amt of the mother-country rather than as a colony. Seventeen of these islands are inhabited; the largest is Stromö, on the eastern shore of which is built the capital Thorshavn. The islands are governed by an amtmand.

Iceland is a large island at the north-western extremity of the map of Europe, just outside the Arctic Circle. Until lately it was considered as a colony of Denmark, and was subject to a tyrannous exercise of the laws of the mother country on the part of small officials. At the visit of Christian IX., however, in 1874, it received a constitution and an independent administration, which came into force in August of that year.

The possessions of Denmark in the West Indies consist of three islands lying to the east of Porto Rico. Of these St Croix is the largest, and St John the smallest, while the chief town and the residence of the governor are on St Thomas. A few years ago the last named island was offered to and very nearly purchased by the United States, but the proceedings fell through.

The whole peninsula or continent of Greenland is nominally in the possession of Denmark; but in point of fact her dominion there is limited to a few scattered trading stations along the western coast. It is divided into two provinces, north and south. Of these, the former contained, according to a census of 1874, 4095 native inhabitants, and the other 5512. The whole European population was only 236, the inhabitants of the entire colony thus numbering 9843.

Population.—There was a census of Denmark taken in 1870, according to which the population of the mother country was 1,784,741, of the Faroe Isles 9992, and of the other dependencies 117,409. On the 1st of February 1876 the following official estimate was made:—

Provinces.	Area in English square miles.		Population.	
Zealand and Moen......	2793		682,400	
Bornholm..................	221		33,500	
Lolland and Falster....	640		93,100	
Funen, Langeland, &c.	1302		248,400	
Jutland................	9597		845,500	
		14,553		1,902,900
Faroe Islands		495		10,600
Iceland....................		30,000		71,300
Greenland.................		...		9,800
West Indies.				
St Croix..................		60		22,600
St Thomas................		14		14,000
St John....................		13		1,000
Total,		45,135		2,032,200

Denmark proper has 130 inhabitants to the English square mile. The density of population is much greater on the islands than in Jutland, Zealand having nearly 250 inhabitants to the square mile. The increase in the population of the towns has of late years been very rapid, and has much exceeded that of the country districts. Of the provincial towns, the most prosperous is Aarhuus, which, from being comparatively insignificant, has become the most important place in Jutland. The only exception to this rapid increase is in the case of the towns on the new German frontier, especially Fredericia and Ribe.

Emigration, which at one time was carried on to a considerable extent, has in recent years greatly diminished. Of the 2088 persons who left Denmark in 1875, 1678 emigrated to the United States of America, 329 to Australia, 47 to Canada, and 34 to other parts of America, including the Salt Lake City.

The Danes are a yellow-haired and blue-eyed Teutonic race, of middling stature, and still bearing traces of their kinship with the Northern Scandinavian peoples. Their habits of life resemble those of the North Germans even more than those of their friendly neighbours the Swedes. The independent tenure of the land by a vast number of small farmers, *bönder*, who are their own masters, gives an air of carelessness, almost of truculence, to the well-to-do Danish peasant. He is thoroughly well satisfied with himself, takes an eager interest in current politics, and is generally a fairly-educated man of extreme democratic principles. The gaiety of the Danes is surprising; they have nothing of the stolidity of the Germans, or the severity of the Norwegians. The townspeople show a bias in favour of French habits and fashions. The separation from the duchies of Schleswig and Holstein, which were more than half German, has intensified the national character; and there is now no portion of the Danish dominions, except perhaps in the West Indian islands, where a Scandinavian language is not spoken.

History.—The original form of the word Denmark is Danmörk, the march or border of the Danir; but whence the name Danir, or Danes, proceeded is undecided, and has given rise to endless antiquarian discussion. A traveller of the name of Pytheas, who lived more than three centuries before the Christian era, is the first to speak of a northern country, under the name of Thule, by which he is believed to have meant Jutland. At this time the inhabitants of Southern Scandinavia are supposed to have been Celts, and it was long after this that what Rask defined as the Sarmatic Invasion (the flooding of the north of Europe by emigrants from Asia) began to take place. These Goths, as they were called, came through Russia into Germany and Denmark, and passed on into Sweden across the Sound. It used to be supposed that they pushed before them the races of the Lapps and Finns, but the latest discoveries of archæology tend to prove that these latter came from Siberia over the north of the Gulf of Bothnia, and met the Goths a little outside the Arctic Circle. The gods anciently worshipped in Denmark were the Æsir, a family of heroic deities in which the characteristics of the leaders of the Sarmatic Invasion are probably enshrined. The language spoken by all the Northern Goths was originally, or very early, called the *Dönsk tunga*, or Danish tongue, which gave way in the 13th and 14th centuries, when the Danish supremacy was on the decline, to *Norræna Mál*, or Norse speech. From the earliest historical accounts we possess it appears that Jutland was divided among a great number of petty chieftains, often at war with one another. These *smaa-kongar*, or "little kings," as they were called, were, however, to some degree banded together, and entirely distinct from the eastern Danes of the islands. These also were ruled by a variety of chiefs, but they all recognized the supremacy of the king of Lejre, a city in Zealand somewhere near the present town of Roeskilde. Western Denmark was known to the Northmen as Red Gotland, and consisted of all the mainland north of the Elbe, that is, Holstein, Schleswig, and Jutland. Island Gotland consisted of the islands, and of the provinces of Skaania and Bleking, that is, all the south of Sweden. During the rule of the Valdemar kings, the old chronicler, Saxo Grammaticus, recorded in Latin an immense number of mythical and semi-mythical stories concerning the old history of Denmark, and his chronicle is a treasure-house of truth and falsehood. According him, the country takes its name from a King Dan Famous, who united the *smaa-kongar* under his sole r and he was succeeded by a King Frode, with who golden age set in. The question of supremacy among Scandinavian peoples was settled in favour of Swede the battle of Bravalla, which was fought, as is supposed the 8th century between Sigurd Ring, king of Swed and Harald Hildetand, king of Denmark; with this L the purely mythic age closes In 823 the gospel was f preached in Denmark by some Frankish monks sent by emperor Louis le Debonaire. Little was done in the w of actual conversion, but the road was opened for futu missionaries. The famous Ansgarius failed to impress th Danes, though he was consoled by his brilliant succes among the Swedes. The Christians, however, began b degrees to be tolerated. The first king of all Denmar was Gorm the Old, who flourished between 860 and 936 He was the son of a king of Lejre, and by great administra tive and strategical skill managed to absorb into hi hereditary dominions not only all that is now included i Denmark, but Schleswig, Holstein, Skaania, and even som provinces in Norway. And besides gaining all this terri tory, he also pushed his conquests for a while as far a Smolensk and Kieff in Russia, as Aix-la-Chapelle in Germany, and as Sens in France, after besieging Paris.

At the period in question, or rather somewhat late namely, about the early part of the 10th century, commences the authentic history of the country. As early a the 8th century the Danes were remarkable for their well planned predatory expeditions by sea, as was proved b their repeated invasions of England, their occasion descents on Scotland, and their conquest of Normandy To cross a sea of three or four hundred miles in breadt was a bold undertaking for men unacquainted with the u of the compass; but the number of islands in Denmar early accustomed the inhabitants to navigation, and gav them a practical dexterity in it.

The early establishment of the Danes in England, an the subsequent arrival of bodies of their countrymen, joine to the talents of two of their princes, Sweyn, or Svend and Canute, enabled the latter to acquire the crown o England. Canute (or Knud) the Great completed the conquest begun by his father, and became king of England a well as of Denmark in the year 1018; he resided generall in the former country, and left the crown to his son Harald and Harthaknud. On the death of the latter without male heirs, the Danish dynasty in England came to a close in 1042.

The feudal system was introduced in the 12th century, which, as well as the 13th, was marked in Denmark by contentions between the sovereign and the barons. About the 13th century the population of the towns in Denmark, as in Germany, though still very small, became such as to entitle them to obtain from the Crown charters of incorporation, and an exemption from the control of the barons, in whom was vested almost the whole property of the land. A regular constitution began now to be formed in Denmark, and the towns sent deputies or representatives to the States, or Parliament, which, it was enacted, should meet once a year. It was also ordered that the laws should be uniform throughout the kingdom, and that no tax should be imposed without the authority of Parliament.

It is unnecessary to recapitulate the successive sovereigns of Denmark in the Middle Ages, of whom few were of distinguished ability. The names of most frequent occurrence among them in those early times were Knud, Valdemar, and Erik. Those of Christiern, or Christian, and Frederic were of later date. One of the most remarkable of th sovereigns in the Middle Ages was Valdemar II. who su

he crown in 1202, and who was the most
nd afterwards the most unfortunate of Danish
conquered Holstein and Pomerania, and in
nperor recognized his authority over a large
north of Germany,—all in fact north of the
emar then pushed his forces into Norway and
; with less success; but in 1219 he set out on
le against the Pagans in Esthonia, the whole of
verran, forcibly converting the inhabitants.
his war that Denmark commenced to use the
or national standard, a white cross on a blood-
On his return, in the midst of his magni-
s, a great calamity befell Valdemar; he was
captured at Lyö in 1223 by the duke of
id imprisoned for several years in a dungeon
urg; but he finally escaped, and ruled until
1241.

mercantile intercourse of Denmark in those
ith Lübeck and the north-west of Germany.
ic Lübeck was nearly what Venice was to the
an, the earliest commercial town of consequence.
lso some traffic from Denmark to the mouths
la,—the name of Dantzic, or Dansvik (Danish
.), indicating that a Danish colony, aware of the
of the situation, had established itself there.

e same period (the 14th century), the associa-
anse Towns had acquired considerable strength,
strenuously the freedom of commerce in the
rope. Denmark, commanding the entrance
ltic, was the power most interested in laying
ssels under a toll or regular contribution; and
as repeated contentions, followed at times by
between the Danish Government and this
federacy.

important event, however, in the history of
indeed of Scandinavia, in the Middle Ages,
junct submission of Sweden, Denmark, and
one sovereign, by the compact or union of
the year 1397. Valdemar III., king of
ving died in the year 1378, left two daughters,
second, Margaret, was married to Hakon VI.,
rway. On the demise of her husband the
of Norway remained in her hands; and after-
e death of her son, who had been declared
mark, the States, or Parliament, of that country
rincess on the throne, on her consenting to
ecure their rights and privileges. The States
ollowed their example; so that Margaret, find-
eated on the thrones of Denmark and Norway,
attention to that of Sweden, the succession to
l have fallen to her husband Hakon had he
The Swedes were divided into two parties—that
, and that of a duke of Mecklenburg. An
ns took place, and the result was favourable to
the queen, her competitor being defeated and
er. In 1397 the States of the three kingdoms
ed at Calmar, a town situated in the south of
here they concurred in passing the Act known
of Calmar, by which the three kingdoms were
be under one sovereign, who should, however,
govern each according to its respective laws
. To guard against their separation, it was
, if a sovereign should leave several sons, one
y should be the ruler of the three kingdoms,
vent of the reigning king or queen dying with-
, the senators and parliamentary deputies of
gdoms should jointly proceed to the election
int sovereign.

the precautions taken by Margaret, who has
he Semiramis of the North, in order to banish war and political dissensions from Scandinavia. For a time they were successful, and peace and concord were maintained during the lifetime of the queen and her two successors. But the union, as regarded the Swedes, was far from being cordial; they submitted reluctantly to a foreign family, and considered themselves as obliged to act in subserviency to the political views of Denmark. At last the severity, or rather the cruelty, of one of the Danish kings, Christian II., and the appearance of an able assertor of Swedish independence in Gustavus Vasa, led to an insurrection, which, beginning in the northern province of Dalecarlia, extended throughout Sweden, and led to a definitive separation of the two crowns in the year 1523.

In 1490 the reigning king of Denmark made a commercial treaty with Henry VII. of England, by which the English engaged to pay the Sound dues on all vessels entering or returning from the Baltic: and in return they were allowed to have mercantile consuls in the chief seaports of Denmark and Norway. By this time the extension of trade had given rise in Denmark, as in England, to a middle class, among whom the sovereign found in each country the means of balancing the political weight of the nobility; hence a grant was made by the kings of Denmark of various privileges to traders, and of relief from a number of local imposts on the transit of merchandise.

The rude habits of the age were strongly marked by the difficulty which the Danish Government found in putting a stop to the practice of plundering merchantmen shipwrecked on the coast. The practice was to collect in the vicinity of a wreck such a number of the inhabitants as to prevent the master or mariners from opposing the seizure of the merchandise. Even bishops residing on the coast, though humane in their treatment of the crews, did not scruple to aid in taking forcible possession of the cargo; and it is a remarkable fact, that a law passed by the king, about the year 1521, for the prevention of these practices, was abrogated and publicly burned at the instance of the barons and clergy a few years after, when a new sovereign had succeeded to the crown.

The doctrines of the Reformation found their way into Denmark at an early date. Frederick I., who began to reign in 1525, and had formerly been duke of Holstein, in that year embraced the Protestant religion. The inhabitants of Denmark being divided between the Catholics and Protestants, Frederick began by an edict for tolerating both religions. An assembly of the States, or Parliament, next passed a solemn Act for the free preaching of the Protestant faith, and for allowing ecclesiastics of any class to marry and reside in any part of the kingdom. The consequence of this was a reduction of the number of the inmates of abbeys, monasteries, and convents, along with the general diffusion of the Lutheran faith throughout the kingdom. This rapid progress enabled the succeeding sovereign, Christian III., to act like Henry VIII. of England, by annexing the church-lands to the Crown, and strengthening the power of the sovereign at the expense of that of the clergy.

The great religious war which broke out in 1618 for the first time fixed the attention of Europe on Denmark. The victories of the imperial general Tilly, and of Maximilian of Bavaria, over the Protestants, appeared to make the Emperor Ferdinand, who was the head of the Catholic party, complete master of Germany, when Christian IV. of Denmark, encouraged by England and France, determined to take up the Protestant cause as a principal in the general contest. But being weakly supported by his allies, the Danish king, after one year's campaign, was obliged to flee before the victorious army of Wallenstein (1626); and to sue for peace, which was concluded at Lübeck in 1629. By the stipulations of this peace Denmark bound itself nev to interfere in the affairs of Germany, and was besides compelled to acknowledge Wallenstein as duke of Mecklenburg. This peace would have been still more humiliating for Denmark, if France, already influenced by the counsels of Richelieu, had not interposed its efforts on behalf of the vanquished. The emperor now thought of nothing less than the entire subjection of Germany to his will. A new adversary, however, arose in Gustavus Adolphus the king of Sweden. The short and glorious career of this king will be found described in its proper place. But this much must be here observed, that despite the fall of Adolphus in the battle of Lützen in 1632, the power of Sweden was becoming continually more considerable, and consequently an object of real envy to all its neighbours, but especially to Denmark. Thus it happened that besides the general religious war, repeated hostilities were being carried on between Sweden and Denmark separately.

The first contest lasted from 1637 to 1645, and the treaty concluded in the latter year proved rather a truce than a peace. The Danish Government formed an alliance with Holland, and aided that republic in its sanguinary contest in 1652 with England, then under the authority of Cromwell. The king of Sweden at that time was Charles Gustavus, a prince in the vigour of life, and actuated by all the ambition and enterprise of the house of Vasa. He had carried his military operations into Poland, which then, as at other times, seemed to invite the presence of foreigners by its internal dissensions. But on learning the hostile disposition of the Danish Government, Charles withdrew his troops from Poland, entered Holstein, and overran the whole province. As soon as the winter had advanced, and it had become practicable to cross on the ice the arms of the sea separating the Danish islands from the mainland, the Swedish army traversed in that manner the Little Belt, took Odense, the capital of the island of Funen, and even invested Copenhagen. That capital was not without a military force, but its walls were weak, nor was it adequately supplied with provisions or military stores. On this occasion the Danes, with their king Frederick III. at their head, displayed great firmness, and resisted the efforts of the Swedes, until, under the mediation of the English envoy at the court of Copenhagen, hostilities were suspended, and a treaty signed. This treaty, however, was only partly carried into execution. Dissatisfied at the delay which took place, Charles Gustavus made a second attempt on Copenhagen in the autumn of 1658; but he found it impracticable to prevent the introduction of supplies into the city by sea, as the Dutch now came to the assistance of their Danish allies. Still the Swedes persisted in the siege, and in the depth of winter (in February 1659) made an attempt to take Copenhagen by storm. The attacks were made on three points; each was headed by an able commander, but all were unsuccessful, and the siege was necessarily converted into a blockade. Soon afterwards the king of Sweden died, and the sanguinary contest was brought to a close by the treaty of Copenhagen in 1660. This peace ceded to the Swedish Crown Skaania, Aland, several places on the island of Rügen, and a free passage through the Sound.

In the following year, 1660, the vicissitudes of war were succeeded by a remarkable revolution in domestic politics. The reigning king of Denmark had gained great popularity, as well by his spirit and firmness in the field, as by resisting the claims made by the nobility to the disadvantage of the other orders of the state. He was thus assured of the support of the middle classes in any attempt to reduce the power of the nobility. On the assembling of the States, or Parliament, the representatives of the different towns were found sufficiently strong, when united with the clergy and strengthened by the power of the Crown, to outweigh the influence of the nobility, and the court determined t with vigour in extending its prerogative. The poli contest began about the crown lands, which had hith been let to nobles only, and at very low rents. It proposed and carried in the Parliament, that men of class or station might henceforth be candidates for t and that they should be let to the highest bidder. next proposition of the clergy and commons was, that crown, hitherto in some degree elective, should be longer, but should devolve, as a matter of right, on lawful heir, whether male or female. Henceforth, in mark, whatever power could be shown to have belonge any ruler in any country, was now forthwith to be u stood as belonging to the king.

This remarkable change in the form of the govern is to be explained chiefly by the repugnance of the p of Denmark to the ascendency of the nobility. The F Revolution proceeded from causes somewhat similar; b Denmark the control possessed by the privileged clas not tempered, as in France, by civilized and refined h The direct authority of the nobles was also greate they possessed the power of life and death over their va Frederick lived ten years after this singular revolutio period which enabled him to consolidate it, and to rein in peace the trade and finances of his country.

His successor, led away by the ardour of y abandoned the pacific policy of his father, and venture make war against Sweden. He relied on the aid of elector of Brandenburg, commonly called the Great Ele the possession of so extensive a country as Prussia pla him quite at the head of the princes of the em Swedish Pomerania was chosen as the scene of operati from being open to attack by the Prussians. The Sw were overmatched in force, but being well comma they made a firm and spirited resistance. By sea Danes had the advantage, having the aid of a D squadron commanded by Van Tromp. This ena them to convey an invading force to Skaania, or Sc the southern and most fertile province of Sweden. the forces of the Swedes were brought to bear ag their opponents, with the advantage of vicinity to supplies. The result was that the Danes were oblig retreat from Skaania, and, after several alternatio success, peace was signed between the two kingdom 1679, the year after the treaty of Nimeguen had suspe the war in the central part of Europe. As usual, much bloodshed and many vicissitudes of fortune, adverse states were placed by the treaty in nearly the situation as at the commencement of the war; but of peace for the future were justified by the marria the young king of Sweden, Charles XI., with a prince Denmark.

These hopes were realized during twenty years; peace continued until 1699, when, Charles XI. having the reigning king of Denmark, Frederick IV., was te by the youth of Charles XII. of Sweden to invad dominions of his ally the duke of Holstein. Fred was little aware of the spirit of his opponent, who b afterwards so well known in the wars of the nor Europe. Charles, determined to strike at once a enemy's capital, lost no time in crossing the narro between Sweden and Denmark, and in investing th of Copenhagen. The inhabitants in alarm appealed humanity of the young monarch; and the result w speedy conclusion of peace, with the payment of a s money to the Swedes. Taught by this lesson, the D Government remained neutral in the following years, the course of events led Charles and his army into P and Saxony, where for a time success attende arms. After the defeat of Charles at the bat

Pultowa, in the year 1709, and his subsequent flight into Turkey, the king of Denmark eagerly embraced the opportunity of renewing hostilities with Sweden, and invaded both Holstein in the south and the province of Skaania to the north. Skaania was badly provided with troops, but it had officers trained in one of the best military schools of the age, and a peasantry full of national antipathy to the Danes. The result was a spirited attack on the invading army, followed by its defeat and precipitate flight into Denmark. The war was then carried on with alternate success in different parts—in Pomerania, in Holstein, and in Norway; until at last the military career of Charles XII. came unexpectedly to a close in the end of 1718. Some time afterwards, negotiations were opened between Sweden and Denmark, under the mediation of England, and ended in 1720 in a definitive treaty of peace, concluded at Stockholm. It was then that Sweden lost all the advantages gained since the Peace of Westphalia, and that George I. of England, as elector of Hanover, Prussia, and Peter the Great shared with Denmark the spoil of Sweden. From that time no danger threatened Denmark from the side of its neighbour, though the cessation of the rivalry was more perceptible in the decline of Sweden than in the progress of Denmark.

The Danish Government had now ample experience of the sacrifices attendant on war, and of the expediency, to a state of such limited power, of avoiding political collisions. It consequently adopted a peace policy, to which it has almost ever since endeavoured to adhere.

It was towards the middle of the 18th century that the family of Bernstorff became known in the councils of Denmark,—the first minister of that name, a man of superior talent and information, having come forward at that time. By the prudence of the ministry, and the pacific disposition of the sovereign, Denmark was kept from taking part in the war begun in Germany in 1740, as well as in the more general contest begun in the same country in 1756.

Frederick V. of Denmark was twice married, and died in 1766, leaving a son by each wife. The crown devolved of course on the elder, his son by the first wife, who took the name of Christian VII. He was a weak prince, and listened too readily to the insinuations of his step-mother, whose secret wish was to secure the succession of the crown to her own son, and who did not scruple, with that view, to sow discord between Christian and his young consort, a princess of England, the youngest daughter of George II. The circumstances were these. A German adventurer named Struensee had ingratiated himself into the favour of Frederick V., the late king, and had found means to be appointed his prime minister—a situation which he was ill qualified to fill. He continued to hold that office under Christian, and was introduced to the young queen as her husband's confidential minister. On this the queen dowager founded an intrigue, and succeeded in persuading the king that the queen, in concert with Struensee and his friend Count Brandt, had formed a project to set him aside, and to get herself declared regent of the kingdom. By working on the fears of this weak prince, the queen dowager prevailed on him to authorize the arrest of the queen and the two ministers The latter were thrown into prison, and Struensee was accused of having abused his authority as minister, and of other criminal acts. As there was no proof of these acts, recourse was had to the barbarous alternative of torture, the dread of which led Struensee to declare, in the form of a confession, much to the injury of the young queen, which is now considered as unfounded. This, however, did not enable him to escape, for he and Count Brandt were both beheaded in April 1772; whilst the queen consort was, at the instance of the British Government, allowed to retire and to pass the remainder of her short life at Zell, in Hanover, repeatedly but fruitlessly demanding an open trial. This ill-fated princess died in her twenty-third year, without the satisfaction of knowing that the author of her misfortunes, the queen dowager, had lost her influence at the court of Denmark.

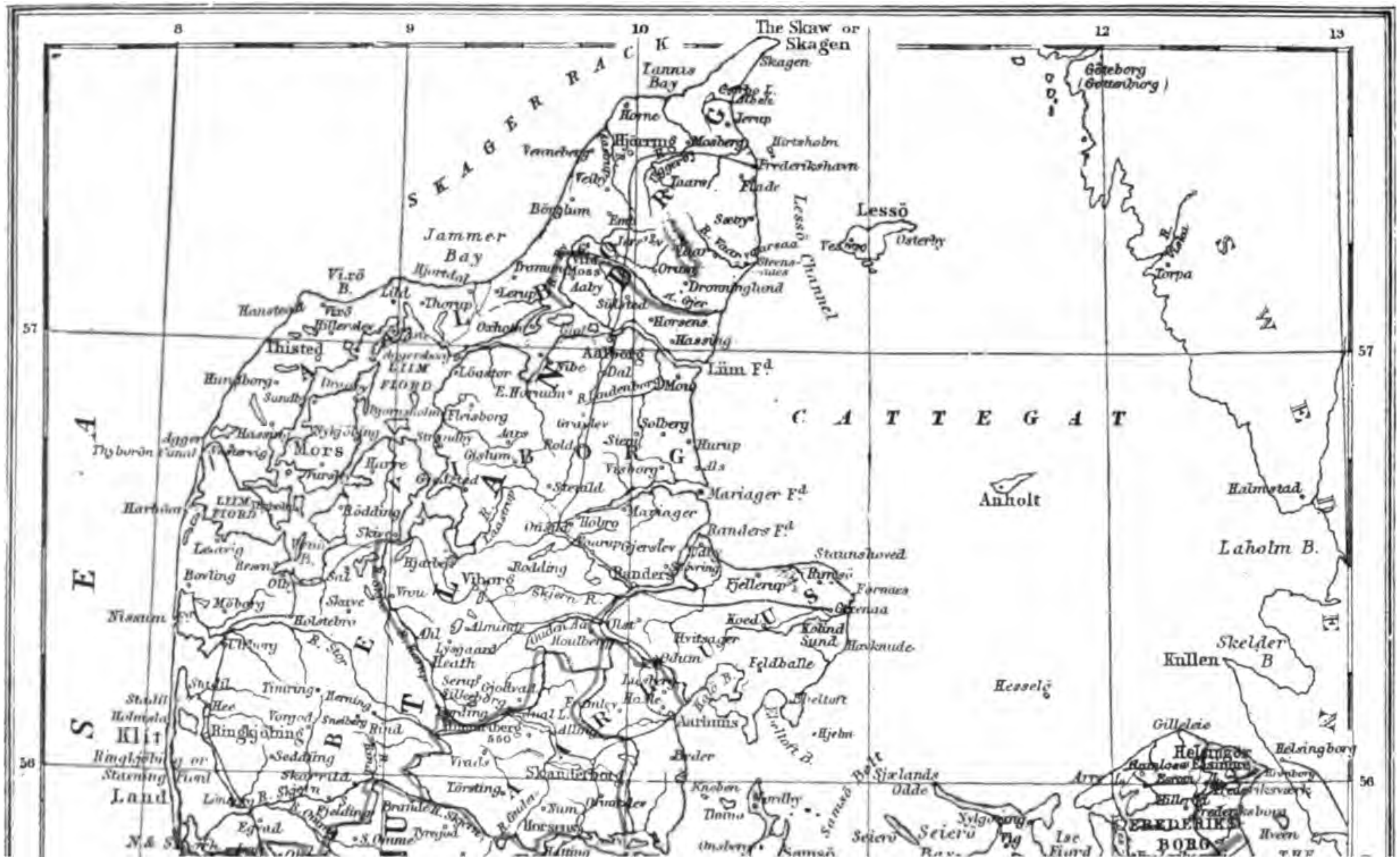
One of the principal political questions between Great Britain and Denmark occurred in 1780, during the war carried on by England against France, Spain, and the North American colonies. During that arduous contest, England, superior at sea, had no difficulty in obtaining, by her own merchantmen, a supply of hemp, cordage, and other naval stores from the Baltic, whilst France and Spain trusted to receiving such supplies by neutral vessels. But the English Government denied the right of neutrals to carry warlike stores; and the northern powers, headed by the ambitious Catherine of Russia, entered into a compact, called the Armed Neutrality, by which, without resorting to actual hostility, they sought to overawe England, and to continue the questionable traffic. Happily no bloodshed followed this diplomatic menace, and the question fell to the ground in 1782, on the negotiation for a general peace.

The king of Denmark, subject all along to imbecility, became after 1784 quite incapable of governing. His son, the crown prince, was therefore appointed regent, and soon passed several judicious enactments. The peasants living on the crown lands were gradually emancipated—an example followed by a number of the nobility on their respective estates. In the abolition of the African slave trade Denmark had the honour of taking the lead among the Governments of Europe. The crown prince, guided by the counsels of Count Bernstorff, son of the minister already mentioned, long remained neutral in the political convulsion engendered by the French Revolution. He continued to adhere steadfastly to this plan until in 1801 the emperor Paul of Russia having, as in the case of the Armed Neutrality, formed a compact of the northern powers hostile to England, a British fleet was sent into the Baltic under the orders of Sir Hyde Parker, with Lord Nelson as his second in command.

It was this fleet which taught the Danes that their capital was not impregnable, and that the long line of men-of-war moored in front of the harbour was an insufficient defence against such enterprising opponents. The attack took place on 2d of April 1801; and the resistance of the Danes was spirited, but fruitless. The loss of the English in killed and wounded exceeded 1000 men, but that of their opponents was much greater, and most of their shipping was destroyed. Happily little injury was done to the capital. A cessation of hostilities took place forthwith, and was followed by a treaty of peace. The death of Paul, which occurred soon afterwards, dissolved the compact between the northern courts.

But no treaty of peace could be regarded as permanent during the ascendency of Napoleon. After defeating first Austria and then Prussia, that extraordinary man found means to obtain the confidence of the emperor Alexander of Russia, and in the autumn of 1807 threatened to make Denmark take part in the war against England. Although the Danish Government discovered no intention to violate its neutrality, the English ministers, eager to please the public by acting on a system of vigour, despatched to the Baltic both a fleet and an army, in order to compel the surrender of the Danish navy, upon condition of its being restored in the event of peace. To such a demand the crown prince gave an immediate negative, declaring that he was both able and willing to maintain his neutrality, and that his fleet could not be given up on any such condition. On this the English army landed near Copenhagen, laid siege to that city, and soon obliged the Govern-

DENMARK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The Skaw or Skagen
Skagen
Tannis Bay
SKAGER RACK
Hjörring
Frederikshavn
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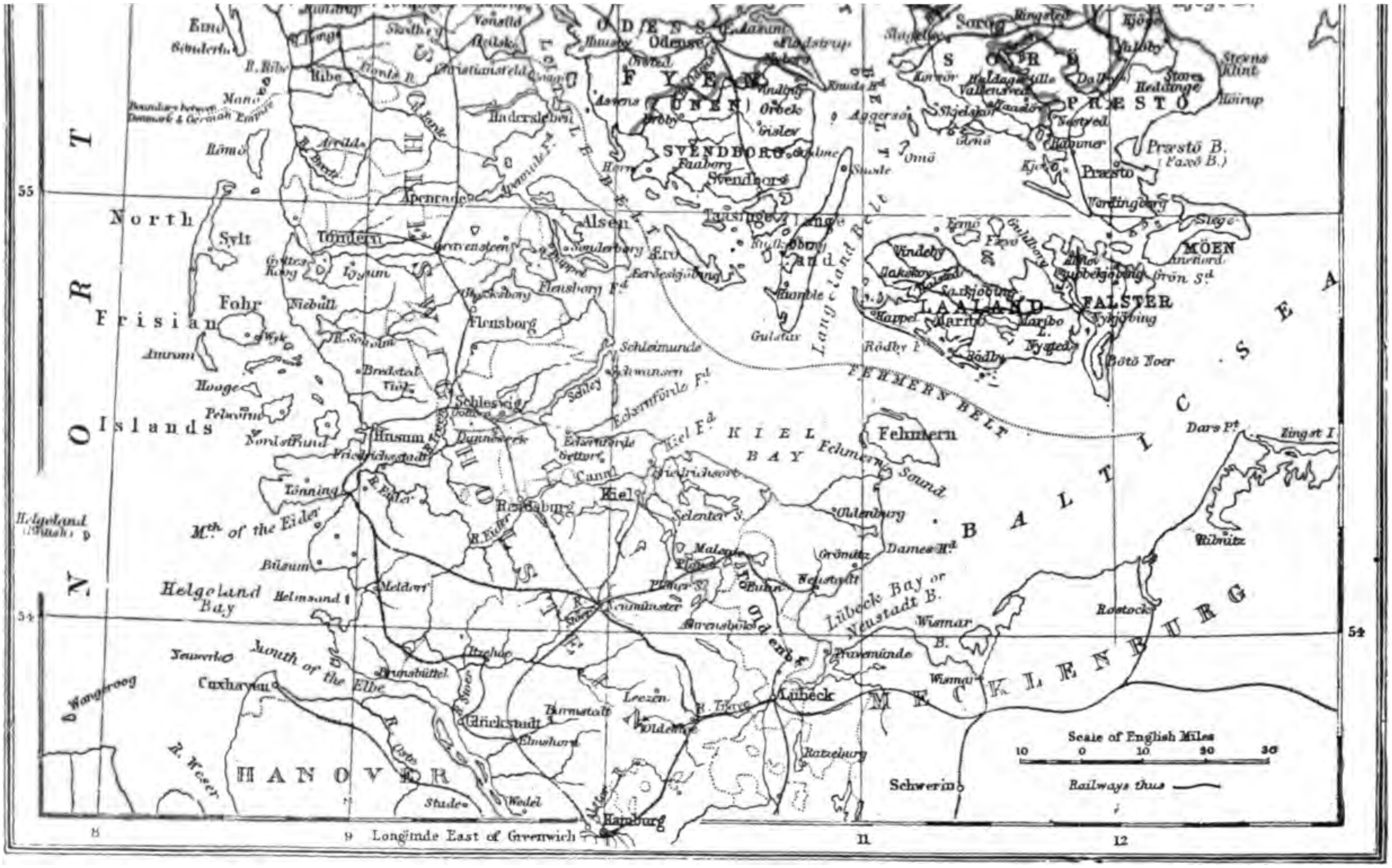
Lessö
Österby
Lessö Channel
Jammer Bay
Virö B.
Thisted
LIIM FIORD
Mors
Aalborg
Lüm Fd.
Hobro
Mariager Fd.
Randers Fd.
Randers
Viborg
Skjern R.
Ringkjöbing
Klit Land
Aarhuus
Skanderborg
Horsens
Samsö
Samsö Belt
Sjælands Odde
Seierö
Seierö Bay
Ise Fiord
Staunshoved
Fornaes
Grenaa
Hesselö
Anholt
CATTEGAT
Göteborg (Gottenborg)
Torpa
Halmstad
Laholm B.
Skelder B
Kullen
Gilleleie
Helsingör
Helsingborg
Frederiksborg
Hveen
SWEDEN
NORTH SEA


North Frisian Islands
NORTH
BALTIC SEA
KIEL BAY
FEHMERN BELT
Langeland Belt
Lübeck Bay or Neustadt B.
Helgoland Bay
Mth. of the Eider
Mouth of the Elbe
SCHLESWIG
HOLSTEIN
MECKLENBURG
HANOVER
FYEN (FUNEN)
ODENSE
SVENDBORG
LAALAND
FALSTER
MÖEN
PRÆSTÖ
SORÖ
Sylt
Fohr
Amrom
Pelworm
Rômö
Alsen
Langeland
Fehmern
Fehmern Sound
Tönning
Husum
Tondern
Apenrade
Haderslebn
Flensborg
Flensborg Fd.
Schleswig
Eckernförde
Kiel
Kiel Fd.
Rendsburg
Canal
Friedrichstadt
Glückstadt
Cuxhaven
Brunsbüttel
Itzehoe
Neumünster
Plöner S.
Oldenburg
Eutin
Lübeck
Travemünde
Ratzeburg
Oldesloe
Hamburg
Altona
Stade
Wedel
Elmshorn
Wismar
Wismar B.
Schwerin
Rostock
Ribnitz
Dars Pt.
Zingst I.
Odense
Svendborg
Faaborg
Assens
Nyborg
Nakskov
Maribo
Nykjöbing
Rödby
Gulstav
Præstö
Præstö B. (Faxö B.)
Vordingborg
Stege
Sorö
Ringsted
Kjöge
Stevns Klint
Ribe
R. Ribe
Boundary between Denmark & German Empire
R. Eider
R. Stör
R. Oste
R. Weser
Elbe
Helgoland
Wangeroog
55
54
8
9 Longitude East of Greenwich
11
12
Scale of English Miles
10 0 10 20 30
Railways thus

guished four periods in the development of the language. The first, which has been called Oldest Danish, dating from about 1100 and 1250, shows a slightly changed character, mainly depending on the system of inflections. In the second period, that of Old Danish, bringing us down to 1400, the change of the system of vowels begins to be settled, and masculine and feminine are mingled in a common gender. An indefinite article has been formed, and in the conjugation of the verb a great simplicity sets in. In the third period, 1400–1530, the influence of German upon the language is supreme, and culminates in the Reformation. The fourth period, from 1530 to about 1680, completes the work of development, and leaves the language as we at present find it.

It was not till the fourth of these periods set in that literature began to be generally practised in the vernacular in Denmark. The oldest laws which are still preserved are written in Danish of the second period. A single work detains us in the 13th century, a treatise on medicine by Henrik Harpestring, who died in 1244. The first royal edict written in Danish is dated 1386; and the Act of Union at Calmar, written in 1397, is the most important piece of the vernacular of the 14th century. Between 1300 and 1500, however, it is supposed that the *Kjæmpeviser*, or Danish ballads, a large collection of about 500 epical and lyrical poems, were originally composed, and these form the most precious legacy of the Middle Ages, whether judged historically or poetically. We know nothing of the authors of these poems, which treat of the heroic adventures of the great warriors and lovely ladies of the chivalric age in strains of artless but often exquisite beauty. The language in which we receive these ballads, however, is as late as the 16th or even the 17th century, but it is believed that they have become gradually modernized in the course of oral tradition. The first attempt to collect the ballads was made in 1591 by A. G. Vedel, who published 100 of them. Peder Syv printed 100 more in 1695. In 1812–14 an elaborate collection in five volumes appeared, edited by Abrahamson, Nyerup, and Rahbek. Finally, Svend Grundtvig has lately been at work on an exhaustive edition, of which six thick volumes have appeared.

In 1490, the first printing press was set up at Copenhagen, by Gottfried of Ghemen, who had brought it from Westphalia; and five years later the first Danish book was printed. This was the famous *Riimkrönike*, a history of Denmark in rhymed Danish verse, attributed to Niels, a monk of the monastery of Sorö. It extends to the death of Christian I., in 1481, which may be supposed to be approximately the date of the poem. In 1479 the university of Copenhagen had been founded. In 1506 the same Gottfried of Ghemen published a famous collection of proverbs, attributed to Peder Lolle. Mikkel, priest of St Alban's Church in Odense, wrote three sacred poems, *The Rose-Garland of Maiden Mary*, *The Creation*, and *Human Life*, which came out together in 1514, shortly before his death. These few productions appeared along with innumerable works in Latin, and dimly heralded a Danish literature. It was the Reformation that first awoke the living spirit in the popular tongue. Christian Pedersen (1480–1554) was the first man of letters produced in Denmark. He edited and published, at Paris in 1514, the Latin text of the old chronicler, Saxo Grammaticus; he worked up in their present form the beautiful half-mythical stories of *Karl Magnus* and *Holger Danske* (Ogier the Dane). He further translated the Psalms of David and the New Testament, printed in 1525, and finally—in conjunction with Bishop Peder Paladius—the Bible, which appeared in 1550. Hans Tausen, the bishop of Ribe (1494–1561), continued Pedersen's work, but with far less talent. But Vedel (1542–1616), whose edition of the *Kjæmpeviser* we have already considered, gave an immense stimulus to the progress of literature. He published an excellent translation of Saxo Grammaticus in 1575. The first edition of a Danish *Reinecke Fuchs* appeared in 1555, and the first authorized Psalter in 1559. Arild Hvitfeld founded the practice of history by his *Chronicle of the Kingdom of Denmark*, printed in 10 vols. between 1595 and 1604. Hieronymus Rauch, who died in 1607, wrote some biblical tragedies, and is the first original Danish dramatist. Peder Claussen (1545–1623), a Norwegian by birth and education, wrote a *Description of Norway*, as well as an admirable translation of Snorre Sturlesen's *Heimskringla*, published ten years after Claussen's death. The father of Danish poetry, Anders Arrebo (1587–1637), was bishop of Trondhjem, but was deprived of his see for immorality. He was a poet of considerable genius, which is most brilliantly shown in *Hexaemeron*, a poem on the creation, in six books, which did not appear till 1641. He was followed by Anders Bording (1619–1677), a cheerful occasional versifier, and by Töger Reenberg (1656–1742), a poet of somewhat higher gifts, who lived on into a later age. Among prose writers should be mentioned Peder Syv (1631–1702); Bishop Erik Pontoppidan (1616–1678), whose *Grammatica Danica*, published in 1668, is the first systematic analysis of the language; and Brigitta Thott, a lady who translated Seneca and Epictetus.

In two spiritual poets the advancement of the literature of Denmark took a further step. Thomas Kingo (1634–1703) was the first who wrote Danish with perfect ease and grace. He was Scotch by descent, and retained the vital energy of his ancestors as a birthright. His *Winter Psalter*, 1689, and the so-called *Kingo's Psalter*, 1699, contained brilliant examples of lyrical writing, and an employment of language at once original and national. Kingo had a charming fancy, a clear sense of form, and great rapidity and variety of utterance. Some of his very best hymns are in the little volume he published in 1681, and hence the old period of semi-articulate Danish may be said to close with this eventful decade, which also witnessed the birth of Holberg. The other great hymn-writer was Hans Adol Brorson (1694–1764), who published in 1740 a great psalm-book at the king's command, in which he added his own to the best of Kingo's. Both these men held high posts in the church, one being bishop of Funen and the other of Ribe; but Brorson was much inferior to Kingo in genius. With those names the introductory period of Danish literature ends. The language was now formed, and was being employed for almost all the uses of science and philosophy.

Holberg.—Ludvig Holberg was born at Bergen, in Norway, in 1684. He commenced his literary career in 1711 by writing *A History of the World*, which attracted notice from its style, rather than its matter, and gained him a professorial chair at the university of Copenhagen. In 1719 he published his inimitable serio-comic epic of *Peder Paars*, under the pseudonym of Hans Mikkelsen. In 1721 the first Danish play house was opened in Copenhagen, and in four years Holberg wrote for it his first 20 comedies. He may be said to have founded the Danish literature; and his various works have still the same freshness and vital attraction that they had a century and a half ago. As an historian his style was terse and brilliant, his spirit philosophical, and his data singularly accurate. He united two unusual gifts, being at the same time the most cultured man of his day, and also in the highest degree a practical person, who clearly perceived what would most rapidly educate and interest the uncultivated. In his 33 dramas, sparkling comedies in prose, more or less in imitation of Molière, he has left his most important positive legacy to literature. Nor in any series of comedies in existence is decency so rarely sacrificed to a desire for popularity or a false sense of wit.

Holberg founded no school of immediate imitators, but his stimulating influence was rapid and general. After the great conflagration, the university of Copenhagen was reopened in 1742, and under the auspices of the historian Gram, who founded the Society of Sciences, it recommended an active intellectual life. In 1744 Langebek founded the Society for the Improvement of the Danish Language, which opened the field of philology. In jurisprudence Andreas Höier represented the new impulse, and in zoology Erik Pontoppidan, the younger. This last name represents a life-long activity in many branches of literature. From Holberg's college of Sorö, two learned professors, Sneedorff and Kraft, disseminated the seeds of a wider culture. All these men were aided by the generous and enlightened patronage of Frederick V. A little later on, the German poet Klopstock settled in Copenhagen, bringing with him the prestige of his great reputation, and he had a strong influence in Germanizing Denmark. He founded, however, the Society for the Fine Arts, and had it richly endowed. The first prize offered was won by C. B. Tullin (1728–1765) for his beautiful poem of *May-day*. Tullin, a Norwegian by birth, represents the first accession of a study of external nature in Danish poetry; he was an ardent disciple of the English poet Thomson. Ambrosius Stub (1707–1758) was a lyrist of great sweetness, born before his due time, whose poems, not published till 1782, belong to a later age than their author.

The Lyrical Revival.—Between 1742 and 1749, that is to say, at the very climax of the personal activity of Holberg, eight poets were born, who were destined to enrich the language with its first group of lyrical blossoms. Of these the two eldest, Wessel and Ewald, were men of extraordinary genius, and destined to fascinate the attention of posterity, not only by the brilliance of their productions, but by the suffering and brevity of their lives. Joannes Ewald (1743–1781) was not only the greatest Danish lyrist of the 18th century, but he had few rivals in the whole of Europe. As a dramatist, pure and simple, his bird-like instinct of song carried him too often into a sphere too exalted for the stage; but he has written nothing that is not stamped with the exquisite quality of distinction. In *The Fishers*, which contains the Danish national song, *Kong Kristian stod*, the lyrical element is most full and charming; in *Rolf Krage*, and *Balder's Death*, Ewald was the first to foresee the revival of a taste for Scandinavian history and mythology; *The Brutal Clappers*, a polemical drama, shows that he also possessed a keen sense of humour. Wessel (1742–1785) excited even greater hopes in his contemporaries, but left less that is immortal behind him. After the death of Holberg, the affectation of Gallicism had reappeared in Denmark; and the tragedies of Voltaire, with their stilted rhetoric, were the most popular dramas of the day. Nordahl Brun (1745–1816), a young writer who did better things later on, gave the finishing touch to the exotic absurdity by bringing out a wretched piece called *Zarina*, which was hailed by the press as the first original Danish tragedy, although Ewald's exquisite *Rolf Krage*, which truly merited that title, had appeared two years before. Wessel, who up to that time had only been known as the president of a club of wits, immediately wrote *Love without Stockings*, in which a plot of the most abject triviality is worked out in strict accordance with the rules of French tragedy, and in most pompous and pathetic Alexandrines. The effect of this piece was magical; the Royal Theatre ejected its cuckoo-brood of French plays, and even the Italian opera. It was now essential that every performance should be national, and in the Danish language. To supply the place of the opera, native musicians, and especially Hartmann, set the dramas of Ewald and others, and thus the Danish school of music originated. Of the other poets of the revival the most important were born in Norway. Nordahl Brun, Claus Frimann (1746–1829), Claus Fasting (1746–1791), C. H. Pram (1756–1821), and Edvard Storm (1749–1794) were associates and mainly fellow-students at Copenhagen, where they introduced a style peculiar to themselves, and distinct from that of the true Danes. Their lyrics celebrated the mountains and rivers of the magnificent country they had left; and, while introducing images and scenery unfamiliar to the inhabitants of the monotonous Denmark, they enriched the language with new words and phrases. This group of writers are now claimed by the Norwegians as the founders of a Norwegian literature; but their true place is certainly among the Danes, to whom they primarily appealed. They added nothing to the development of the drama, except in the person of N. K. Bredal (1733–1778), who became director of the Royal Danish Theatre, and the writer of some mediocre plays.

To the same period belong a few prose writers of eminence. Werner Abrahamson (1744–1812) was the first æsthetic critic Denmark produced. Johan Clemens Tode (1736–1806) was eminent in many branches of science, but especially as a medical writer. Ove Malling (1748–1829) was an untiring collector of historical data, which he annotated in a lively style. Two historians of more definite claim on our attention are Peter Frederik Suhm (1728–98) and Ove Guldberg (1731–1808). In theology Bastholm (1740–1819) and Balle (1744–1816) demand a reference. But the only really great prose-writer of the period was the Norwegian Niels Treschow (1751–1833), whose philosophical works are composed in an admirably lucid style, and are distinguished for their depth and originality.

The poetical revival sunk in the next generation to a more mechanical level. The number of writers of some talent was very great, but genius was wanting. Two intimate friends, Rein (1760–1821) and Zetlitz (1761–1821), attempted, with indifferent success, to continue the tradition of the Norwegian group. Thomas Thaarup (1749–1821) was a fluent and eloquent writer of occasional poems. The early death of Ole Sammöe (1759–1796) prevented the development of a dramatic talent that gave rare promise. But while poetry languished, prose, for the first time, began to flourish in Denmark. Knud Lyne Rahbek (1760–1830) was a pleasing novelist, a dramatist of some merit, a pathetic elegist, and a witty song-writer; he was also a man full of the literary instinct, and through a long life he never ceased to busy himself with editing the works of the older poets, and spreading among the people a knowledge of Danish literature. Peter Andreas Heiberg (1758–1841) is best known as the husband and the father of two of the greatest Danish writers, but he was himself a political and æsthetic critic of note. He was exiled from Denmark in company with Malte Conrad Brun (1775–1826), who settled in Paris, and attained a world-wide reputation as a geographer. O. C. Olufsen (1764–1827) was a writer on geography, zoology, and political economy. Rasmus Nyrup (1759–1829) expended an immense energy in the compilation of admirable works on the history of language and literature. From 1778 to his death he exercised a great power in the statistical and critical departments of letters. The best historian of this period, however, was Engelstoft (1774–1850), and the most brilliant theologian Bishop Mynster (1775–1854). In the annals of modern science Hans Christian Oersted (1777–1851) is a name universally honoured. He explained his inventions and described his discoveries in language so lucid and so char acteristic that he claims an honoured place in the literature of the country of whose culture, in other branches, he is one of the most distinguished ornaments.

We pause on the threshold of the romantic movement to record the name of a man of great genius, whose work was entirely independent of the influences around him. Jens Baggesen (1764–1826) is the greatest comic poet that Denmark has produced. As a dramatist he failed; as a philosophic and critical writer he has not retained the attention he once commanded; but as a satirist and witty lyrist he has no rival among the Danes. In his hands the difficulties of the language disappear; he performs with the utmost ease extraordinary *tours de force* of style. His astonishing talents were wasted on trifling themes and in a fruitless resistance to the modern spirit in literature.

Romanticism.—With the beginning of the 19th century the new light in philosophy and poetry, which radiated from Germany through all parts of Europe, found its way into Denmark also. In scarcely any country was the result so rapid or so brilliant. There arose in Denmark a school of poets who created for themselves a reputation in all parts of Europe, and would have done honour to any nation or any age. The splendid cultivation of metrical art threw other branches into the shade; and the epoch of which we are about to speak is eminent above all for mastery over verse. The swallow who heralded the summer was a German by birth, Adolph Schack-Staffeldt (1769–1826), who came over to Copenhagen from Pomerania, and prepared the way for the new movement. Since Ewald no one had written Danish lyrical verse so exquisitely as Schack-Staffeldt, and the depth and scientific precision of his thought won him a title which he has preserved, of being the first philosophic poet of Denmark. The writings of this man are the deepest and most serious which Denmark has produced, and at his best he yields to no one in choice and skilful use of expression. This sweet song of Schack-Steffeldt's, however, was early silenced by the louder choir that one by one broke into music around him. It was Adam Gottlob Oehlenschläger (1779–1850), the greatest poet of Denmark, who was to bring about the new romantic movement. Oehlenschläger had already written a great many verses in the old semi-didactic, semi-rhetorical style, when in 1802 he happened to meet the young Norwegian Henrik Steffens (1773–1845), who had just returned from a scientific tour in Germany, full of the doctrines of Schelling. Under the immediate direction of Steffens, Oehlenschläger commenced an entirely new poetic style, and destroyed all his earlier verses. A new epoch in the language began, and the rapidity and matchless facility of the new poetry was the wonder of Steffens himself. The old Scandinavian mythology lived in the hands of Oehlenschläger exactly as the classical Greek religion was born again in Keats. After twelve years of ceaseless labour, and the creation of a whole library of great works, the vigour of Oehlenschläger somewhat suddenly waned, and he lived for nearly forty years longer, completely superseded by younger men, and producing few and mainly inferior works. Since and except Holberg no author has possessed so great an influence on Danish letters as Oehlenschläger. He aroused in his people the slumbering sense of their Scandinavian nationality.

The retirement of Oehlenschläger comparatively early in life, left the way open for the development of his younger contemporaries, among whom several had genius little inferior to his own. Steen Steensen Blicher (1782–1848) was a Jutlander, and preserved all through life the characteristics of his sterile and sombre fatherland. After a struggling youth of great poverty, he at length, in 1814, published a volume of lyrical poems; and in 1817 he attracted considerable attention by his descriptive poem of *The Tour in Jutland.* His real genius, however, did not lie in the direction of verse; and his first signal success was with a volume of stories in 1824, which were rapidly followed by others for the next twelve years. Blicher is a stern realist, in many points akin to Crabbe, and takes a singular position among the romantic idealists of the period, being like them, however, in the love of precise and choice language, and hatred of the mere commonplaces of imaginative writing.

Nikolai Frederik Severin Grundtvig (1783–1872), like Oehlenschläger, learned the principles of the German romanticism from the lips of Steffens. He adopted the idea of introducing the Old Scandinavian element into art, and even into life, still more earnestly than the older poet. There was scarcely any branch of letters in which Grundtvig did not distinguish himself; he was equally influential as a politician, a theologian, a poet, and a social economist.

Bernhard Severin Ingemann (1789–1862) was a man in every way unlike the last-mentioned poet. A mild, idyllic mind, delicately appreciative of the gentler manifestations of nature, and shrinking from violent expression of any sort, distinguished the amiable Ingemann. His greatest contributions to Danish literature are the historical romances which he published in middle life, strongly under the influence of the novels of Sir Walter Scott. Several of these, particularly *Valdemar Seier* and *Prince Otto of Denmark,* have enjoyed and still enjoy a boundless popularity. He is remarkable as the first importer into Scandinavia of the historical novel, since very generally cultivated.

Johannes Carsten Hauch (1790–1872) first distinguished himself as a disciple of Oehlenschläger, and fought under him in the strife against the old school and Baggesen. But the master misunderstood the disciple; and the harsh repulse of Oehlenschläger silenced Hauch for many years. He possessed, however, a strong and fluent genius, which eventually made itself heard in a multitude of volumes, poems, dramas, and novels. All that Hauch wrote is marked by great qualities, and by distinction; he had a native bias towards the mystical, which, however, he learned to keep in abeyance.

Johan Ludvig Heiberg (1791–1860) as a critic ruled the world of Danish taste for many years, and his lyrical and dramatic works were signally successful. He had the genius of good taste, and his witty and delicate productions stand almost unique in the literature of his country.

The mother of J. L. Heiberg, the Countess Gyllembourg (1773–1856), was the greatest authoress which Denmark has possessed. She wrote a large number of anonymous novels, which began to appear in 1828 in her son's journal, *The Flying Post.* Her knowledge of life, her sparkling wit, and her almost faultless style, make these short stories, the authorship of which remained unknown until her death, master-pieces of their kind.

Ludvig Adolf Bödtcher (1793–1874) wrote only one single volume of lyrical poems, which he gradually enlarged in succeeding editions. He was a consummate artist in verse, and his impressions are given with the most delicate exactitude of phrase, and in a very fine strain of imagination. Most of his poems deal with Italian life, which he learned to know thoroughly during a long residence in Rome. He was the secretary of Thorwaldsen for a considerable time.

Christian Winther (1796–1876) made the island of Zealand his loving study, and that province of Denmark belongs to him no less thoroughly than the Cumberland lakes belong to Wordsworth. Between the latter poet and Winther there was much resemblance. He was, without compeer, the greatest pastoral lyrist of Denmark His exquisite strains, in which pure imagination is blended with most accurate and realistic descriptions of scenery and rural life, have an extraordinary charm not easily described.

The youngest of the great poets born during the last twenty years of the 18th century was Henrik Hertz (1798–1870). He was the most tropical and splendid lyrist of the period, a sort of troubadour, with little of the Scandinavian element in his writing. It is true that in some of his dramas, particularly in *Svend Dyring's House*, 1837, the theme and plot were taken from Danish history, but the spirit of his poems was distinctly southern. As a satirist and comic poet he followed Baggesen, and in all branches of the poetic art stood a little aside out of the main current of romanticism. In his best pieces, at the same time, he is the most modern and most cosmopolitan of the Danish writers of his time.

It is noticeable that all the great poets of the romantic period lived to an advanced age. Of the ten writers last considered, five died at an age of more than eighty, and the briefest life lasted to the confines of seventy years. This prolonged literary activity—for some of them, like Grundtvig, were busy to the last—had a slightly damping influence on their younger contemporaries, and since their day fewer great names have arisen. Four poets of the next generation, however, deserve most honourable mention.

Hans Christian Andersen (1805–1875), the greatest of modern fabulists, was born in very humble circumstances at Odense in Funen. His life was a struggle for existence, in the course of which he suddenly found himself famous. He attempted lyrical and dramatic poetry, novels, and travels, before he discovered the true bent of his genius. In all these branches of literature he escaped failure, but without attaining brilliant success. In 1835 there appeared the first collection of his *Fairy Tales*, and won him a world-wide reputation. Almost every year from this time forward until near his death he published about Christmas time one or two of these unique stories, so delicate in their humour and pathos, and so masterly in their simplicity. He also wrote, later in life, some excellent novels, *The Two Baronesses*, *Only a Player*, and others; his early story of *The Improvisatore*, 1835, has also considerable charm. Andersen was an incessant wanderer over Europe, and the impressions of his travels form a series of interesting, if egotistical, memoirs.

Carl Christian Bagger (1807–1846) published volumes in 1834 and 1836 which gave promise of a great future,—a promise broken by his early death. Frederik Paludan-Müller (1809–1876) survived much longer, and slowly developed a magnificent poetical career. He is one of the greatest names of Danish literature. His mythological dramas, his great satiric epos of *Adam Homo* (1841–48), his comedies, his lyrics, and above all his noble philosophic tragedy of *Kalanus*, prove the immense breadth of his compass, and the inexhaustible riches of his imagination.

The poets completely ruled the literature of Denmark during this period. There were, however, some eminent men in other departments of letters, and especially in philology. Rasmus Christian Rask (1787–1832) was one of the most original and gifted linguists of his age. His grammars of Old Frisian, Icelandic, and Anglo-Saxon were unapproached in his own time, and are still admirable. Niels Matthias Petersen (1791–1862), a disciple of Rask, was the author of an admirable *History of Denmark in the Heathen Antiquity*, and the translator of many of the Sagas. Christian Molbech (1783–1859) was a laborious lexicographer, author of the first good Danish dictionary, published in 1833. In Joachim Frederik Schouw (1789–1852), Denmark produced a very eminent botanist, author of an exhaustive *Geography of Plants*. In later years he threw himself with zeal into politics. His botanical researches were carried on by Frederik Liebmann (1813–1856). The most famous zoologist contemporary with these men was Salomon Drejer (1813–1842.)

The romanticists found their philosopher in a most remarkable man, Sören Aaby Kierkegaard (1813–1855), one of the most subtle thinkers of Scandinavia, and the author of some brilliant philosophical and polemical works. A learned philosophical writer, not to be compared, however, for genius or originality to Kierkegaard, was Frederik Christian Sibbern (1785–1875).

Of novelists who were not also poets, only one was great enough to demand notice,—Andreas Nikolai de Saint-Aubain (1798–1865), who, under the pseudonym of Carl Bernhard, wrote a series of charming romances. We close our brief sketch of the romantic period with the mention of two dramatists, Peter Thun Foersom (1777–1817), who produced an excellent translation of Shakespeare, 1807–1816, and Thomas Overskou (1798–1873), author of a long series of successful comedies.

Latest Period.—Three living writers connect the age of romanticism with the literature of to-day. Parmo Carl Ploug (born 1813) is a vigorous politician and poet, violently Pan-Scandinavian, and editor of the newspaper *Fædrelandet*. Meyer Aron Goldschmidt (born 1818) the life-long opponent of Ploug in politics and journalism, is the author of some novels written in the purest Danish, and with great vivacity and art. Jens Christian Hostrup (born 1818) is by far the best of the younger dramatists, having produced between 1843 and 1855 a series of exquisite comedies, unrivalled in delicacy and wit.

Hans Vilhelm Kaalund (born 1818) is a lyrist of much sweetness and force. He has lately published a good tragedy, *Fulvia*. Erik Bögh (born 1822) is the author of inimitable songs, vaudevilles, and jeux d'esprit. Christian Richardt (born 1831) is the man of most decided genius among the younger poets. His four volumes of lyrical poems include some exquisite and many admirable pieces. Holger Drachmann (born 1847) is a young poet, novelist, and painter of amazing fecundity, and great, though still uncertain, promise.

The greatest living Danish zoologist is Johannes Japetus Smith Steenstrup (born 1813). Jens Jakob Asmussen Worsaae (born 1821) is an eminent antiquarian. Johan Nikolai Madvig (born 1804) is celebrated as a philologist, and particularly as one of the most eminent of modern Latinists. A young disciple of Madvig, Vilhelm Thomsen, has distinguished himself by his researches into the Sclavonic languages. Rasmus Nielsen (born 1809) and Hans Bröchner (born 1820) are the two most eminent philosophers who have proceeded from the school of Kierkegaard. In æsthetic criticism no recent writer has approached—in knowledge, catholicity, and eloquence—Georg Brandes (born 1842), who stands alone among the writers of his country as an advocate for the most liberal culture and the most advanced speculation.

Fine Arts.—Within the present century the fine arts have been successfully cultivated in Denmark. In painting there has been displayed of late years an increased power and variety. The father of Danish painting, Nikolaj Abildgaard (1744–1809), was a man of great but rhetorical talent, taught in the French school of his day. Jens Juel (1745–1802), a portrait-painter of the same age, is a great favourite among the Danes. It was, however, Eckersberg (1783–1853) who gave the first real stimulus to the art of the nation. He was the pupil, first of Abildgaard, afterwards of David in Paris. In a distant and imperfect way he may be said to hold a position analogous to that of Turner in England. The influence of this genius has not been entirely beneficial, and while the Danish painters reproduce what they see around them with photographic precision, they are singularly cold in colour and void of imagination. Marstrand (1810–1875) was by far the most richly-gifted of the pupils of Eckersberg; his best works are full of brilliant qualities, and would command admiration in any country. Sonne (born 1801) has made himself a name by painting a series of large canvases representing the victories of the Danish people in 1848, and their misfortunes in 1864. He has tenderness and a skill in composition that make up for the absence of greater gifts. Vermehren (born 1823) has shown an eminent talent in depicting the Danes in their country-life, at serious or mournful occasions; he carries stiffness and reserve to their greatest excess. Exner (born 1825) is far more genial and charming, a genre-painter of a high order, full of delicate fancy, and rejoicing in sunlight, humour, and soft gay colours. He has produced a large number of studies of the fast-disappearing habits and dresses peculiar to the peasants. Dalsgaard (born 1824) has followed the practice of Marstrand with originality and success. Skovgaard was the most eminent Danish landscape painter. Among the more recent artists the most powerful is Carl Bloch, who has produced some very brilliant work.

In sculpture the single name of Berthel Thorwaldsen (1770–1844) has raised Denmark to a great pre-eminence. As the opponent of the smooth and effeminate style of Canova, Thorwaldsen inaugurated a true revival of the masculine spirit of the ancients. He had an extraordinary fecundity and conceived designs with such rapidity that he almost abandoned the use of the chisel in his later years. All the works he was able to leave he bequeathed to the Danish state. The Thorwaldsen Museum, in which these works were placed, is one of the greatest attractions of the capital, and is truly a national monument. Two disciples of Thorwaldsen's continued his tradition with ability, and one with a spark of his great genius. The few works completed during the short life of Bissen prove that he possessed very considerable force and imagination. Jerichau had a milder and more common-place talent.

In architecture the Danes have little to boast of. The most picturesque buildings in Copenhagen belong to the style of Christian IV., a sort of Tudor. One of the most important, the palace of Rosenborg, was actually designed by Inigo Jones. A few cathedral churches, as those of Ribe and Viborg, deserve attention. The country towns are poorly and monotonously built.

The Danes have a great delight in music. Their first great composer was Christoph Weyse (1774–1842), who represented in music the romanticism of Oehlenschläger in poetry and Steffens in philosophy. The comic operas of Weyse are especially admired. Frederick Kuhlau (1786–1832) was a talented and a hated rival of Weyse, who put to charming music a great many of Oehlenschläger's lyrical dramas. The two most eminent living Danish composers are Hartmann (born 1805), who is allied to the latest German school, and whom Wagner has warmly commended, and Gade (born 1817), the pupil and friend of Mendelssohn, whose concerted pieces are admired and performed in all parts of Europe. Heise is the best Danish song-writer, a most imaginative and delicate musician.

No good work exists on Danish literature. See, however, Nyrup, *Den danske Digtekunsts Historie*, 1800–1808, and *Almindeligt Literaturlexikon*, 1818–1820; Petersen, *Literaturhistorie*; Overskou, *Den danske Skueplads*, 1854; Brandes, *Kritiker og Portraiter*, 1870; Brandes, *Danske Digtere*, 1877.

On the fine arts the following works may be consulted:—*Sammendrag af statistiske Oplysninger angaaende Kongeriget Danmark*, Copenhagen, 1876; Trap (J. P.), *Statistisk-topographisk Beskrivelse af Kongeriget Danmark*, 4 vols., Copenhagen, 1857–63; Julius Lange, *Nutids-Kunst*, Copenhagen, 1873; Carl Thrane, *Danske Komponisten*, Copenhagen, 1875; E. C. Otté, *Scandinavian History*, London, 1874; N. M. Petersen, *Danmarks Histoire i Hedenold*, 8 vols., Copenhagen, 1854–55. (E. W. G.)

DENNIS, JOHN (1657–1734), a critic and poet of some celebrity in his own day, was the son of a saddler in London, where he was born in the year 1657. He received the first branches of education at Harrow and at Caius College, Cambridge, from which after four years' residence he removed to Trinity Hall. In 1683 he graduated M.A. When he quitted the university he made the tour of Europe, in the course of which he acquired a strong prejudice against foreign manners and customs, and became confirmed, as was natural in one born and brought up a Whig, in his dislike of foreign Governments. On his return to England he became acquainted with Dryden, Wycherly, Congreve, and Southerne, whose conversation, inspiring him with a passion for poetry, and a contempt for every attainment that had not in it something of the *belles lettres*, diverted him from entering any profession. He lived for a time on a small fortune he had inherited from an uncle, but this was soon squandered. Through the patronage of the duke of Marlborough, to whom he had recommended himself by his zeal for the Protestant succession, he obtained a place in the customs worth £120 per annum. After some years, however, his extravagance reduced him to the necessity of disposing of it; but, in selling it, he reserved to himself an annuity for a term of years. Outliving this term, he was in the closing years of his life reduced to extreme necessity.

Dennis was the author of several small poems of little merit, and one or two plays which possess none, though one at least of the latter was received with considerable favour at the time of its production, on account of its hitting the strongest popular prejudice then existing. His tragedy of *Love Asserted*, produced at Lincoln's Inn Fields theatre in 1704, was fiercely anti-French, and as such met with warm sympathy and approval. Dennis conceived the insane idea that by writing it he had roused the implacable resentment of the French Government, and amusing stories are told of the precautions he thought it necessary to take in consequence. He is said to have visited the duke of Marlborough, previous to the negotiations for the peace of Utrecht, and asked him to secure the insertion of a special clause in the treaty protecting his person from vengeance. On another occasion the appearance of an approaching vessel is said to have caused him to flee to London from a friend's house on the coast of Sussex. His tragedy of *Appius and Virginia*, produced at Drury Lane in 1709, was unsuccessful. It is memorable only on account of a peculiar kind of thunder used in the performance, which was both novel and effective. A few nights after the failure of his play Dennis, sitting in the pit, heard the thunder introduced into the tragedy of Macbeth, whereupon he rose and cried to the audience, "They won't act my tragedy, but they steal my thunder."

But for his inordinate vanity, and an infirmity of temper that fell little short of insanity, Dennis might have made some mark in literature as a critic. His reviews of Pope's *Essay on Man* and Addison's *Cato* showed considerable discernment and not a little wit; but they were disfigured by bitter personal feeling. As his attacks were almost always on persons of abilities greatly superior to his own, like Addison, Steele, and Pope, their replies usually turned opinion strongly against him, irritating his testy temper, and rendering him a perpetual torment to himself. Pope pilloried him in the *Dunciad*, and in the following epigram—

> Should Dennis publish you had stabb'd your brother,
> Lampoon'd your monarch, or debauch'd your mother,—
> Say, what revenge on Dennis can be had?
> Too dull for laughter, for reply too mad;
> On one so poor you cannot take the law;
> On one so old your sword you scorn to draw.
> Uncag'd then let the harmless monster rage,
> Secure in dulness, madness, want, and age.

At length, after a long life of vicissitudes, he was compelled to receive obligations from those whom he had been continually reviling. In the very close of his days a play was acted for his benefit at the little theatre in the Haymarket, through the united interests of Thomson, Mallet, and Pope. It is much to the credit of Pope especially that, notwithstanding the gross manner in which Dennis had calumniated him on many occasions, he took part in the arrangements, and even wrote an occasional prologue to the play, which was spoken by Cibber. Not long after this Dennis died, on the 6th of January 1734.

DENON, DOMINIQUE VIVANT, BARON DE (1747–1825), artist and archæologist, was born at Châlon-sur-Saône on the 4th January 1747. His parents sent him to Paris to study law, but he showed from the first a decided preference for art and polite literature, and he soon gave up his professional studies. In his twenty-third year he produced a comedy, *Le bon père*, which obtained a *succès d'estime*, its author having already made himself a favourite in society by his agreeable manners and exceptional conversational powers. He brought himself under the notice of Louis XV. with such address as to establish at once his position in court favour. The king intrusted him with the collection and arrangement of a cabinet of medals and antique gems for Madame de Pompadour, and subsequently appointed him attaché to the French embassy at St Petersburg. On the accession of Louis XVI. Denon was transferred to Sweden; but he returned, after a brief interval, to Paris with the ambassador M. de Vergennes, who had been appointed foreign minister. In 1775 Denon was sent on a special mission to Switzerland, and availed himself of the opportunity to visit Voltaire at Ferney. He took a portrait of the philosopher, which was engraved and published on his return to Paris. His next diplomatic appointment was to Naples, where he spent seven years, first as secretary to the embassy and afterwards as *chargé d'affaires*. He devoted this period to a careful study of the monuments of ancient art, collecting many specimens and making drawings of others. He also perfected himself in etching and mezzotinto engraving. The death of his patron, M. de Vergennes, in 1787, led to his recall, and the rest of his life was given mainly to artistic pursuits. On his return to Paris he was admitted a member of the Academy of Painting. After a brief interval he returned to Italy, and resided for some years chiefly at Venice. He also visited Florence and Bologna, and afterwards went to Switzerland. While there he heard that his property had been confiscated, and his name placed on the list of the proscribed, and with characteristic courage he resolved at once to return to Paris. His situation was critical, but he found support and protection in the friendship of the painter David, who obtained for him a commission to furnish designs for republican costumes. This he did to the satisfaction of the Revolutionists, and his name was removed from the list of emigrants. When the terrors of the Revolution were over, Denon was one of the numerous band of eminent men who found a congenial resort in the house of Madame de Beauharnais. Here he formed the acquaintance of Bonaparte, to whose fortunes he attached himself with the happy instinct of one who was always quick to discern the coming power. On the special invitation of the general he joined the expedition to Egypt, and thus found the opportunity of gathering the materials for his most important literary and artistic work. He accompanied General Desaix to Upper Egypt, and made numerous sketches of the monuments of ancient art, sometimes under the very fire of the enemy. The results were published in his *Voyage dans la basse et la haute Egypte* (2 vols. fol., with 141 plates, Paris, 1802), a work which crowned his reputation both as an archæologist and as an artist. In 1804 he was appointed by Napoleon to the important office of director-general of museums, which he filled greatly to the benefit of art and artists until the restoration in 1815, when he had to retire. He was a devoted friend of Napoleon, whom he accompanied in his expeditions to Austria, Spain, and Poland, taking sketches with his wonted fearlessness on the various battle-fields, and guiding the conqueror in his choice of spoils of art from the various cities that were pillaged. After his retirement he occupied himself with the preparation of a profusely illustrated history of ancient and modern art, in which he had the co-operation of several skilful engravers. He died at Paris on the 27th April 1825, leaving the work unfinished. It was published posthumously, with an explanatory text by Amaury Duval under the title *Monuments des Arts du dessin chez les peuples tant anciens que modernes, recueillis par Vivant Denon* (4 vols. fol. Paris, 1829).

DENTISTRY. The province of dentistry embraces the art of treating diseases and lesions of teeth, and supplying artificial substitutes in the place of these organs when lost. Disease of the teeth is not always a mere local affection, but may, and very generally does, arise from constitutional causes. With cases of the latter description the dentist, unless qualified as a surgeon or physician, is not in a position to deal, except in so far as to repair or ameliorate the local affections produced. The morbid conditions of the system leading in some way to disorders of the dental tissues are various and dissimilar in their nature; and the exact connection between such morbid conditions and their effects upon the teeth is not well understood. In this way the diagnosis, the treatment, and the removal of the cause might be considered more properly the duty of the general practitioner than of the specialist. Up to a very recent date this has been more particularly the case, dentists until lately having in the greater number of instances been educated with a view to proficiency in the mechanical rather than the surgical department of their profession; while what surgical knowledge they, in a few cases, did acquire was confined to certain facts connected exclusively with the organs upon which they were expected to operate. From the *Lancet* for 3d June 1876 it appears that not much more than fifty of all the numerous body of so-called surgeon-dentists of the United Kingdom then possessed in reality any medical or surgical diploma at all.[1]

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[1] Indeed it is comparatively of late years that dentistry has occupied anything like a properly recognized position among the different departments of minor surgery; for long it was practised to a large extent as a superadded means of livelihood by persons engaged in some other pursuit, and without any professional education whatever. The blacksmith, barber, watchmaker, and others of the same class were the dentists of every village and country town; while even in some of our larger cities dentists of the kind were till lately to be found practising under the very shadow of universities and medical schools. The explanation of this seems to have been that mere tooth-drawing constituted the surgical dentistry of these days; and as the operation is one demanding muscular strength and manual dexterity more than anatomical knowledge or surgical skill, and was performed as successfully in many cases by the irregular as by the regular practitioners, it had not many attractions for medical men. It was accordingly consigned to the uneducated and the charlatan, who did not fail with proverbial unscrupulousness to parade their specialty as sufficient to confer a surgical status on those performing it, and entitle them to the designation of *surgeon* dentist,—a designation which has ever since been applied without discrimination or distinction to qualified or unqualified practitioners in this particular branch. In 1840 or 1841 this state of matters seems to have attracted the attention of the profession, since, after much consideration, some anxiety was manifested by its more respectable members to be recognized in the new Medical Act of 1843, then being introduced by Sir James Graham. Both then and later, however, the fully qualified medical men objected to the fractionally qualified being made to appear as on an equal footing with themselves. The profession may at this time be said to have divided itself into three sections—1st, those who desired to see all dentists fully qualified surgeons; 2d, those who wished them to have only a certain amount of surgical knowledge,

A special examination in dentistry now exists in connection with the Royal College of Surgeons of England for students training in that profession, a certain amount of information being required in various branches of medicine and surgery. A curriculum of study in these departments has been arranged; and candidates who can produce certificates of attendance on it are admitted for examination, and, if found fit, receive a certificate entitling them to practise as dentists.

In America this special system has for long been adopted and carried to a much greater extent. Colleges of dentistry are established in many of the leading cities there, each with what they designate a faculty of professors in the various departments of the art. In the *Dental Cosmos*, vol. xvii. No. 11, an American periodical, advertisements appear of seven different dental colleges, with seventy-eight professors, demonstrators, &c. The professorships in these institutions comprehend those of mechanical dentistry, operative dentistry, dental physiology, dental pathology, dental therapeutics, mechanical dentistry and metallurgy, institutes of dentistry, &c. In each a diploma in dentistry —"doctor of dental surgery," or of "dental medicine," as the case may be—is conferred, the general fee for which seems to be $30, on the candidates having fulfilled the curriculum and passed the examination.

In the medical schools and examining boards in Scotland all this is different. No special or partial diploma is there given by the Royal College of Surgeons or other licensing body, while diseases of the teeth and adjacent structures are understood to be made subjects of lecture and examination in the same manner as other regional or special diseases occurring in the practice of medicine or surgery; and great as the improvements certainly are which such arrangements as those of England and America are on the old system, still it is to be hoped, and it is likely, that ere long practitioners devoting themselves to dental surgery will—like oculists, or aurists, or obstetricians, or other physicians or surgeons restricting themselves to or selecting one branch of practice in preference to another—be at the same time fully qualified medical men.

Number of Teeth.[1]—The complement of teeth in the adult human subject amounts to 32—16 in the upper, and 16 in the lower jaw. These are divided into what are termed incisors, canines, bicuspids or small grinders, and molars or the large grinding teeth. The order in which these different forms of teeth are placed in each jaw is the following:—there are four incisors in front; immediately behind these on each side is placed the canine or eye tooth; next come the bicuspids, two on each side; and behind these again are placed on each side the three molar teeth, the last of which is sometimes termed the wisdom tooth, from its generally appearing so late as from eighteen to twenty-five.

In the infant or milk teeth, or, as they are more properly denominated, the temporary teeth, the number and class of these organs is different. Here only 20 members of the series exist, and are divided into four incisors, two canines, and four molar teeth, similarly placed—ten in each jaw. The four temporary molar teeth represent or rather precede the four bicuspid teeth of the adult set, while the six molars above and below of the adult are not represented in the temporary set at all. In other words, the true permanent molar teeth have no predecessors.

Dentition.—The temporary set appear, or are cut, as follows. The two lower central incisors appear between the sixth and eighth months of infant life—these are generally succeeded in a few weeks by those of the upper jaw; the two lateral incisors of the upper jaw next appear about the eighth or ninth month, and those of the lower jaw quickly follow; the anterior molars of the lower jaw are cut about the twelfth, fourteenth, or sixteenth month, and those of the upper jaw immediately after; the canines appear about the seventeenth or eighteenth month, generally those in the upper jaw first; and before the age of two and a half years the second milk molars have usually commenced to appear, thus completing the temporary set of teeth at the age of about three years.

The temporary set of teeth begin to be shed between the sixth and eighth years of life. Previous to this, however, the first permanent molars are cut, generally about the age of seven. These are followed by the central and then by the lateral incisors. Next come the anterior bicuspids about nine years old; the posterior about ten or eleven; the canines about twelve; the second molars at thirteen; and the last molars, or wisdom teeth, from the eighteenth to the twenty-fifth years of life. Deviations from the order and time of appearance of both sets occur, but the above may be regarded as the general rule in the evolution of the temporary and permanent teeth of the human subject.

Structure and Form of Teeth.—The structure of both sets may be said to be the same. The body of each tooth is composed of a dense bony substance termed dentine. This is invested on the crown by a cap of still more dense material termed enamel; while the root, or fang, is coated externally by a layer of a softer substance, closely resembling ordinary bone, and termed cement. In the centre of each fang, and extending into the body of the tooth, is a hollow canal termed the pulp cavity, for the passage of vessels and nerves.

In form the incisors of both jaws are single-fanged, as are also the canines. The bicuspids of the lower jaw are also single-fanged, while those of the upper jaw are occasionally double-fanged, or have a single fang bifid at its extremity. The lower molars, both temporary and permanent, possess two fangs, one behind the other. These two fangs are widely separated in the temporary molars; while, on the other hand, in the posterior molars of the permanent set they are not uncommonly united into one. The upper molars of both sets possess three fangs—two external or cheek fangs placed one behind the other, and a third situated on that side of the tooth next the palate.

No such spaces exist between any of the teeth in the dental arch of man as occur in the lower animals. In this way, where the jaw is small, or where unusually rapid or simultaneous appearance of the members of the second, or persistence of those of the first set occurs, irregularity of the teeth results. This is sometimes increased by the evolution of supernumerary teeth, these being generally out of the line of the others; and occasionally matters are rendered worse by the natural teeth being themselves of unusually large size. Cases also occur in which the number of the teeth is defective, and some rare instances have been recorded where these organs never appeared at all.

The remedy in cases of dental irregularity is to remove

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and in this way to be subordinate to fully qualified practitioners; and 3d, those who advocated dentists being altogether dissociated from surgeons, and having a college and a diploma of their own. The old tendency, however, of desiring to appear a kind of surgeons here again seemed to predominate, as the idea of the dental college and diploma was abandoned for the prospect of being attached in some way or other to the Royal College of Surgeons of England. The difficulties then presented, however, were not few, and many of them are found still to exist. A full medical or surgical education was always deemed desirable by those best able to judge of it, but the obstacle had been the mechanical acquirements which dentistry required and which would have to be added to a surgeon's qualifications, an arrangement entailing a very protracted period of education. The scheme of partial surgical instruction, again, did not give the title to registration as qualified practitioners, and both schemes were held to entail considerable hardships on provincial candidates owing to the prescribed classes and constituted examining board being exclusively confined to London. All these representations were, however, set aside and in 1858 the dental certificate of the College of Surgeons of England noticed above was established.

[1] For anatomy of the dental system see p. 282 of the present volume.

by extraction such teeth as are in the way, and by mechanical contrivances, known as regulating plates, to apply pressure in such a manner as will move the misplaced tooth or teeth into their normal position, and retain them there for some time afterwards. Such plates are constructed on the same principles, and of the same materials, as the bases of artificial sets, which will come to be treated of afterwards. It not unfrequently happens that nature, if left to herself, effects a wonderful improvement in cases of dental irregularity. This is frequently observable where it is the upper canines which are misplaced. These teeth when appearing, as they often do, outside and much above the necks of the adjoining teeth, occupy a long time in descending, and in certain cases the anterior portion of the maxillary arch seems to enlarge sufficiently to afford space for their almost perfect arrangement during this period. The same thing occurs, but to a less marked extent, in the case of other teeth; in general, however, nature requires to be assisted by art in some way, as has been above indicated, where the irregularity exists to any great amount.

Diseases of Teeth.—The teeth being living organisms are, like other structures in the animal body, subject to disease. Some of the diseases bear a close resemblance to mere chemical decomposition, such as occurs in dead or inorganic matter, and at a certain stage of some dental affections a process of the kind does no doubt occur; but this is so mixed up with, and accompanied and preceded by vital action, that to consider it as a mere chemical or physical lesion would be pathologically incorrect. Various arguments have been advanced by its advocates in support of the chemical theory of dental caries; but however ingenious or specious these at first sight appear, they fail to explain many phenomena in the origin, the period of occurrence, and the stages and progress of this disease, unless the vital element in its nature be also taken into account.

Dental caries, or decay of the teeth, may briefly be described as consisting in a previous imperfect development, or in the access of some morbid action interfering with the nutrition or vitality of their tissues, thus rendering them liable to any destructive agencies to which they may be subjected, by which they become disorganized, disintegrated, and broken down, leaving the sensitive pulp exposed, whereby acute pain is occasioned, especially when the destruction of the protective tooth substance has been rapid. Sometimes the process of decay is insidious and unobserved. Its advent is then supposed to have been sudden, and its progress more speedy than has really been the case. This, however, in many instances arises from the condition of matters being overlooked until the enamel, which resists destruction longest, being undermined and falling in, reveals for the first time the cavity existing underneath. Pain, probably also for the first time, is then experienced from exposure and irritation of the dentinal pulp, and toothache, as it is termed, is produced.

Necrosis, or death of a whole tooth, is another lesion to which these organs are liable. This may result from either acute or chronic inflammation in the tissues connecting them with the jaw, or from a blow, or from any other cause leading to their vascular supply being cut off. The necrosis may involve the whole tooth, or it may be partial —as, for example, where it is limited to one fang of a multiple fanged tooth. In these cases there may be no breaking down of texture, but the tooth becomes discoloured, loosened, extruded, and at last detached from its socket, from which after a time, and generally after considerable uneasiness, it drops out.

Exostosis, or a morbidly increased growth of certain parts of a tooth, being in almost every instance confined to the cement substance described as covering the fang or root, is an affection somewhat obscure in its outward symptoms. It is generally a consequence of previous disease of the tooth, leading to chronic inflammation of the textures covering the fang and lining the socket (or alveolus) in which it is implanted. This leads to a deposition of new material in the cement till that substance appears in nodular masses attached to or surrounding the apex of each fang, and sometimes uniting several of such fangs into one. The presence of this additional and increasing bulk of hard tissue within the inclosing socket produces pain of a severe and somewhat anomalous character by pressure on the adjacent nerves, which is often mistaken for neuralgia or tic of a less unaccountable origin. It further acts within the unyielding bony socket referred to as a means of rendering removal of the tooth much more difficult, owing to the bulbous extremity of the enlarged fang acting like a rivet in its fixation. Generally, however, the teeth in which exostosis occurs have been too long the subjects of irritation and decay not to be suspected when obscure pain of a less localized nature exists in their vicinity; and not unfrequently there is found round the necks of teeth or stumps so affected a red and tumified condition of the gum, sufficiently indicative of the state of matters below to warrant their extraction.

Alveolar abscess, or gum boil, as it is popularly denominated, is a localized inflammation going on to suppuration, and generally confined to the tissues surrounding the apex of a tooth fang. The pain usually commences with a feeling of tenderness and enlargement or lengthening of the whole tooth. The gum becomes swollen and tender over the whole depth of the root, generally to a greater extent on the outer side of the jaw. The face also becomes swollen, and the glands in the neighbourhood of the jaw feel enlarged and tender. The pain is not commonly continuous, but rather remitting in its character, sometimes ceasing altogether—only, however, to be followed by an increased attack, while its repeated exacerbations night and day lead in many cases to very considerable constitutional disturbance. After a time the purulent matter secreted makes its way to the surface, sometimes finding an escape alongside of or through the pulp cavity of the fang, and very frequently, as the name given to the disease indicates, by pointing and discharging itself through the gum.

Occasionally, instead of pointing on the surface of the gum, the matter takes a more indirect course and points on the surface of the cheek, bursting and leaving an open sore there which seldom closes until the tooth or stump has been extracted. At an early stage of this disease fomentations and other modes of relieving inflammatory action do good, but evacuating the matter by means of incisions or extraction of the offending tooth are the only reliable remedies at a later period.

Teething.—What is termed dentition, although in its widest sense properly including the development of the teeth within, as well as their subsequent appearance through, the superimposed tissues, is generally restricted in its application to the latter division of this process, more especially as it occurs in connection with the temporary or milk set, during the period of early infancy. The genesis, increment, and evolution of these organs involve so much of what is purely physiological, and would entail the discussion of so many points of a histological nature, that only the latter stages of evolution or cutting of the teeth can be referred to here. Regarding this occurrence, the most vague and contradictory opinions have been entertained. Erroneous notions of its nature, and of the exact manner in which to account for many of its phenomena, have been and still are promulgated. A number of morbid affections incident during infancy are set down as clearly attributable to the tooth's penetration of its inclosing tissues, and considered by many authorities as of every day occurrence; while the views advanced with reference to the pathology and treatment of such cases, suppositional or otherwise, are equally various and conflicting. The probable solution of the difficulty seems to be that, while evil consequences may in certain instances be traceable to dentition, the frequency and importance of such cases is very much exaggerated.

Extraction.—This constitutes the most important operation of a surgical nature falling under the care of the dentist, and is chiefly called for where the condition of the tooth, from disease or injury, precludes the possibility of saving it by stopping or other means. The operation is also frequently resorted to where the teeth are too crowded in the jaw, or where they are irremediably misplaced, or where supernumerary members of the series exist and occasion inconvenience. In order to extract any tooth successfully, there is demanded a knowledge of what its configuration normally ought to be, and of the proper instrument to use; and, along with these, the condition to which decay or other disease may have reduced the tooth must be kept in mind while proceeding with the operation.

In seizing a tooth in order to its extraction the part upon which the hold is taken should be sufficiently sound and strong to withstand the force necessary for dislodging the fangs; and to obtain such a hold it is necessary to thrust the grasp of the instrument as far as possible beyond the spot affected by decay. It should then be detached from the walls of its socket in that direction where least resistance is likely to be met. This must be judged of according to circumstances, but in general is indicated by an acquaintance with the anatomy of the structures concerned. After being thus loosened it has merely to be lifted from the jaw to complete the operation. Sometimes a tooth is so firmly secured in the jaw that its own tissue will give way before it will separate from the alveolar cavity in which it is fixed. This is particularly the case in friable teeth; and frequently even in the strongest teeth the root or fangs may be malformed or bent, or secured in such a manner as renders their extraction extremely difficult or altogether impossible by any ordinary means.

The instruments employed in extraction may be divided into those which grasp the tooth between their blades and literally extract or draw it out, such as forceps, and those which apply the dislodging force by acting as a lever in the manner of a crow bar, such instruments being termed elevators. The key, an instrument of great power, but now very properly almost disused, partakes in a measure of the properties of both these instruments, but that in a very imperfect and disadvantageous manner. In some rare cases, however, it may be found of much service when used with circumspection. It is impossible here to enter into detail regarding the different forms of forceps, elevators, and other instruments required in dental surgery; but one great principle may be laid down with respect to all of them, which applies especially to forceps, and that is that their form should be as simple as possible consistently with firmly and grasping securely the particular teeth they are intended to remove, and with conveniently reaching that part of the mouth in which it is situated.

Irregularity of Teeth.—In the extraction of teeth for the purpose of affording space in cases of dental irregularity from overcrowding it often becomes necessary to remove a healthy organ, and before doing so among the permanent teeth certain questions present themselves for consideration. Unless there be a fair probability of such a step being successful, in exchange the loss of two teeth should the originally misplaced one be so objectionable and so unyielding to treatment as to require this. In the temporary set the principal disadvantage connected with the removal of any of their number is when to make room for one ‖ manent tooth two or more temporary ones would requ extraction,—as of course space is thus provided at expense of the second permanent tooth, for which one the two temporary ones was keeping a place. In this however, the objection to removal of any of its series greatly obviated by the fact that, while the teeth are v soon to be lost at all events, the jaw is increasing in and progressively affording more and more room itself the incoming second set. Along with extraction, in great majority of instances pressure requires to be app to the misplaced teeth in order to effect their regulati This has generally to be continuously kept up for a c siderable period, and in many cases requires to be m tained after the teeth have been restored to their natu position in order to keep them there until they seem sett in the new locality. Various forms of what are cal regulating plates are used for the purpose of applying p sure in this manner, and may be said generally to con of a framework fitted and fixed to the adjoining te something in the same manner as an artificial set, and c culated to afford a fixed point or fulcrum from which to on the tooth to be moved.

In disease of the dental tissues it is not always necessa to remove the affected organ; such an extreme measure this is only called for when other remedial means ha failed, or appear hopeless. The chief of all dental disea demanding the dentist's care is, as has been already state that known as caries, or decay. It is this affection direct or indirectly that leads to by far the larger number of e tractions performed; but it by no means follows th extraction is the only remedy at our command. Ma teeth are extracted which might be saved, and the princip method by which this can be effected is by what is term stopping, or plugging, or filling the teeth.

Stopping.—The operation of stopping a decayed tooth co sists in cleaning out the carious cavity and removing the softened or disintegrated tissue, and shaping and tri ming it so as to reduce it to a form fit for receiving a retaining the material with which it is to be filled. Along with these proceedings it in general becom necessary to diminish the sensitive condition in which t interior surface of the prepared cavity is left, to remove destroy any of the vascular and highly nervous pulp whi may be protruding into it, and to subdue any inflammati and arrest any discharge which may have been going in the fang. Various applications and other remed measures are resorted to for these purposes, the mo common being the applying for a time some of the mo convenient escharotics on a plug inserted into and k within the cleaned-out cavity till this end is achiev When thus prepared, the cavity is ready to be filled w whatever substance has been selected to replace the l tissue, and as nearly as possible to restore the contour the tooth. The substances employed as permanent st pings are generally metallic. Gold in the form of foil, in that condition known as sponge gold, tin in the fo of foil, and amalgams composed of various metals eith in a simple or compound condition combined with merc are the principal materials in use as stoppings. T oxychlorides, from their being capable of insertion i plastic state, and quickly acquiring a density and hardn approaching that of tooth bone, are also favourites w many as serviceable fillings; and various preparations gutta-percha, gum resins, sulphur, and other matters ha long been known as valuable, though not very durab when employed in certain cases.

Dexterity in the insertion of a gold or other foil filling a matter which can be acquired by experience alone. T general principles are that, the cavity being prepared a shaped as already described, the gold plug should be secured and consolidated piece by piece, until there is built up a mass filling every part of the vacant space with a uniform consistency of metal which, when finished, ought to present the feeling of being as hard as a piece of solid gold.

The other fillings are more easily dealt with. The same careful preparatory steps are requisite in all fillings, but the insertion of the plug in amalgam and other stoppings being performed while the material is in a plastic condition, the process is rendered much more simple. The cavity should be completely filled, but not over-filled, and the amalgams ought to be used with as little mercury as is at all possible. A number of instruments are necessary for effecting all these various manipulations, but to describe them here would be as unintelligible as it appears unnecessary. Excavators, enamel cutters, burr head drills, points, pluggers, burnishers, &c., are only some of those required; while their modes of use are either by the hand or by mechanical-apparatus, such as what are termed burring-engines, &c. Stopping may be regarded as one of the most valuable operations in modern dentistry; and although it is no guarantee that the tooth stopped is ever after safe from the renewed attack of caries any more than its unstopped neighbours are from its original attack, yet it is surprising how few well-filled teeth are lost by caries recommencing in the stopped cavity.

Besides those already mentioned, the teeth and jaws are subject to a number of disorders and lesions which it would be out of place here to do more than enumerate. Fracture and dislocation of the teeth, ulceration and absorption of the gum, necrosis and exfoliation of the jaw, alteration in the secretions of the mouth, the deposit of tartar or salivary calculus on the teeth or in the salivary ducts, the effect of various medicines and poisonous agents on the teeth, jaws, and mouth generally,—these and the like matters are all of much interest, and more or less connected with dentistry proper. But for information in regard to them the reader must be referred to the various excellent publications treating of them, which have appeared in considerable numbers since dental surgery has occupied more notice and taken a place as one of the recognized specialities of medicine.

Mechanical dentistry, properly so called, consists in the construction of artificial substitutes to supply the place of lost teeth. Stopping and such like operations might also be classed with mechanical dentistry as contrasted with purely surgical treatment; as yet, however, these matters are not quite decided; and the day when the dental surgeon and the mechanical dentist—like the ophthalmic surgeon and the optician—should each occupy a separate sphere has not arrived. All that can here be given is a mere outline of the principles involved in mechanical dentistry. The subject is one comprehending a knowledge of many departments of mechanical science; and to do more than indicate the nature of the various modes of construction, and the processes carried on in the manufacture of artificial teeth, would be useless and inexpedient.

The removal of roots and stumps as a preparatory step in the fitting of artificial teeth is a matter to be decided by the circumstances of the case. The length of time which can be afforded for cicatrization and absorption of the alveolar walls and gum; the presence of adjoining teeth to be left standing, especially front teeth; the fitness of the patient for the operation of extraction,—these and other circumstances must determine what amount of surgical preparation is to precede the supplying of false teeth. As a general rule, the clearer the gums are of stumps and decayed teeth the better; but at the same time certain advantages, transitory as they may be, are in some instances to be derived from their retention.

The jaw, gum, and teeth being then considered as in a suitable condition, the first step in the process is to obtain a plaster cast of the parts,—"the model," as it is termed. This is done by pressing softened beeswax or some similarly plastic composition against them until they are imbedded and leave an impression in it, giving an exact mould of the gums, remaining teeth, and all other parts on its removal. Plaster of Paris is now run into the mould so obtained, and when this is set and hardened a perfect facsimile of the structures to be fitted is the result.

Any further proceedings now depend upon the mode and material in which the future artificial set is to be constructed. Every set of artificial teeth consists of representatives of the lost organs, modelled in a species of porcelain, and mounted upon a base adjusted to the gum and remaining natural teeth. This base is manufactured in a variety of materials, the principal of which are—(1) metal plate, of gold, platinum, silver, or different alloys; (2) vulcanized caoutchouc, or vulcanite, as it is called; and (3) celluloid base, a composition of collodion and camphor, which has not been long enough tested as yet to rank with the other substances; while (4) the teeth may be mounted merely with as much extraneous material as will support a pin or pivot by which they may be attached as new crowns to a root in which such pivot is firmly inserted. When it is intended that the base shall be of gold or other plate, a metal die and counter have to be made from the plaster model, between which dies the plate is embossed, and the requisite form obtained. The die and counter die are generally made the one in zinc or gun metal, the other in lead or tin; and—unlike the dies from which jewellery patterns, &c., are embossed, and which may serve for thousands of times—the dental dies, having served to emboss the plate for one patient, are of no further use for any other case. The plate being thus far advanced next requires to be adjusted to the mode in which the patient closes the opposing jaw or teeth against it in shutting the mouth—in other words, the "bite" has to be taken, and the artificial teeth, which are to be mounted on the plate, arranged accordingly. Any fastenings supporting or steadying the set have also to be adjusted; and after this, if everything has gone well, the false set should be ready for placing in its destined locality and for use by the wearer.

Should it be proposed to make the base of vulcanite, celluloid base, or a similar material, a different mode of procedure must be adopted. These materials necessitate a greater bulk of substance occupying the mouth than is the case where metal plate is employed. This, however, is in some cases an advantage—since, for instance, where the gum has been greatly diminished in size through absorption, it requires some bulk of material to restore the parts to their normal size, and to give the former natural expression to the features. In preparing a vulcanite base no metal die is necessary. The base is built up in wax directly on the plaster model, and the porcelain teeth adjusted in their places, the bite and attachments being carefully attended to, as described in speaking of plate cases. The set thus made up, and presenting the exact counterpart of what the finished work is intended to be, is now, after testing it and finding it correct and perfect in the mouth, imbedded in Paris plaster as follows. A small box, or "flask," as it is denominated, of iron or other metal, like one saucer inverted on the top of another, is opened and the model with the wax-built set on it is placed in the lower saucer, which is then filled up with plaster to the level of the wax set. This being allowed to harden is soaped or oiled all over its surface, and the lid of the flask, or what corresponds to the upper saucer, is now placed upon the under portion of the flask. An opening in this covering portion enables plaster to be next poured into it till the inclosed wax-mounted set is shut up like a fossil in the heart of its stony covering. On the two halves of the flask being separated, the set of course remains firmly secured in the lower portion. Boiling water is now poured over it, and the wax thus melted out, leaving the porcelain teeth undisturbed and *in situ*. A cavity is thus left when the two sides of the flask are again closed, representing exactly the form of the wax removed. Raw vulcanite, or whatever other material of the kind is to be used, is now introduced with care into the space thus left by the removal of the wax. The two sides of the flask are next brought together and maintained there by the pressure of a clamp and screw. The whole is then placed in a vessel termed a vulcanizer, where it is subjected, for the space of from an hour and a quarter to two hours or more, to the action of steam at a temperature ranging up to 320° Fahr., at the end of which time the piece will be found hard and ready for finishing and polishing as may be desirable. In firing and manipulating the celluloid base some modification of this process is required, but as yet the substance is comparatively little used, and would scarcely justify further remark in this place.

What is termed a pivot tooth, again, is an artificial tooth having a metal or sometimes a wooden pin firmly attached to it; and this being inserted into the opened pulp cavity of a healthy fang, the artificial forms a secure and very perfect substitute for the original crown when destroyed by caries, broken off, or otherwise lost.

The use of artificial teeth, especially by those previously unaccustomed to them, requires considerable practice and no small amount of perseverance. The larger the artificial set,—that is, the greater the number of teeth replaced,—the greater the difficulties and the more the discomfort experienced. Time, however, works wonders here as in many other instances. It is not an uncommon thing to find a set which never has fitted well, or one which owing to many years of use does not fit well, being felt so comfortable, through mere habit of wearing it, that on a new and perfectly fitting set being made, the old one, with all its faults, is preferred to the other. A few days' wear, however, of the new one generally brings all the shortcomings of the old glaringly out on its being again attempted to be worn. And in the same manner, a week or two's perseverance generally enables any ordinary set to be worn and used with comfort and facility even by patients who are for the first time under the dentist's care. Various modes of fixation are adopted for the retaining of artificial teeth in their proper situation. Atmospheric pressure, or "suction," as it is termed, is the simplest of all, being merely the hold established between the palate and the set in the same way as occurs between a wet leather "sucker" and the stone it lifts. Another method is by what are termed "spiral springs," a mode only applicable, however, where both an upper and lower set are worn at the same time. And a third style of fixation is where the set is supported upon certain natural teeth among those remaining in the patient's jaw. Each mode has its own advantages, and sometimes one or other method is the only one at all possible to be adopted. This, however, is seldom a difficult matter to decide by any one who has had much experience of either the operating room or the dental workshop.

The art of dentistry is difficult to acquire, and comprehends in itself processes appertaining to several separate branches of manufacture. It is, however, an art which is an extremely useful one, and has done valuable service, since it is not too much to say that in all probability many lives have been saved and a still greater number prolonged through the instrumentality of the aid afforded by the use of artificial teeth.

Literature of the subject and authorities on Dental Surgery.—Goodsir, *Edinburgh Medical Journal*, 1838; Heath, *On Diseases of the Jaws*, 1868; Owen, *On the Skeleton and Teeth*, 1855; Tome's *Dental Surgery*, 1873; Taft's *Operative Dentistry*, 1877; Salter's *Dental Pathology*, 1874; Smith's *Dental Anatomy and Surgery*, 1864, and various papers in *Edinburgh Medical Journal*, *Proceedings of Royal Society of Edinburgh*, &c., from 1852; Cole's *Dental Mechanics*, 1876; Waldeyer, in *Stricker's Handbuch*, 1870; Turner's *Human Anatomy*, 1877; Richardson's *Mechanical Dentistry*, 1860; Wedl's *Pathology of the Teeth*, 1860; various papers, by Kolliker, Arnold, Boll, Robin and Magitot, Huxley, &c., in British and Continental journals. (J. S.*)

DENVER, a city of the United States of America, capital of the State of Colorado, and of Arapahoe county, occupies a commanding position on the south bank of the South Platte river, where it is joined by the Cherry creek, 500 miles west of the Missouri,—its elevation above the level of the sea being 5267 feet. The town, which is of recent origin, and mostly built of brick, contains some large public buildings connected with the State administration, as well as a large public school, a State library, and churches belonging to the different denominations. It forms the centre of an important railway system, and has several factories engaged in smelting, iron founding, and wood work, besides a mint for assaying gold and silver ore, breweries, wool mills, &c. The population, which numbered 4759 in 1870, and was estimated at 15,000 in 1873, is rapidly increasing.

DEODAND (*Deo dandum*), in English law, was a personal chattel (any animal or thing) which, on account of its having caused the death of a human being, was forfeited to the king for pious uses. Blackstone, while tracing in the custom an expiatory design, alludes to analogous Jewish and Greek laws,[1] which required that that what occasions a man's death should be destroyed. In such usages the notion of the punishment of an animal or thing, or of its being morally affected from having caused the death of a man, seems to be implied. The forfeiture of the offending instrument in no way depends on the guilt of the owner. The imputation of guilt to inanimate objects or to the lower animals, repugnant as it is to our habits of thought, is not inconsistent with what we know of the ideas of uncivilized races. In English law, deodands came to be regarded as mere forfeitures to the king, and the rules on which they depended were not easily explained by any key in the possession of the old commentators. The law distinguished, for instance, between a thing in motion and a thing standing still. If a horse or other animal in motion killed a person, whether infant or adult, or if a cart run over him, it was forfeited as a deodand. On the other hand, if death were caused by falling from a cart or a horse at rest, the law made the chattel a deodand if the person killed were an adult, but not if he were a person below the years of discretion. Blackstone accounts for the greater severity against things in motion by saying that in such cases the owner is more usually at fault, an explanation which is doubtful in point of fact, and would certainly not account for other instances of the same tendency. Thus, where a man's death is caused by a thing not in motion, that part only which is the immediate cause is forfeited, as "if a man be climbing up the wheel of a cart, and is killed by falling from it, the wheel alone is a deodand;" whereas, if the cart were in motion, not only the wheel but all that moves along with it (as the cart and the loading) are forfeited. A similar distinction is to be found in Britton. Where a man is killed by a vessel at rest the cargo is not deodand; where the vessel is under sail, hull and cargo are both deodand. For the distinction between the death of a child and the death of an adult Blackstone accounts by suggesting that the child "was presumed incapable of actual sin, and therefore needed no deodand to purchase propitiatory masses; but every adult who died in actual sin stood in need of such atonement, according to the humane superstition of the founders of the English law." Sir Matthew Hale's explanation was that the child could not take care of himself, whereon Blackstone asks why the owner should save his forfeiture on account of the imbecility of the child, which ought to have been an additional reason for caution. The finding of a jury was necessary to constitute a deodand, and the investigation of the value of the instrument by which death was caused occupies an important place among the provisions of our early criminal law. It became a necessary part of an indictment to state the nature and value of the weapon employed—as, that the stroke was given by a certain penknife, of the value of sixpence—so that the king might have his deodand. Accidents on the high seas did not cause forfeiture, being beyond the domain of the common law; but it would appear that in the case of ships in fresh water, the law as quoted above from Britton held good. The king might grant his right to deodands to another.

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[1] Compare also the rule of the Twelve Tables, by which an animal which had inflicted mischief might be surrendered in lieu of compensation.

In later times these forfeitures, so unintelligible in their purpose, so capricious and unjust in operation, became extremely unpopular; and juries, with the connivance of judges, found deodands of trifling value, so as to defeat the inequitable claim. But deodands were not abolished till the 9 and 10 Vict. c. 62 was passed, whereby it is enacted that "there shall be no forfeiture of any chattel for or in respect of the same having caused the death of a man; and no coroner's jury sworn to inquire, upon the sight of any dead body, how the deceased came by his death, shall find any forfeiture of any chattel which may have moved to or caused the death of the deceased, or any deodand whatsoever; and it shall not be necessary in any indictment or inquisition for homicide to allege the value of the instrument which caused the death of the deceased, or to allege that the same was of no value." The date of this Act (1846) may suggest the great inconvenience which the law, if it had remained in operation, would have caused to railway and other enterprise in which loss of life is a frequent occurrence.

DEPRÈS, JOSQUIN (1440–1521), also called Desprez, and, by a Latinized form of his name, Jodocus Pratensis or a Prato, a celebrated musical composer, was born about 1440 at Vermand, near St Quentin, in French Flanders. He was a pupil of Ockenheim, the great contrapuntist, and himself one of the most learned musicians of his time. In spite of his great fame, the accounts of his life are vague and scanty, and even the place of his birth has only lately been established beyond dispute—Belgians, Germans, Italians, and Frenchmen claiming him as their countryman. M. Fétis, the well-known historian of music, has contributed greatly towards elucidating the doubtful points, and to that author's *Biographie Universelle* the reader is referred for more detailed information. In his early youth Josquin seems to have been a member of the choir of the collegiate church at St Quentin; when his voice changed he went (about 1455) to Ockenheim to take lessons in counterpoint; afterwards he again lived at his birth-place for some years, till Pope Sixtus IV. invited him to Rome to teach his art to the musicians of Italy, where musical knowledge at that time was at a low ebb. In Rome Deprès lived till the death of his protector (1484), and it was there that many of his works were written. His reputation grew rapidly, and he was considered by his contemporaries to be the greatest master of his age. Luther, himself an excellent musical amateur, is credited with the saying that "other musicians do with notes what they can, Josquin what he likes." The composer's journey to Rome is in itself a most important part in the history of musical progress; for it marks in a manner the transference of the art from its Gallo-Belgian birth-place to Italy, which for the next two centuries remained the centre of the musical world. To the school of the Netherlands, of which Deprès and his pupils Arcadelt, Mouton, and others are the chief representatives, modern music owes its rise. But far more important than this school itself was its outgrowth and successor, the so-called Roman school, immortalized by the name of Palestrina. After leaving Rome Deprès went for a time to Ferrara, where the art-loving duke Hercules I. offered him a home; but before long he accepted an invitation of King Louis XII. of France to become the chief singer of the royal chapel. According to another account, he was for a time at least in the service of the emperor Maximilian I. The date of his death has by some writers been placed as early as 1501. But this is sufficiently disproved by the fact of one of his finest compositions, *A Dirge (Déploration) for Five Voices*, being written to commemorate the death of his master Ockenheim, which took place after 1512. The real date of Josquin's decease has since been settled as the 27th August 1521. He was at that time a canon of the cathedral of Condé. The most complete list of Deprès's compositions—consisting of masses, motets, psalms, and other pieces of sacred music—will be found in Fétis. The largest collection of his MS. works, containing no less than 20 masses, is in the possession of the Papal chapel in Rome. The well-known works by Drs Burney and Hawkins give specimens of his music.

DEPTFORD, a town of England situated at the junction of the Ravensbourne with the Thames, 3½ miles east of London Bridge. It forms the western portion of the parliamentary borough of Greenwich, occupying an area of about 1650 acres, situated mostly in the county of Kent, and partly in Surrey. It comprises two parishes—that of St Nicholas, including Lower Deptford on the Thames, and St Paul's, or the landward part of the town, which extends into Surrey and includes Hatcham Manor. Lower Deptford consists of irregular narrow streets, and the houses are mostly of a mean description. It contains the site of the old dockyard, and the royal victualling yard is also situated there. The former was discontinued as a dockyard in 1869; it was filled up and converted into a foreign cattle market by the corporation of London, but this was given up in 1873. The victualling yard immediately to the west of it is the most important establishment of its kind in the kingdom, supplying the navy with provisions, medicines, furniture, &c., which are manufactured or stored in the large warehouses that constitute the establishment. As many as 500 hands are employed in the warehouses and at the lading wharf. The only other industrial employment of importance in the place is to be found in the engineering works, which are carried on near the river. Of public buildings the most noteworthy are St Nicholas Church, with a square embattled tower, built on the site of an older structure at the beginning of the last century, and St Paul's, of classic design, erected in 1730. There is also the hospital for master mariners, maintained by the corporation of the Trinity House, which was originated here. Of the mansion known as Sayes Court, with which Deptford is historically identified, nothing now remains but the garden. The house—taken down in 1729—was the residence of the duke of Sussex in Queen Elizabeth's time; it was occupied in the following century by John Evelyn, the author of *Sylva*, and by Peter the Great during his residence in England in 1698. The population of Deptford in 1871 amounted to 60,188 persons, seven-eighths living in the landward parish of St Paul's.

DE QUINCEY, THOMAS (1785–1859), an eminent English author, was born at Greenhay, near Manchester, on the 15th of August 1785. He was the fifth child in a family of eight (four sons and four daughters), of whom three died young. His father, descended from a Norman family, was an opulent merchant, who lived much abroad, partly to look after his foreign engagements, but mainly from considerations of health; he died of pulmonary consumption in the thirty-ninth year of his age, leaving his wife and six children a clear income of £1600 a year. The widow, a woman of exceptional talent, secured to her family the enjoyment of those social and educational advantages which their position and means afforded. Thomas was from infancy a shy, sensitive child, with a constitutional tendency to dreaming by night and by day; and, under the influence of an elder brother, a lad "whose genius for mischief amounted to inspiration," who died in his sixteenth year, he spent much of his boyhood in imaginary worlds of their own creating. The amusements and occupations of the whole family, indeed, seem to have been mainly intellectual; and in De Quincey's case, emphatically, "the child was father to the man." "My life has been," he affirms in the *Confessions*, "on the whole the life of a philosopher; from my birth I was made an intellectual creature, and intellectual in the highest sense my pursuits and pleasures have been." From boyhood he was more or less in contact with a polished circle; his education, easy to one of such native aptitude, was sedulously attended to. When he was in his twelfth year the family removed to Bath, where he was sent to the grammar school, at which he remained for about two years; and for a year more he attended another public school at Winkfield, Wiltshire. At both his proficiency was the marvel of his masters. At thirteen he wrote Greek with ease; at fifteen he not only composed Greek verses in lyric measures, but could converse in Greek fluently and without embarrassment; one of his masters said of him, "that boy could harangue an Athenian mob better than you or I could address an English one." Towards the close of his fifteenth year he visited Ireland, with a companion of his own age, Lord Westport, the son of Lord Altamont, an Irish peer, and spent there in residence and travel some months of the summer and autumn of the year 1800,—being a spectator at Dublin of "the final ratification of the bill which united Ireland to Great Britain." On his return to England, his mother having now settled at St John's Priory, a residence near Chester, De Quincey was sent to the Manchester grammar school, mainly that it might be easier for him to get thence to Oxford through his obtaining one of the school exhibitions.

Discontented with the mode in which his guardians conducted his education, and with some view apparently of forcing them to send him earlier to college, he left this school after less than a year's residence—ran away, in short, to his mother's house. There one of his guardians made an arrangement for him to have a weekly allowance, on which he might reside at some country place in Wales, and pursue his studies, presumably till he could go to college. From Wales, however, after brief trial, "suffering grievously from want of books," he went off as he had done from school, and hid himself from guardians and friends in the world of London. And now, as he says, commenced "that episode, or impassioned parenthesis of my life, which is comprehended in *The Confessions of an English Opium Eater*." This London episode extended over a year or more; at the end of it the lad was reconciled to his guardians, and in 1803 went to Oxford, being by this time about nineteen. It was in the course of his second year at Oxford that he first tasted opium,—having taken it to allay neuralgic pains.

After finishing his career of five years at college in 1808, he ultimately settled in 1812 to the life of a student on the borders of Grasmere, drawn thither partly by neighbourhood to Wordsworth, whom he early appreciated,—having been, he says, the only man in all Europe who quoted Wordsworth so early as 1802. Here also he enjoyed the society and friendship of Coleridge, Wilson, and Southey, as in London he had of Charles Lamb and his select circle. Here he continued his classical and other studies, especially exploring the at that time almost unknown region of German literature, and indicating its riches to English readers. Here also, in 1816, he married the "dear M——," of whom a charming glimpse is accorded to the reader of the *Confessions*; his family came to be five sons and three daughters. For a year he edited, at Kendal, the *Westmoreland Gazette*. He resided till the end of 1820 at Grasmere, afterwards in London, and latterly at Lasswade near Edinburgh, or in Edinburgh. He died in that city December 8, 1859, aged seventy-four, and is buried in the West Churchyard.

During nearly fifty years De Quincey lived mainly by his pen. His patrimony seems never to have been entirely exhausted, and his habits and tastes were simple and inexpensive; but he was careless to recklessness in the use of money, and debts and pecuniary difficulties of all sorts hung about him through the greater part of his life. There was, indeed, his associates affirm, an element of romance even in his impecuniosity, as there was in everything about him; and the diplomatic and other devices by which he contrived to keep clear of clamant creditors, while scrupulously fulfilling many obligations, often disarmed animosity, and converted annoyance into amusement. The famous *Confessions of an English Opium Eater*, having first appeared in *The London Magazine*, were published in a small volume in 1820, and attracted a very remarkable degree of attention, not simply from their disclosures as to his excessive use of the drug, and its effects, but also by the marvellous beauty of the style of the work, its romantic episodes, and extraordinary power of dream-painting. All De Quincey's other writings appeared in periodicals—*Blackwood's Magazine*, *Tait's Magazine*, *Hogg's Instructor*, &c. No other literary man of his time, it has been remarked, achieved so high and universal a reputation from such merely fugitive efforts. Since his works were brought together, that reputation has been not merely maintained, but extended. The American edition of twelve volumes was reprinted in this country in 1853, under the author's own supervision, and expanded to fourteen volumes; upon his death two more volumes were made up of previously uncollected material. For range of thought and topic, within the limits of pure literature, no like amount of material of such equality of merit has proceeded from any eminent writer of our day. However profuse and discursive, De Quincey is always polished, and generally exact—a scholar, a wit, a man of the world, and a philosopher, as well as a genius. He looked upon letters as a noble and responsible calling; in his essay on Oliver Goldsmith he claims for literature the rank not only of a fine art, but of the highest and most potent of fine arts; and as such he himself regarded and practised it. He drew a broad distinction between "the literature of *knowledge* and the literature of *power*," asserting that the function of the first is to *teach*, the function of the second to *move*,—maintaining that the meanest of authors who moves has pre-eminence over all who merely teach, that the literature of knowledge must perish by supersession, while the literature of power is "triumphant for ever as long as the language exists in which it speaks." It is to this class of motive literature that De Quincey's own works essentially belong; it is by virtue of that vital element of power that they have emerged from the rapid oblivion of periodicalism, and live in the minds of a second generation of readers and admirers, as they are safe to do in those of a third and fourth. The risk of their not reaching on through succeeding time arises from their diffuseness—their power is weakened by their volume.

De Quincey has fully defined his own position and claim to distinction in the preface to his collected works. These he divides into three classes:—"*first*, that class which proposes primarily to amuse the reader," such as the *Narratives*, *Autobiographic Sketches*, &c.; "*second*, papers which address themselves purely to the understanding as an insulated faculty, or do so primarily," such as the essays on Essenism, the Cæsars, Cicero, &c.; and finally, as a *third* class, "and, in virtue of their aim, as a far higher class of compositions," he ranks those "modes of impassioned prose ranging under no precedents that I am aware of in any literature," such as the *Confessions* and *Suspiria de Profundis*. The high claim here asserted has been so far questioned; and short and isolated examples of eloquent apostrophe, and highly-wrought imaginative description, have been cited from Rousseau and other masters of style; but De Quincey's power of sustaining a fascinating and elevated strain of "impassioned prose" is allowed to be entirely his own. In this his genius most emphatically asserts itself; if it be not admitted that in that dread circle *none* durst walk but he, it will be without hesitation conceded that there he moves supreme. Nor, in regard to his writings as a whole, will a minor general claim which he makes be disallowed, namely, that he "does not write without a thoughtful consideration of his subject," and also with novelty and freshness of view. "Generally," he says, "I claim (not arrogantly, but with firmness) the merit of rectification applied to absolute errors, or to injurious limitations of the truth." Another obvious quality of all his genius is its overflowing fulness of allusion and illustration, recalling his own description of a great philosopher or scholar—"Not one who depends simply on an infinite memory, but also on an infinite and electrical power of combination, bringing together from the four winds, like the angel of the resurrection, what else were dust from dead men's bones into the unity of breathing life." It is useless to complain of his having lavished and diffused his talents and acquirements over so vast a variety of often comparatively trivial and passing topics, instead of concentrating them on one or two great subjects. The world must accept gifts from men of genius as they offer them; circumstance and the hour often rule their form. Those influences, no less than the idiosyncrasy of the man, determined De Quincey to the illumination of such matter for speculation as seemed to lie before him; he was not careful to search out recondite or occult themes, though these he did not neglect,—a student, a scholar, and a recluse, he was yet at the same time a man of the world, keenly interested in the movements of men and in the page of history that unrolled itself before him day by day. To the discussion of things new, as readily as of things old, aided by a capacious, retentive, and ready memory, which dispensed with reference to printed pages, he brought also the exquisite keenness and subtlety of his highly analytic and imaginative intellect, the illustrative stores of his vast and varied erudition, and that large infusion of common sense which preserved him from becoming at any time a mere *doctrinaire*, or visionary. If he did not throw himself into any of the great popular controversies or agitations of the day, it was not from any want of sympathy with the struggles of humanity or the progress of the race, but rather because his vocation was to apply to such incidents of his own time, as to like incidents of all history, great philosophical principles and tests of truth and power. In politics, in the party sense of that term, he would probably have been classed as a Liberal Conservative or Conservative Liberal—at one period of his life perhaps the former, and at a later the latter. Originally, as we have seen, his surroundings were somewhat aristocratic, in his middle life his associates, notably Wordsworth, Southey, and Wilson, were all Tories; but he seems never to have held the extreme and narrow views of that circle. Though a flavour of high breeding runs through his writings, he has no vulgar sneers at the vulgar. As he advanced in years his views became more and more decidedly liberal, but he was always as far removed from Radicalism as from Toryism, and may be described as a philosophical politician, capable of classification under no definite party name or colour. Of political economy he had been an early and earnest student, and projected, if he did not so far proceed with, an elaborate and systematic treatise on the science, of which all that appears, however, are his fragmentary *Dialogues* on the system of Ricardo, which John Ramsay M'Culloch pronounces "unequalled for brevity, pungency, and force." But political and economic problems largely exercised his thoughts, and his historical sketches show that he is constantly alive to their interpenetrating influence. The same may be said of his biographies, notably of his remarkable sketch of Dr Parr. Neither politics nor economics, however, exercised an absorbing influence on his mind,—they were simply provinces in the vast domain of universal speculation through which he ranged "with unconfined wings." How wide and varied was the region he traversed a glance at the titles of the papers which make up his collected—or more properly selected—works (for there was much matter of evanescent interest not reprinted) sufficiently shows. He was equally at home in all provinces, though never exerting his great powers so as to make himself paramount in any. Surprising as his literary achievements are, his capabilities were still greater; and the general survey leaves the impression of regret that, doing so much so well, he did not do more, or did not less better. Some things in his own line he has done perfectly; he has written many pages of magnificently mixed argument, irony, humour, and eloquence, which, for sustained brilliancy, richness, subtle force, and purity of style and effect have simply no parallels; and he is without peer the prince of dreamers. The use of opium no doubt stimulated this remarkable faculty of reproducing in skilfully selected phrase the grotesque and shifting forms of that "cloudland, gorgeous land," which opens to the sleep-closed eye; but the faculty itself was a speciality of his constitution, coloured by the quality of his genius, and enriched by the acquisitions of his intellect.

To the appreciation of De Quincey the reader must bring an imaginative faculty somewhat akin to his own—a certain general culture, and large knowledge of books, and men, and things. Otherwise much of that slight and delicate allusion that gives point and colour and charm to his writings will be missed; and on this account the full enjoyment and comprehension of De Quincey must always remain a luxury of the literary and intellectual. But his skill in narration, his rare pathos, his wide sympathies, the pomp of his dream-descriptions, the exquisite playfulness of his lighter dissertations, and his abounding though delicate and subtle humour, commend him to a larger class. Though far from being a professed humourist—a character he would have shrunk from—there is no more expert worker in a sort of half-veiled and elaborate humour and irony than De Quincey; but he employs those resources for the most part secondarily. Only in one instance has he given himself up to them unreservedly and of set purpose, namely, in the famous *Essay on Murder considered as one of the Fine Arts*,—an effort which, admired and admirable though it be, is also, it must be allowed, somewhat strained. He was a born critic and dreamer, a logician by instinct and culture, a student by choice, a scholar by right of conquest of the stores of many minds, a writer of English of the first quality by dint of native command of language and life-long study and practice. His style, full and flexible, pure and polished, is peculiarly his own; yet it is not the style of a mannerist,—its charm is, so to speak, latent; the form never obtrudes; the secret is only discoverable by analysis and study. It consists simply in the reader's assurance of the writer's complete mastery over all the infinite applicability and resources of the English language. Hence involutions and parentheses, "cycle on epicyle," evolve themselves into a stately clearness and harmony; and sentences and paragraphs, loaded with suggestion, roll on smoothly and musically, without either fatiguing or cloying—rather, indeed, to the surprise as well as delight of the reader; for De Quincey is always ready to indulge in feats of style, witching the world with that sort of noble horsemanship which is as graceful as it is daring.

It has been complained that, in spite of the apparently full confidences of the *Confessions* and *Autobiographic Sketches*, readers are left in comparative ignorance, biographically speaking, of the man De Quincey. Two passages in his *Confessions* afford sufficient clues to this mystery. In one he describes himself "as framed for love and all gentle affections," and in another confesses to the "besetting infirmity" of being "too much of an eudæmonist." "I hanker," he says, "too much after a state of happiness, both for myself and others; I cannot face misery, whether my own or not, with an eye of sufficient firmness, and am little capable of surmounting present pain for the sake of any recessionary benefit." His sensitive disposition dictated the ignoring in his writings of traits merely personal to himself, as well as his ever-recurrent resort to opium as a doorway of escape from present ill; and prompted those habits of seclusion, and that apparently capricious abstraction of himself from the society not only of his friends, but of his own family, in which he from time to time persisted. He confessed to occasional accesses of an almost irresistible impulse to flee to the labyrinthine shelter of some great city like London or Paris,—there to dwell solitary amid a multitude, buried by day in the cloister-like recesses of mighty libraries, and stealing away by night to some obscure lodging. Long indulgence in seclusion, and in habits of study the most lawless possible in respect of regular hours or any considerations of health or comfort,—the habit of working as pleased himself without regard to the divisions of night or day, of times of sleeping or waking, even of the slow procession of the seasons, had latterly so disinclined him to the restraints, however slight, of ordinary social intercourse, that he very seldom submitted to them. On such rare occasions, however, as he did appear, perhaps at some simple meal with a favoured friend, or in later years in his own small but refined domestic circle, he was the most charming of guests, hosts, or companions. A short and fragile, but well-proportioned frame; a shapely and compact head; a face beaming with intellectual light, with rare, almost feminine beauty of feature and complexion; a fascinating courtesy of manner; and a fulness, swiftness, and elegance of silvery speech,—such was the irresistible "mortal mixture of earth's mould" that men named De Quincey. He possessed in a high degree what the American poet Lowell calls "the grace of perfect breeding, everywhere persuasive, and nowhere emphatic;" and his whole aspect and manner exercised an undefinable attraction over every one, gentle or simple, who came within its influence; for shy as he was, he was never rudely shy, making good his boast that he had always made it his "pride to converse familiarly *more socratico* with all human beings—man, woman, and child"—looking on himself as a catholic creature standing in an equal relation to high and low, to educated and uneducated. He would converse with a peasant lad or a servant girl in phrase as choice, and sentences as sweetly turned, as if his interlocutor were his equal both in position and intelligence; yet without a suspicion of pedantry, and with such complete adaptation of style and topic that his talk charmed the humblest as it did the highest that listened to it. His conversation was not a monologue; if he had the larger share, it was simply because his hearers were only too glad that it should be so; he would listen with something like deference to very ordinary talk, as if the mere fact of the speaker being one of the same company entitled him to all consideration and respect. The natural bent of his mind and disposition, and his life-long devotion to letters, to say nothing of his opium eating, rendered him, it must be allowed, regardless of ordinary obligations in life—domestic and pecuniary—to a degree that would have been not only culpable, but very highly so, in any less singularly constituted mind. It was impossible to deal with or judge De Quincey by ordinary standards—not even his publishers did so. Much no doubt was forgiven him, but all that needed forgiveness—and, after all, his sins were rather of omission than commission, trivial rather than heinous, trying rather than deadly—will soon be covered by the kindly oblivious veil of lapsing time, while his merits as a master in English literature will remain to be gratefully acknowledged..

A collection of De Quincey's works was published by James Hogg and Sons, Edinburgh, in 14 volumes, 1856–1860; and the same edition was republished by A & C. Black, Edinburgh, with alterations and additions, in 16 volumes, 1862–1871. An American edition, issued by Ticknor & Fields, Boston, 1859–1868, extends to 20 disconnected volumes. A biography in two volumes, by H. A. Page, *Thomas De Quincey, his Life and Writings*, has been published by John Hogg and Co., London, 1877. (J. R. F.)

DERÁ GHÁZI KHÁN, a district of British India, in the Deraját division of the lieutenant-governorship of the Punjab, is situated between 28° 27′ 0″ and 31° 1′ 0″ N. lat. and 69° 36′ 30″ and 70° 58′ 20″ E. long. It is bounded on the N. by Derá Ismáil Khán, on the E. by the Indus, on the S. by Jacobábád in Sind, and on the W. by the Suláimán range of hills. The district is a long narrow strip of country, 198 miles in length,[1] sloping gradually from the hills which form its western boundary to the River Indus on the east. Below the hills the country is high and arid, generally level, but sometimes rolling in sandy undulations, and much intersected by hill torrents, 201 in number. With the exception of two, these streams dry up after the rains, and their influence is only felt for a few miles below the hills. The eastern portion of the district is at a level sufficiently low to benefit by the floods of the Indus. A barren tract intervenes between these zones, and is beyond the reach of the hill streams on the one hand and of the Indus on the other. Although liable to great extremes of temperature, and to a very scanty rainfall, the district is not unhealthy. The rainfall in 1872–73 was 7·7 inches; the mean temperature 79° Fahr. The maximum temperature (112°) occurred in June, the minimum (40°) in December. The principal agricultural products are wheat, great millet, *joár*, cotton, rice, and indigo. The poppy plant is also rather extensively cultivated in the south of the district. The less important food grains are barley, spiked millet (*bájrá*), and pulses. Oil seeds and tobacco are also grown to a small extent.

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[1] The area of the district is returned at 4950 square miles, or 3,168,000 acres, of which 2,412,749 acres were under assessment in 1872–73. The cultivated area amounts to 1662 square miles, or 1,063,680 acres, or 33·57 per cent of the total area. Of the cultivated area 427,599 acres, or 40·24 per cent, are irrigated. The first regular land settlement of the district was concluded in 1872.

cultivation mainly depends upon artificial irrigation, effected principally by canals leading from the Indus. In 1872–73 there were 15 main canals, drawing their supply direct from the Indus, of which 2 were the property of private individuals, and 13 were under the management of Government. Alum, earth salt, and *raggi* (an impure carbonate of soda) are manufactured in some quantities. The exports are indigo, opium, salt, dates, wheat, cotton, barley, millet, *ghi*, and hides. The imports are sugar, fruits from Cabul, gram, woollen goods, English piece goods and broad cloth, metals, salt, and spices. The total revenue of the district in 1872–73, exclusive of local funds and canal collections, amounted to £45,161, of which £35,588, or 79 per cent., was derived from the land. The administrative staff of the district consists of a deputy commissioner, with two assistants and one extra assistant, four tahsildárs, each with a deputy or assistant, a district superintendent of police, and two civil surgeons. The police force numbered 733 men. There are 35 schools, maintained or assisted by the state, and 132 indigenous village schools—total 167, attended in 1872–73 by 2907 pupils. Three charitable dispensaries afford gratuitous medical relief. The principal town of the district, and chief seat of commerce, is Derá Ghási Khán, situated on the west bank of the Indus, 30° 4′ lat., 70° 51′ long. Population in 1868:—Mahometans, 10,699; Hindus, 8850; Sikhs, 328; Christians, 52; "others," 194—total, 20,123. The other towns containing a population exceeding 5000 souls are Jámpur, population 7796; Choti, population 7300; Dágil, population 5693; and Rájhan, population 5656. Rájanpur, although not containing 5000 inhabitants, is important as a cantonment, a regiment of cavalry and two companies of infantry being stationed there. The foregoing towns are all municipalities.

The census of 1868 returned the population as follows:—Mahometans, 264,527; Hindus, 38,467; Sikhs, 1124; "others," 4722; total 308,840. The Beluchis, who are Mahometans, form by far the most important section of the population, and number 82,590. The Játs, who are also Mahometans, are the most numerous, numbering 162,519. Among the Hindu population, the Arorás form the most important caste, 38,024 in number, principally traders. Of the total population, 164,729, or 53 per cent., are returned as agriculturists.

DERÁ ISMÁIL KHÁN, a district of British India in the Deráját division of the lieutenant-governorship of the Punjab, is situated between 30° 35′ 30″ and 32° 33′ 0″ N. lat., and 70° 15′ 0″ and 72° 3′ 20″ E. long. It is bounded on the N. by the district of Bannu, on the E. by Sháhpur and Jhang, on the S. by Muzaffargarh and Derá Ghási Khán, and on the W. by the Suláimán hills, which mark the frontier. The district is divided into two almost equal portions by the Indus, which intersects it from north to south, and is the only river of any importance. To the west of the Indus, the characteristics of the country resemble those of Derá Ghási Khán. To the east of the present bed of the river there is a wide tract known as the *Kachi*, exposed to river action. Beyond this, the country rises abruptly, and a barren, almost desert plain stretches eastwards, sparsely cultivated, and inhabited only by nomadic tribes of herdsmen. The area of the district is 7096·56 square miles, or 4,541,800 acres; the cultivated area amounts to 541,913 acres, of which 428,604 acres are under irrigation, and 113,309 unirrigated. The uncultivated area, which is returned at 3,999,887 acres, is subdivided as follows:—grazing lands, 364,864 acres; cultivable, but not actually under cultivation, 1,329,796 acres; uncultivable, 3,999,887 acres. The district has recently been granted a regular land settlement for the first time. The period of the latest summary settlement expired in 1868 in part of the district, and in 1871 in the remainder. The principal agricultural products are wheat, barley, grain, pease, tobacco, and oil-seeds for the spring or *rabi* harvest; and rice, millets, and cotton for the autumn or *kharif* crop. There are no manufactures of importance. The principal municipalities and trading towns, with their populations (1863), are as follows:—Derá Ismáil Khán, the civil station and chief town, population 24,906; Leid, 17,033; Koláchí, 9921; Takhwárá, 6800; Karor, 5720; Bhakkar, 5554; Panmala, 5502. Other minor towns, which are also municipalities, are Kot Sultán, Mankherá, and Tánk. The income of the district in 1872–73 (exclusive of municipal taxation) amounted to £50,918, of which £39,784 was derived from the land. The police force consisted of 617 men. There were 18 Government or aided and 87 indigenous village schools in 1872–73, attended by 2190 pupils.

The census of 1868 returned the population as follows:—Mahometans, 338,387; Hindus, 48,756; Sikhs, 1587; others 6134; total 394,864. Of the Mahometan population, the principal classes are the Beluchis, 34,708 in number; Patháns, 51,828; and Sayyids, 8669. The Hindus consist almost entirely of Arorás, 42,087, principally traders and money lenders. Of the total population, 187,096, or 48 per cent., are returned as agriculturists.

DERAJÁT, a division or commissionership of British India, under the jurisdiction of the lieutenant-governor of the Punjab, comprising the frontier districts of Derá Ghási Khán, Derá Ismáil Khán, and Bannu, situated between 28° 27′ 0″ and 33° 15′ 30″ N lat. and 70° 15″ 0″ and 72° 3′ 20″ E. long. The division is bounded on the N. by the district of Kohát, on the E. by the districts of Rawal Pindi, Sháhpur, and Jhang, and by the River Indus, on the S. by the district of Jacobábád in Sind, and on the W. by the Wazírí and Suláimán hills, beyond British territory. The two northern districts of the division, Bannu and Derá Ismáil Khán, are intersected by the Indus. The Bannu valley is drained by the Kuram and Gambila rivers. It is shut in on the N. and S. by hills, and is traversed from N. to S. by a continuation of the great Punjab salt range. According to the census of 1868, the Deraját division comprises an area of 14,432 square miles, with a population of 991,251 souls, inhabiting 1695 villages, classified as follows:—Mahometans, 863,464, or 87·1 per cent.; Hindus, 113,445, or 11·5 per cent.; Christians, 341; Sikhs, 3204, or ·3 per cent.; and "others," 10,797. or 1·1 per cent.

DERBEND, or DERBENT, a town of Russia, in the government of Daghestan, on the western shore of the Caspian, about 170 miles E.N.E. of Tiflis, in 42° 4′ N. lat. and 47° 53′ E. long. It occupies a narrow strip of land lying between the sea and a mountain ridge of moderate elevation, which is crowned by the citadel, or Narin Kalé; and on all sides except towards the east, where it projects into the water, it is surrounded by strong walls built of porous limestone. Its general aspect is decidedly Oriental, owing to the flat roofs of its two-storied houses. Besides the governor's residence, which stands in the neighbourhood of the citadel, the town possesses a fine Russian church, 3 Jewish synagogues, 17 mosques (including one belonging to the Sunna sect), 3 bazaars, and a number of caravanserais. The upper part of the town is supplied with water from a reservoir in the citadel, fed by a fountain in the mountain behind; but the Dubar, or lower town along the shore, communicates by an aqueduct with the Rubas-Chai, a small river to the south. The environs are occupied by vineyards, gardens, and orchards, in which madder, saffron, and tobacco, as well as figs, peaches, pears, and other fruits are cultivated. The madder is a valuable export, and the saffron is in high repute. Earthenware, weapons, and silk and cotton fabrics, are the principal products of the manufacturing industry. To the north of the town is the monument of the *Kirk Lar*, or Forty Heroes of Daghestan, whose valour is commemorated in Arabic inscriptions; and to the south lies the seaward extremity of the great Derbend or Caucasian wall, otherwise known as

Sedd-Eskender, or Alexander's wall, which, while still entire, had a height of 29 feet and a thickness of about 10, and with its iron gates and numerous watch-towers formed a valuable defence of the Persian frontier. Derbend is a place of great antiquity, and is usually identified with Albana, the capital of the ancient Albania. The modern name, which is the Persian word for a gateway, probably came into use about the end of the 5th or the beginning of the 6th century, when the city was re-founded by Kobod of the Sassanid dynasty. The walls and the citadel are believed to belong to the time of Kobod's son, Nushirvan Chosroes. In 728 the Arabs entered into possession, and established a khanate in the city, which they called either Bab-el-abwab, "the principal gate," Bab-el-Khadid, "the iron gate," or Seril-el-Dagab, "the golden throne." The celebrated caliph, Haroun-al-Rashid, lived in Derbend at different times, and brought it into great repute as a seat of arts and commerce. In 1220 it was captured by the Mongolians, and in the course of the succeeding centuries it frequently changed masters. In the reign of Feodor Ivanovitch, the Persian Government promised to make it over to Russia in reward for assistance against the Turks, but the surrender was never completed. In 1722 Peter the Great took advantage of the disturbances in Persia, seized the town, established a garrison, and intrusted the government to Imam Kuli-Beg; but in 1733 the supremacy of the Persian Nadir Shah was again recognized. Captured in 1760 by Fut Ali Khan, and governed after his death by his brother Sheikh Ali, the town was in 1796 besieged by the Russians both by land and sea, and in 1813 formally incorporated by the treaty of Gulistan with the Russian empire. In 1831 it was vainly attacked by Kazi-mull. Population in 1873, 15,739.

late II. DERBY, County of, lies as nearly as possible in the centre of England, being about equally distant from the eastern and western seas. In the time of the Britons it was part of the district which constituted the kingdom of the Coritani. While under the Roman sway it formed a part of Britannia Prima; and under the Heptarchy it belonged to the kingdom of Mercia. It is bounded on the E. by Nottinghamshire and a part of Leicestershire, on the W. by Staffordshire and Cheshire (from which it is separated by the rivers Trent, Dove, Etherow, and Goyt), on the N. by Yorkshire and a part of Cheshire, and on the S. by Leicestershire. Its greatest length from S.E. to N.W. is 56 miles, its greatest width from N.E. to S.W. is 33 miles. It contains an area of 656,243 statute acres, equal to about 1025⅜ square miles. Its population in 1851 amounted to 296,084 persons, in 1861 to 339,327, and in 1871 to 379,394, of whom 190,657 were males, and 188,737 females. From the beginning of the century down to 1871, 13 per cent. was the mean rate of increase in each intermediate period of ten years; while from 1861 to 1871 the total increase was 40,067, or at the rate of nearly 12 per cent. For practical purposes the population may be taken at 400,000, giving an average of 0·60 persons per acre, or 1·64 acres per person. The rental of the county, as given in the Owners of Land Return, 1873, was £1,658,995.

Derbyshire is divided into the hundreds of High Peak, Scarsdale, Appletree, Repton and Gresley, Morleston and Litchurch, and the wapentake of Wirksworth. It consists of 331 parishes, townships, and parts of parishes. It has a court of quarter sessions, and is included as an archdeaconry in the diocese of Lichfield. For electoral purposes the county has been formed into the 3 divisions of east, north, and south, each returning 2 members to Parliament, and thus, with the 2 members from the borough of Derby, is represented by a total of 8 members.

The geographical or physical aspect of Derbyshire is very diversified. The southern part presents little that is picturesque, or in any way striking, being for the most part a level surface, with occasional slight undulations. In its northern portions, however, particularly in the bold and mountainous regions of the High Peak, there are imposing combinations of those features which go to constitute impressive and romantic scenery. In the more hilly districts, some of the valleys and dales are very beautiful, notably the valleys of Castleton and Glossop, Dovedale, Millersdale, and the dale of Matlock. Derbyshire is on the whole a well-wooded county, and in the spacious parks surrounding the numerous mansions of noblemen and others which it contains, may be seen many fine oaks of noble appearance, those at Kedleston, the seat of Lord Scarsdale, three miles from Derby, being considered among the largest and oldest in the kingdom.

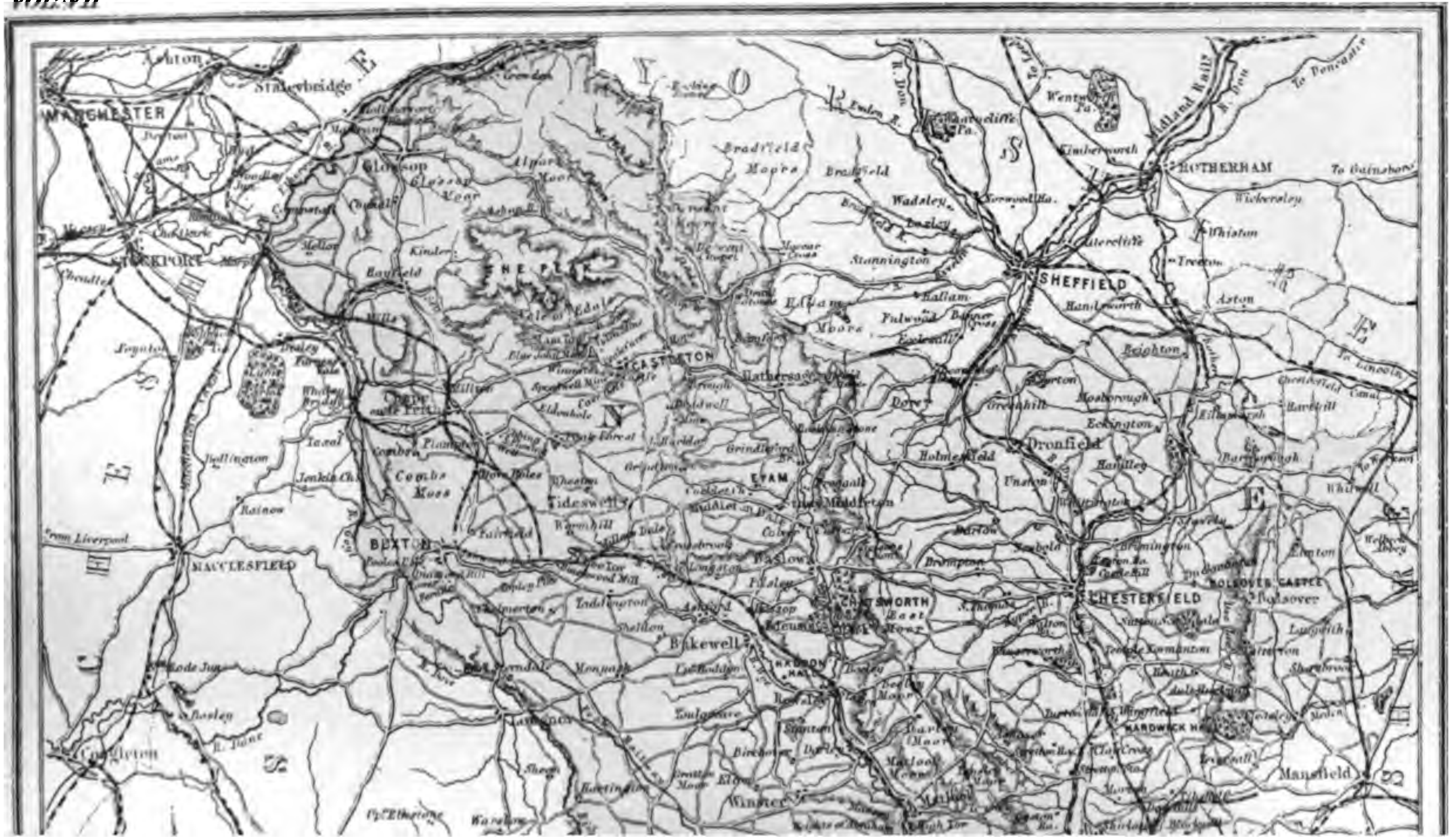
The climate, as might be expected from the diversified configuration of the land, varies very considerably in different parts. From the elevation which it attains in its northern division the county is colder and is more frequently visited with rain than other midland counties. In summer cold and thick fogs are often seen hanging over the rivers, and clinging to the lower parts of the hills, and hoar-frosts are by no means unknown even in June and July. Owing to the great elevation some kinds of grain will not grow at all in many of the northern parts, while that which is sown in the more sheltered spots is exceptionally late in coming to maturity. The winters there are generally severe, and the rainfall heavy. At Belper, in 1876, there were 36·01 inches of rain during the year, while the average for the five years was 32·09 inches per annum.

The elevation of the land proceeds gradually from south to north, the greatest altitudes being attained in the north division of the county, which is of a distinctly mountainous character. The mountains (or the plateau) of North Derbyshire may be said to form the central watershed of England, containing the source of many large rivers—as the Don, the Trent, and the Mersey. The highest altitudes are Kinder Scout (1981 feet), the Peak (1880), and, on the borders of Cheshire and Staffordshire, Axe Edge (1751).

From Axe Edge the streams of the county radiate. Those of the north-west belong to the Mersey, and those of the north-east to the Don, but all the others to the Trent, which, like the Don, falls into the Humber. The principal river is the Trent, which, rising in the Staffordshire moor lands, does not intersect this county, but forms its south-west boundary for some distance, separating Derbyshire from Staffordshire on the south. After the Trent the most important river is the Derwent, one of its tributaries, which, taking its rise in the lofty ridges of High Peak, flows southward through a succession of striking and beautiful scenery, receiving a number of minor streams in its course. The other principal rivers are the following. The Dane rises at the junction of the three counties, Yorkshire, Cheshire, and Derbyshire. The Goyt has its source a very little further north, at the base of the same hill, and, taking a N.N.E. direction, divides Derbyshire and Cheshire, and falls into the Mersey. The Dove rises on the southern slope, and flows on as the boundary stream between Derbyshire and Staffordshire for about 45 miles. It receives several feeders, and falls into the Trent at Repton. The Erewash is the boundary between Notts and Derbyshire. The Rother rises about Baslow, and flows north-east into Yorkshire. A little more to the west are the Sheaf, Wallin, Poulter, and Ryton, which flow into the Don at Sheffield.

Canals.—There are numerous canals intersecting this county in various directions. The Trent and Mersey or Grand Trunk canal, communicating between Liverpool and

DERBY


Y O R K S
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Ashton
Stalybridge
MANCHESTER
Glossop
Glossop Moor
Alport Moor
Bradfield Moors
Bradfield
R. Don
Wentworth Pa.
Wadsley
Kimberworth
ROTHERHAM
To Doncaster
To Gainsboro
Midland Railw.
Wickersley
Whiston
Treeton
Aston
STOCKPORT
Cheadle
Mellor
Kinder
Hayfield
THE PEAK
Vale of Edale
CASTLETON
Stannington
SHEFFIELD
Handsworth
Hallam
Fulwood
Ecclesall
Moors
Beighton
To Lincoln
Chesterfield Canal
Barlborough
Hathersage
N
Eyam
Tideswell
Wormhill
Combs Moss
BUXTON
Greenhill
Mosborough
Eckington
Dronfield
Holmesfield
Unstone
Whittington
E
Elmton
Whitwell
Welbeck Abbey
From Liverpool
MACCLESFIELD
Baslow
Pilsley
Ashford
CHATSWORTH
East Moor
Brimington
CHESTERFIELD
BOLSOVER CASTLE
Bolsover
Longnor
Monyash
Bakewell
HADDON HALL
Youlgreave
Winster
Birchover
Darley
Matlock
Wingfield
HARDWICK HALL
Clay Cross
Mansfield
Sheen
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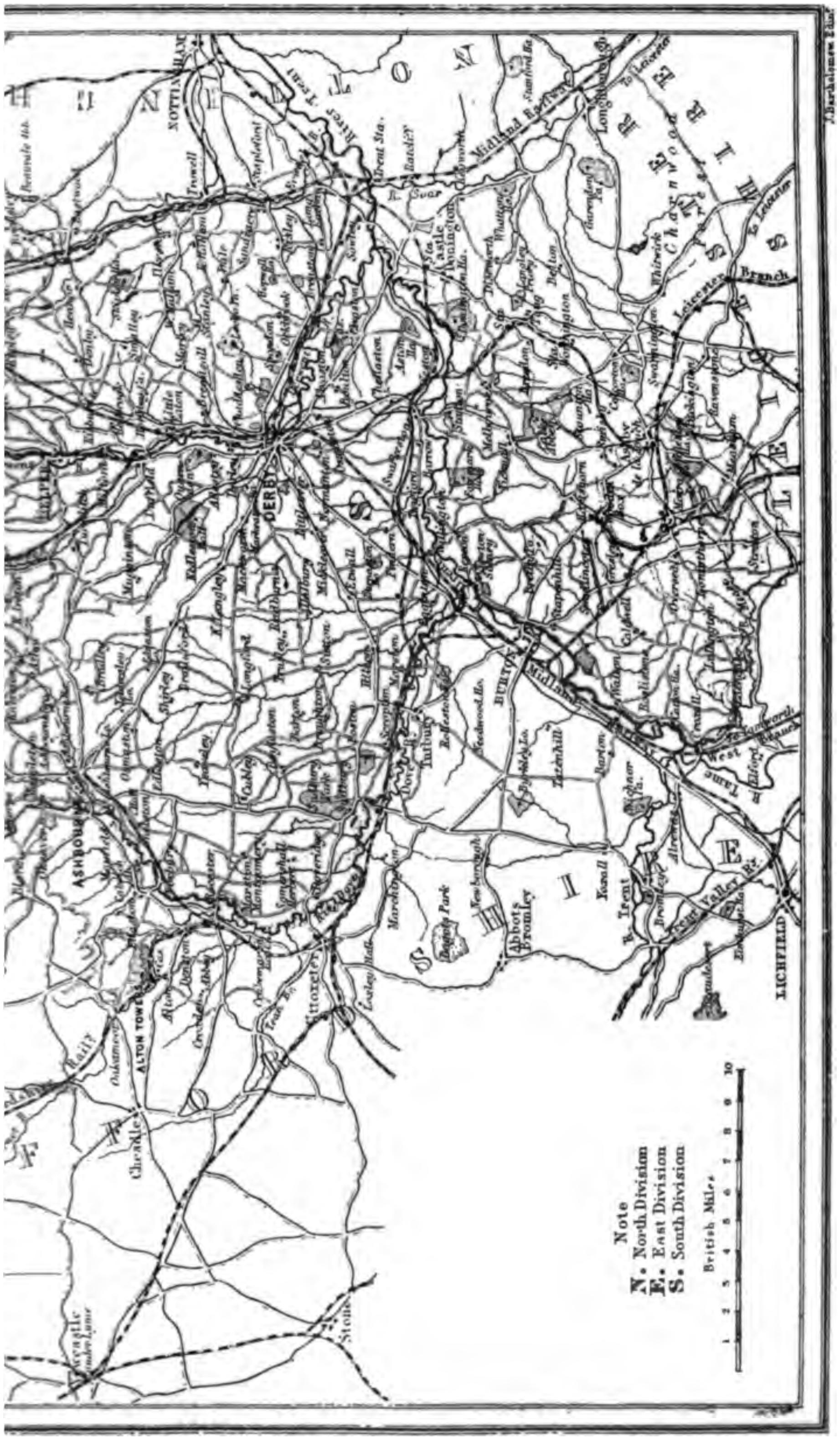

NOTTINGHAM
DERBY
ASHBOURNE
BURTON
LICHFIELD
Uttoxeter
Cheadle
Alton Towers
Abbots Bromley
Stone
Castle Donington
Loughborough
River Trent
R. Soar
R. Dove
R. Tame
Midland Railway
Leicester Branch
Trent Valley Ry.
Charnwood Forest
Note
N. North Division
E. East Division
S. South Division
British Miles
1 2 3 4 5 6 7 8 9 10
J. Bartholomew Edin.

London, and also with Bristol and Hull, was begun in 1776 by the celebrated Brindley, a native of the county, and completed under Smeaton and Rennie. It passes through Derbyshire from Burton, following the course of the Trent The Chesterfield canal was begun in 1771 by Brindley, and completed by his brother-in-law, Mr Henshall, in 1776. It enters the county at Killamarsh, and terminates at Chesterfield. There are also the Langley Bridge or Erewash canal. the Peak Forest canal, the Ashton-under-line, the Cromford, the Ashby-de-la-Zouch, the Derby, and the Nutbrook canals.

Nowhere have railways received a more complete development than in this county, and nowhere are their beneficial effects more apparent. For this the system of the Midland Company must claim the chief credit. The roads in Derbyshire are numerous, and generally in good condition. The great road from London to Manchester crosses the Trent near Shardlow, and passes through Derby and Ashbourne into Staffordshire.

Geology, Minerals, &c.—With the exception of drift gravel, and some alluvial deposits, the rocks of this county belong to the Palæozoic and Mesozoic periods. The mountain limestone underlies all the other rocks, and in the Peak district rises to a great elevation. It is in this formation that the well-known caves of Derbyshire occur. The calcareous rocks are confined to the western side of the county,—Tissington being the southern, Castleton the northern, Axe Edge the western, and Matlock the eastern extremities. There is also an outcrop at Crich. The intrusive beds of toadstone (some of which attain a thickness of 200 feet) and volcanic mud mark great submarine eruptions when this ancient lava was spread over the sea-bottom. It is estimated that upwards of half a million tons are worked yearly. The marbles are numerous and valuable for ornamental purposes. Derbyshire also contains several metallic ores—viz., galena, barytes, zinc, calamine, fluor spar, and elaterite. Galena (sulphide of lead) is obtained rather extensively, some mines near Castleton having been worked by the Romans. In 1874 the quantity raised was 4301 tons, from which were extracted 800 ounces of silver. In connection with galena zinc is found, of which 4050 tons were raised in 1876; of calamine (carbonate of zinc) 30 tons. Barytes is used as an inferior white paint, and also for ornamental purposes. The total output for 1876 was 2700 tons. Blue john is a somewhat rare fluor spar, impregnated with oxide of manganese. It is one of the most ornamental minerals of the county, and is much used in the manufacture of tazzas, brooches, &c. In one or two places a thin seam of coal is found in the mountain limestone. Copper was once worked in this formation at Eoton, on the border of the county, but it has never been abundant. Traces of gold have also been found in toadstone Chert is got near Bakewell, and is used for the manufacture of porcelain. The most remarkable and rare mineral is elaterite, or elastic bitumen, found at Windy Knoll, near Castleton. It is found only at two other places—at Montrelaix in France, and in Connecticut, United States. The fauna of this formation may be briefly tabulated as follows, from Etheridge's list—Cœlenterata, 54 species; Echinodermata, 27; Crustacea, 15; Brachiopoda, 96; Lamellibranchiata-Monomyriata, 29; Gasteropoda, 55; Cephalopoda, 31; Pisces, 12. The surface soils of the mountain limestone are very unproductive, and, as a rule, can only be used for grazing. The Yoredale rocks make a narrow margin round the above formation, forming also the range of hills between Hope and Edale valleys, and extends to the north of the Peak, attaining a thickness of 500 feet. As is usual with this rock, frequent landslips take place, notably at Alport Tower, Dove Holes, and at the southern flank of Mam-Tor, the latter having carried with it part of the old Roman camp, &c. The Millstone Grit is part of a large formation stretching into adjacent counties. It is a long, narrow outcrop, running from north to south on the whole western side of the Coal Measures from Stanedge Pole to Little Eaton. There is also an outcrop, 200 feet thick, south of the Trent. The high table-land of the Peak is of this formation. It is a valuable building-stone, and as such it is extensively used, as well as for millstones, from which it derives its name. The Coal Measures are the southern continuation of the great Yorkshire coal-field. They occupy the larger portion of the eastern side of the county from a few miles south of Sheffield to near Balborough Hall, where they disappear under the Permian. The coal-field (which extends into Notts) covers an area of about 700 square miles, 230 of which are in this county. At Shireoaks the top hard coal is worked, at a depth of 510 yards, the overlying Permian rock being only 200 feet thick. The principal coals worked are the deep soft and deep hard, both important. Still more so is the clod, or black shale; but the best of all is the Kilbourne, near Belper, which is equal to the best Newcastle. Upwards of 10,000 people are employed in the Derbyshire coal-fields, which produce annually more than 7,000,000 tons. The ironstones associated with this coal-field are very valuable, yielding upwards of 130,000 tons annually. The Permian is represented in the north-east by a narrow strip of Magnesian Limestone, which is said to be one of the best building stones in the kingdom. The surface soils of this formation are probably the most fertile in the county, its barley or malt having become famous. A narrow strip of the Bunter stretches just on the edge of the Yoredale, from Ashbourne to Quarndon, and patches occur to the north of Breadsal; at Sandiacre, and in the neighbourhood of Repton. The Keuper Red Marl and Sandstone occupy the larger part of South Derbyshire, the most northerly point being near Ashbourne. The sandstones are extensively used for building purposes. An important bed of gypsum is worked at Chellaston, which is burnt and pulverised for making plaster of Paris,—the white variety being made into chimney ornaments, statuettes, &c. The Drift Gravel is confined almost to the south and east of the county. Near Derby it is very abundant. Much light has been thrown upon the fauna of the Pleistocene period by the researches of Mr Pennington at Castleton, and Messrs Mills and Heath at Cresswell. The more rare and important "finds" are the mammoth, woolly rhinoceros, Irish elk, reindeer, cave bear, wolf, British lion, hyæna, glutton, Arctic fox, machairodus (?), &c., and a large collection of palæolithic implements. Peat bogs are spread over all the moorland districts of the Yoredale and Millstone Grit.

Agriculture.—In the valley of the Trent a large surface is laid down in permanent grass, being devoted to cattle-feeding and dairy purposes, while heavy crops of wheat, turnips, &c., are grown in other parts of the district. Dairy farms are numerous; and Derbyshire cheese, which holds a high reputation, is annually sent to the metropolis, or to the seaports for exportation. Cheese fairs or markets are held in various parts of the county, as at Derby, Burton-on-Trent, Ashbourne, Uttoxeter, and Loughborough. Barley is much cultivated, especially about Repton and Gresley, and also in the east of the county, the inducement being great from the proximity of Burton, the great seat of the brewing industry. In the upland districts, where the soil is poor and the climate harsh and unfriendly, agricultural industry is much less important and profitable. It is chiefly devoted to the feeding of sheep. The following figures, taken from the Agricultural Returns for 1873 and 1876, shows the distribution of the agricultural acreage of the county, and the numbers of live stock, in those years:—

	Under all kinds of Crops.	Corn Crops.	Green Crops.	Grass under rotation.
1873	498,674	74,940	20,896	35,967
1876.........	502,791	68,933	21,837	36,259

In 1876 wheat and oats constituted each one-third of the corn crops, and barley a fourth; turnips formed one-half of the green crops.

	Horses.	Cattle.	Sheep.	Pigs.
1873.......	18,004	136,939	263,429	40,078
1876.......	20,618	134,891	242,732	38,361

A marked feature of the upland districts is the total absence of hedges, and the substitution of limestone walls, put together without any mortar or cement. The county possesses a flourishing agricultural society, which holds a show of cattle and other live stock annually.

In respect of the ownership of the land, Derbyshire in 1873 was divided among 19,866 separate proprietors, whose gross estimated rental amounted to £1,764,689. The average size of each holding in that year was 31 acres, while that of all England was 34 acres; and the average value per acre was £2, 16s. 10d., that of all England being £3, 0s. 2d. There were 12,874 owners holding less than one acre of land, equal to 65 per cent. of the total number of proprietors, or about 6 per cent. fewer than the average of small owners in all England. Eight proprietors held more than 6000 acres each, viz.—duke of Devonshire (Chatsworth), 83,829 acres; duke of Rutland (Haddon Hall), 26,973; Sir J. H. Crewe, Bart. (Calke Abbey), 12,923; Lord Scarsdale (Kedleston), 9166; Lord Howard (Glossop Hall), 9108; duke of Portland, 7740; T. W. Evans (Allestree), 6799; Lord Vernon (Sudbury Hall) 6154.

Manufactures.—These are both numerous and important, embracing silks, cotton hosiery, iron, woollen manufacures, lace, elastic web, and brewing, for which see BURTON. For many of these this county has long been famous, especially silk, which is carried on to a large extent in Derby, as well as in Belper and Duffield, where the first silk mill in England was set up by a mechanic, John Lombe, who introduced it from Italy. Cotton was also at one time an important industry, but has in great measure passed into the county of Lancashire. It was introduced here by the celebrated Sir Richard Arkwright in 1771. Hosiery also was much in vogue, and obtained great celebrity from the invention of Mr Strutt, by which "ribbed" stockings could be made—the Derby "rib" having been long the familiar designation of the article produced by Strutt's invention. There are numerous iron foundries, machine and iron-bridge works, &c., in Derbyshire, those in the county town alone employing a great many hands. Silk-throwing is a principal industry of Derby, which in ordinary times gives employment to 3000 or 4000 persons, chiefly females. Elastic web weaving by power looms is carried on to a great extent, and the manufacture of lace and net curtains, gimp trimmings, braids, and cords. In the county town and neighbourhood are several important chemical and colour-works; and in various parts of the county, as at Belper, Cromford, Matlock, Tutbury, &c., are extensive cotton-spinning mills, as well as hosiery and tape manufactories.

Ecclesiastical Buildings.—Derbyshire is distinguished for numerous old and interesting churches. The prevailing style of the churches is the Norman, and next to that the Early English, the style which immediately succeeded it. Steetly Chapelry, near Whitwell, on the east side of the county, is Norman; and of this church Mr C. Cox, in his work on Derbyshire churches, says that it is "the most complete and beautiful specimen of Norman work, on a small scale, that can be met with anywhere in this country or in Normandy." It was probably built during the reign of Stephen, 1135–54.

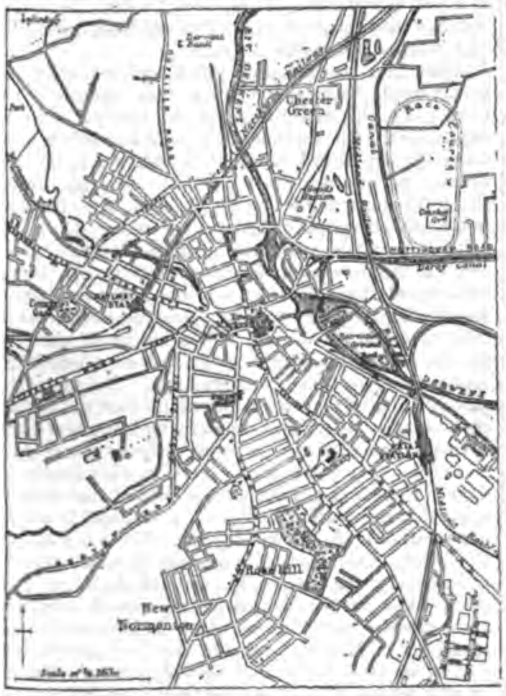
The *antiquities* of Derbyshire are of considerable interest. One of the more noteworthy is a causeway, or Roman paved road, called Bathgate, running seven miles from Buxton to a small village called Brough, which road from its name seems to indicate that the Buxton waters were known to the ancients. Rocking-stones exist near Rowter and at other places; Druidical remains, in the form of a Druidical temple, on Stanton moor, with a large number of associated objects which seem to justify the assumption that it has been inhabited by Druids. On Hartle moor, at Arbelow, is another Druidical temple, with its barrows and tumuli; there are others on the moor near Eyam, and near Edale. Barrows are found at Arbelow, Brassington, on the moor near Eyam, and at Tissington. At Taddington is one of the most perfect examples now existing. Roman stations are to be found near Buxton, at Little Chester (which is the old Roman town *Derventio*), and at Mam-Tor, near Castleton, where there is also an encampment. At Repton, in 660, "there was a noble monastery of religious, of both sexes, under an abbess, after the old Saxon fashion, wherein several of the royal line were buried." This was afterwards destroyed by the Danes, when Maud, widow of Ranulph, second earl of Chester, built a priory for Black Canons in 1172. Here the Mercian kings who resided at Tamworth were buried. At Melbourne is a castle which was a royal demesne at the Conquest, and where John, duke of Bourbon, taken at the battle of Agincourt, was kept nine years in the custody of Nicholas Montgomery the younger.

DERBY, the county town of Derbyshire, is a corporate and borough town, sending two representatives to Parliament, and consisting of five parishes. It is situated chiefly on the western bank of the river Derwent, upon ground of varying heights, and is surrounded with gentle eminences, from which flow the Markeaton and other brooks. It occupies a position almost in the centre of England, 127 miles N.W. of London. Derby possesses several large public buildings, including the town hall, a spacious range of buildings recently erected for the postal and telegraph departments and the inland revenue offices, the county gaol, a new masonic hall, All Saints Church, the tower of which (174 feet high) is considered one of the finest in the midland counties, and a Roman Catholic church (one of the best examples of Pugin). The Derby grammar school, an ancient foundation which occupies St Helen's House (once the town residence of the Strutt family), has lately had class-rooms added to it, erected by public subscription as a memorial of the visit of the Prince and Princess of Wales. There are flourishing schools of art and science, a large and commodious infirmary for town and county,* an arboretum of 17 acres, given to the town in 1840 by the late Joseph Strutt, Esq., a market square, a market hall, and water-works erected at a cost of £40,000, and since greatly extended. A recreation ground, free public swimming baths, a free library, and museum buildings have all been presented to the town by Mr M. T. Bass. Since about 1850 Derby has been greatly improved and extended, owing chiefly to the impulse given by the establishment of the head offices and principal workshops of the Midland Railway Company, and will be still further improved by the construction now in process of a branch of the Great Northern Railway, which passes through the town over a long series of arches.

Seal and Arms of Derby.

Derby has been long celebrated for its porcelain, which rivalled that of Saxony and France. This manufacture was introduced in the year 1750, and although for a time partially abandoned, it has been so far revived, and is still continued. There are also spar works where the fluor spar, or blue john, is wrought into a variety of useful and ornamental articles. The manufacture of silk, hosiery, lace, and cotton formerly employed a large portion of the population, and there are still numerous silk mills and elastic web works, &c. The iron manufacture is also of great importance; among the larger establishments may be mentioned the Britannia Works, which furnished the roof of the great Agricultural Hall, London.

The sanitary condition of the town is much improved since the formation of a local board, and the rate of mortality is low. Among benevolent institutions may be mentioned a ragged school, and a nurses' "home." The population of the municipal borough, which occupies an area of 1796 acres, numbered 40,609 persons in 1851, 43,091 in 1861, and 49,810 in 1871. The parliamentary borough, which in 1867 was extended so as to include the townships of Litchurch and Little Chester, and covers an area of 2999 acres, had a population in 1871 of 61 381—29,882 males and 31,499 females.



Plan of Derby.

Derby is a town of great antiquity, but its origin is unknown. During the Heptarchy it was called Northworthig and its present name Derby, or Deoraby, is due to the Danes. Constituted in the ninth century the chief town of the county by King Segurd, Derby was incorporated by Henry I. Its charter was surrendered to Charles II. in 1680, and a new one was granted in 1683, by which the government of the borough was vested in a mayor, 9 aldermen, 14 brethren, and 14 capital burgesses. In 1835 the town council was re-organized under the Municipal Corporations Act, and now consists of a mayor, 12 aldermen, and 36 councillors. Derby was the furthest place reached by the Pretender in his march towards London in 1745; he lodged in Exeter House, Full Street, and held there a council of war, which resulted in the abandonment of his project.

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DERBY,* EDWARD-GEOFFREY SMITH STANLEY, FOURTEENTH EARL OF, Baron Stanley of Bickerstaffe, and a baronet (1799–1869), born at Knowsley in Lancashire, on the 29th March 1799, was the eldest son of Lord Stanley, who afterwards (1834) became the thirteenth earl of Derby. The title in the direct line of succession to which he was thus born ranks second in precedency among the earldoms in the peerage of England. He was educated at Eton and at Christ Church, Oxford, where he distinguished himself as a classical scholar, though he took only an ordinary degree on quitting the university. In 1819 he obtained the Chancellor's prize for Latin verse, the subject being "Syracuse." He gave early promise of his future eminence as an orator, and it is said that in his youth he used to practise elocution under the instruction of Lady Derby, his grandfather's second wife, who as Miss Eliza Farren had been a celebrated actress. With such an inclination and aptitude for public speaking, the heir to an ancient title was only fulfilling his natural destiny in seeking a seat in the House of Commons, and of course he had no difficulty in finding one. In 1820, soon after he had attained his majority, he was returned for Stockbridge in Hampshire, one of the nomination boroughs whose electoral rights were swept away by the Reform Bill of 1832, Stanley, like several others who entered parliament by means of them, being a warm advocate of their destruction. It may appear somewhat strange that he should have remained for four years, so far as is known, a silent member; but the representative of a pocket borough had no constituency to consider, and there was not in those days the incentive to frequent speaking that is now furnished by full daily reports of the debates circulating through the entire country. His maiden speech was delivered early in the session of 1824 in the debate on a private bill for lighting Manchester with gas. Although the subject can scarcely have given scope for any high flight of oratory, the speaker was warmly complimented by Sir James Mackintosh, one of the first authorities in the House, who welcomed him as an accession to the Liberal ranks, and Hansard reports the speech as characterized by "much clearness and ability." His second appearance was made in connection with a subject—irrepressible as it proved, though he always did his utmost to repress it—which was afterwards to determine more than one important turning point in his political career, and to call forth his last utterance in parliament. It is noteworthy also as an early exhibition of the Conservative instinct whose growing strength led gradually to an entire change of his political position. On the 6th May 1824, he delivered what seems to have been a vehement and eloquent speech against Joseph Hume's motion for a reduction of the Irish Church establishment, maintaining in its most conservative form the doctrine that church property is as sacred as private property. From this time his appearances became frequent; and he soon asserted his place as one of the most powerful speakers in the House. Specially noticeable almost from the first was the skill he displayed in reply. Macaulay, in an essay published in 1834, remarked that he seemed to possess intuitively the faculty which in most men is developed only by long and laborious practice. "Indeed, with the exception of Mr Stanley, whose knowledge of the science of parliamentary defence resembles an instinct, it would be difficult to name any eminent debater who has not made himself a master of his art at the expense of his audience."

In the autumn of 1824 Stanley went on an extended tour through Canada and the United States in company with Mr Labouchere, afterwards Lord Taunton, and Mr Evelyn Denison, afterwards Lord Ossington. In May of the following year he married the second daughter of Edward Bootle-Wilbraham, created Baron Skelmersdale in 1828, by whom he had a family of two sons and one daughter who survived, besides three children who died in infancy.

At the general election of 1826 Stanley renounced his connection with Stockbridge, and became the representative of the borough of Preston, where the Derby influence has usually, though not invariably, been paramount. The change of seats had this advantage, that it left him free to speak against the system of rotten boroughs, which he did with great force during the Reform Bill debates, without laying himself open to the charge of personal inconsistency as the representative of a place where, according to Gay, cobblers used to "feast three years upon one vote." In 1827 he and several other distinguished Whigs made a coalition with Canning on the defection of the more unyielding Tories, and he commenced his official life as under-secretary for the colonies. Whether the coalition arrangement would have proved stable had its distinguished leader survived is more than questionable, but it was entirely broken up by his death in August of the same year. Lord Goderich, who had been Stanley's chief at the Colonial Office, succeeded to the premiership, but he never was really in power, and he resigned his place after the lapse of a few months without venturing to meet parliament. During the succeeding administration of the duke of Wellington (1828–30), Stanley and those with whom he acted were in opposition. His robust and assertive Liberalism about this period sounds somewhat curiously to a younger generation who knew him only as the very embodiment of Conservatism. They can find little of the earl of Derby except his characteristic force of expression in the conviction uttered by Stanley, "that the old and stubborn spirit of Toryism is at last yielding to the liberality of the age—that the Tories of the old school, the sticklers for inveterate abuses under the name of the wisdom of our ancestors, the *laudatores temporis acti* are giving way on all sides." Even the most retrograde political party, however, makes distinct progress almost in spite of itself as the years pass on, and Lord Derby might very well have maintained that the Toryism he represented in his maturity was not the Toryism he had denounced in his youth.

By the advent of Lord Grey to power in November 1830, Stanley obtained his first opportunity of showing his capacity for a responsible office. He was appointed to the chief secretaryship of Ireland, a position in which, as it turned out, he found ample scope for both administrative and debating skill. On accepting office he had, according to the usual practice, to vacate his seat for Preston and seek re-election; and it must have been peculiarly mortifying to one of his high spirit that, in spite of his family influence and growing reputation, he alone of all the members of the new ministry in the Lower House failed to secure his return. He was defeated, and the defeat was doul rendered more bitter by the fact that his opponen the Radical "orator" Hunt. The contest was a pecu keen one, and turned upon the question of the b which Stanley refused to support. He re-entere house as one of the members for Windsor, Sir H Vivian having resigned in his favour. In 1832 he changed his seat, being returned for North Lanca which he continued to represent until his elevation t House of Lords.

Mr Stanley was one of the most ardent supporte the great measure which has made Lord Grey's admin tion the most memorable of the present century. this no other proof is needed than his frequent p mentary utterances, which were fully in sympathy wit popular cry "The bill, the whole bill, and nothing the bill." Reference may be made especially to the s he delivered on the 4th March 1831 on the adjou debate on the second reading of the bill, which was m by all the higher qualities of his oratory. More thirty years later, when he was premier, he was called upon to deal with the question, and he had s manship enough to settle it on a permanent basis; the incertitude with which he then took what he hi in a well remembered phrase called "a leap in the d was in curious contrast to the clear conviction with he advocated the earlier measure.

Apart from his connection with the general policy o Government, Stanley had more than enough to employed all his energies in the management of his department. The secretary of Ireland has seldom an task; Stanley found it one of peculiar difficulty. country was in a very unsettled state. The just conce that had been somewhat tardily yielded a short time b in Catholic emancipation had excited the people to ma sorts of demands, reasonable and unreasonable. A result of that concession these demands were now perm to be urged on the floor of the House by the most elo and the most widely popular representative Irelan ever possessed,—one, too, whose hatred of the " bloody, and brutal Whigs" seems to have totally un him for judging Whig measures fairly. Problems of practical difficulty in connection with the land and the c pressed for solution; and the alarming increase of ag outrages demanded even more urgently the instant ap tion of vigorous measures of repression. Mr Stanley' duct in these trying circumstances showed that he ha spirit that rises with difficulties. Undaunted by the denunciations of O'Connell, who styled him Sco Stanley, he discharged with determination the ungr task of carrying a Coercion Bill through the House. F ment has probably seldom witnessed warmer or mor sonal encounters than those which took place abou time between the Liberator and the Irish Secretary seldom has an official position been more gallantly defe It was generally felt that O'Connell, powerful thou was, had fairly met his match in Stanley, who, with tive scarcely inferior to his own, evaded no chal ignored no argument, and left no taunt unanswered. title "Rupert of Debate" is peculiarly applicable to connection with the fearless if also often reckless m of attack he showed in his parliamentary war O'Connell. It was first applied to him, however, th years later by Sir Edward Bulwer Lytton in the foll passage of *The New Timon* :-

"One after one the lords of time advance;
Here Stanley meets—here Stanley scorns the glanc
The brilliant chief, irregularly great,
Frank, haughty, rash,—the Rupert of debate."

The best answer, however, which he made to the f the great agitator was not the retorts of debate, effective hough these were, but the beneficial legislation he was nstrumental in passing. Two of his measures deserve special mention. He introduced and carried the first national education act for Ireland, one result of which was the remarkable and to many almost incredible phenomenon of a board composed of Catholics, Episcopalians, and Presbyterians, harmoniously administering an efficient education scheme. He was also chiefly responsible for the Irish Church Temporalities Act, though the bill was not introduced into parliament until after he had quitted the Irish secretaryship for another office. By this measure two archbishoprics and eight bishoprics were abolished, and a remedy was provided for various abuses connected with the revenues of the church. As originally introduced, the bill contained a clause authorizing the appropriation of surplus revenues to non-ecclesiastical purposes. This had, however, been strongly opposed from the first by Stanley, and several other members of the cabinet, and it was withdrawn by the Government before the measure reached the Lords. There was therefore no ground for the charge of inconsistency brought against Stanley, when a year later he seceded from the cabinet on the proposal being renewed.

In 1833, just before the introduction of the Irish Church Temporalities Bill, Stanley had been promoted to be secretary for the colonies with a seat in the cabinet. In this position it fell to his lot to carry through parliament a measure which is one of the abiding glories of English legislation. The agitation for the emancipation of the slaves had been mainly the work of others whose names have become historical in connection with it; but to Stanley belonged the honour and privilege of bringing it to a successful practical issue in the pages of the statute book. The speech which he delivered on introducing the bill for the emancipation of the slaves in the West Indies, on the 14th May 1833, was one of the finest specimens of his eloquence. It showed a philanthropic spirit and a love of freedom which proved him to be a not unworthy associate of Clarkson, Wilberforce, and Buxton, and it was admirable for the clear statement of the somewhat complicated arrangement by which the all but unanimous wish of the nation was to be carried out. The latter quality was still more conspicuous in committee, through which Stanley carried the measure with the firmness and tact of true statesmanship.

It has already been said that the Irish Church question determined more than one turning-point in Mr Stanley's political career. The most important occasion on which it did so was in 1834, when the proposal of the Government to appropriate the surplus revenues of the church to educational purposes led to his secession from the cabinet, and, as it proved, his complete and final separation from the Whig party. In the former of these steps he had as his companions Sir James Graham, the earl of Ripon, and the duke of Richmond. Soon after it occurred, O'Connell, amid the laughter of the House, described the secession in a couplet from Canning's *Loves of the Triangles*:—

> "Still down thy steep, romantic Ashbourne, glides
> The Derby dilly carrying six insides."

Stanley was by no means content with marking his disapproval of the conduct of the Government of which he had been a member by the simple act of withdrawing from it. He spoke against the bill to which he objected with a vehemence that showed the strength of his feeling in the matter, and against its authors with a bitterness that he himself is understood to have afterwards admitted to have been unseemly towards those who had so recently been his colleagues. The language of one speech deserves to be quoted as a good specimen of what he could do in the way of invective when he chose. "Plunder," a term very familiar in more recent debates on the same long-vexed question, was perhaps the mildest word he used. The course followed by the Government was "marked with all that timidity, that want of dexterity, which led to the failure of the unpractised shoplifter." His late colleagues were compared to "thimble-riggers at a country fair," and their plan was "petty larceny, for it had not the redeeming qualities of bold and open robbery."

In the end of 1834, Lord Stanley, as he was now styled by courtesy, his father having succeeded to the earldom in October, was invited by Sir Robert Peel to join the short-lived Conservative ministry which he formed after the resignation of Lord Melbourne. Though he declined the offer for reasons stated in a letter published in the Peel memoirs, he acted from that date with the Conservative party, and on its next accession to power, in 1841, he accepted the office of colonial secretary, which he had held under Lord Grey. His position and his temperament alike, however, made him a thoroughly independent supporter of any party to which he attached himself. When, therefore, the injury to health arising from the late hours in the Commons led him in 1844 to seek elevation to the Upper House in the right of his father's barony, Sir Robert Peel, in acceding to his request, had the satisfaction of at once freeing himself from the possible effects of his "candid friendship" in the House, and at the same time greatly strengthening the debating power on the Conservative side in the other. If the premier in taking this step had any presentiment of an approaching difference on a vital question, it was not long in being realized. When Sir Robert Peel accepted the policy of free trade in 1846, the breach between him and Lord Stanley was, as might have been anticipated from the antecedents of the latter, instant and irreparable. Lord Stanley at once asserted himself as the uncompromising opponent of that policy, and he became, as his position warranted, the recognized leader of the Protectionist party, having Lord George Bentinck and Mr Disraeli for his lieutenants in the Commons. They did all that could be done in a case in which the logic of events was against them, but their watchword of Protection was never to become more than a watchword. It is one of the peculiarities of English politics, however, that a party may come into power because it is the only available one at the time, though it may have no chance of carrying the very principle to which it owes its organized existence. Such was the case when Lord Derby, who had succeeded to the earldom on the death of his father in June 1851, was called upon to form his first administration in February 1852. He was in a minority, but the circumstances were such that no other than a minority Government was possible, and he resolved to take the only available means of strengthening his position by dissolving parliament and appealing to the country at the earliest opportunity. The appeal was made in autumn, but its result did not materially alter the position of parties. Parliament met in November, and by the middle of the following month, the ministry had resigned in consequence of their defeat on the clever but financially unsound budget proposed by Mr Disraeli. For the six following years, during Lord Aberdeen's "ministry of all the talents" and Lord Palmerston's premiership, Lord Derby remained at the head of the opposition, whose policy gradually became more generally Conservative and less distinctively Protectionist as the hopelessness of reversing the measures adopted in 1846 made itself apparent to all but the most reactionary. In 1855, he was asked to form an administration after the resignation of Lord Aberdeen, but failing to obtain sufficient support, he declined the task. It was in somewhat more hopeful circumstances that, after the defeat of Lord Palmerston on the Conspiracy Bill in February 1858, he assumed for the second time the reins of government. Though he still could not count upon a working majority, there was a possibility of carrying on affairs without sustaining defeat, which was realized for a full session, owing chiefly to the dexterous management of Mr Disraeli in the Commons. The one rock ahead was the question of Reform, on which the wishes of the country were being emphatically expressed, but it was not so pressing as to require to be immediately dealt with. During the session of 1858 the Government contrived to pass two measures of very considerable importance, one a bill to remove Jewish disabilities, and the other a bill to transfer the government of India from the East India Company to the Crown. Next year the question of parliamentary reform had to be faced, and, recognizing the necessity, the Government introduced a bill at the opening of the session, which, in spite of, or rather in consequence of, its "fancy franchises," was rejected by the House, and, on a dissolution, rejected also by the country. A vote of no confidence having been passed in the new parliament on the 10th June, Lord Derby at once resigned.

After resuming the leadership of the Opposition Lord Derby devoted much of the leisure the position afforded him to the classical studies that had always been congenial to him. It was his reputation for scholarship as well as his social position that had led in 1852 to his appointment to the chancellorship of the university of Oxford, in succession to the duke of Wellington; and perhaps a desire to justify the possession of the honour on the former ground had something to do with his essays in the field of authorship. These were made at first with a diffidence that contrasted strongly with his boldness in politics. His first venture was a poetical version of the 9th ode of the 3rd book of Horace, which appeared in Lord Ravensworth's collection of translations of the *Odes*. In 1862 he printed and circulated in influential quarters a volume entitled *Translations of Poems Ancient and Modern*, with a very modest dedicatory letter to Lord Stanhope, and the words "Not published" on the title-page. It contained, besides versions of Latin, Italian, French, and German poems, a translation of the first book of the *Iliad*. The reception of this volume was such as to encourage him to proceed with the task he had chosen as his *magnum opus*, the translation of the whole of the *Iliad*, which accordingly appeared in 1864. The fact that it speedily passed through six editions is, of course, not so unequivocal a proof of its literary merit as would have been the case had the work proceeded from an author of less social distinction, but it has considerable significance. Tried on its merits, the most severe critic could not pronounce the work a failure. That it was not a complete success was due principally to the facts that the author had not caught the difficult secret of the management of the metre he chose—blank verse,—and that he was unable to divest himself of the diffuseness and of the modern cast of thought and style of expression natural to the parliamentary orator.

During the seven years that elapsed between Lord Derby's second and third administrations an industrial crisis occurred in his native county, which brought out very conspicuously his public spirit and his philanthropy. The destitution in Lancashire, caused by the stoppage of the cotton-supply in consequence of the American civil war, was so great as to threaten to overtax the benevolence of the country. That it did not do so was probably due to Lord Derby more than to any other single man. From the first he was the very life and soul of the movement for relief. His personal subscription, munificent though it was, represented the least part of his service. His noble speech at the meeting in Manchester in December 1872, where the movement was initiated, and his advice at the subsequent meetings of the committee, which he attended very regularly, were of the very highest value in stimulating and directing public sympathy. His relations with Lancashire had always been of the most cordial description, notwithstanding his early rejection by Preston; but it is not surprising that after the cotton famine period the cordiality passed into a warmer and deeper feeling, and that the name of Lord Derby is still cherished in most grateful remembrance by thousands of the factory operatives.

On the rejection of Earl Russell's Reform Bill in 1866, Lord Derby was for the third time intrusted with the formation of a cabinet. Like those he had previously formed it was destined to be short-lived, but it lived long enough to settle on a permanent basis the question that had proved fatal to its predecessor. The "education" of the party that had so long opposed all reform to the point of granting household suffrage was the work of another; but it is understood that Lord Derby fully concurred in, if he was not the first to suggest, the statesmanlike policy by which the question was disposed of in such a way as to take it once for all out of the region of controversy and agitation. The passing of the Reform Bill was the main business of the session 1867. The chief debates were, of course, in the Commons, and Lord Derby's failing powers prevented him from taking any large share in those which took place in the Lords. His description of the measure as a "leap in the dark," was eagerly caught up, because it exactly represented the common opinion at the time,—the most experienced statesmen, while they admitted the granting of household suffrage to be a political necessity, being utterly unable to foresee what its effect might be on the constitution and government of the country.

Finding himself unable, from declining health, to encounter the fatigues of another session, Lord Derby resigned office early in 1868. The step he had taken was announced in both houses on the evening of the 25th February, and warm tributes of admiration and esteem were paid by the leaders of the two great parties. He was succeeded by Mr Disraeli, to whom he yielded the entire leadership of the party as well as the premiership. His subsequent appearances in public were few and unimportant. It was noted as a consistent close to his political life that his last speech in the House of Lords should have been a denunciation of Mr Gladstone's Irish Church Bill marked by much of his early fire and vehemence. A few months later, on the 23rd October 1869, he died at Knowsley.

Lord Derby was one of the last and most brilliant representatives of a class which seems to have become extinct, for the time at least, if the sharp differentiation of human pursuits that has now established itself has not rendered it impossible that it should ever again exist. Politics is now a distinct and exclusive profession; the number of those to whom, like Lord Derby, it is the main without being the all-absorbing interest of life seems to become fewer year by year. There still remain one or two noted statesmen who are also noted authors, but of the life of many interests embracing public affairs, scholarship, literature, society, sportsmanship, and estate management, Lord Derby was almost the last specimen. Of another class, which will have ceased to exist when one or two more have passed away, he was also among the last and best; he was a master of the all but lost art of parliamentary oratory. On this point it is enough to quote the testimony of two most competent witnesses. Sir Archibald Alison, writing of him when he was in the zenith of his powers, styles him "by the admission of all parties the most per best orator of his day." Even higher was the opinion of Lord Aberdeen, who is reported by the *Times* to have said that no one of the giants he had listened to in his youth, Pitt, Fox, Burke, or Sheridan, "as a speaker, is to be compared with our own Lord Derby, when Lord Derby is at his best." (W. B. S.)

DEREYEH, or DERAYA, a town of Arabia, in the Nejd, on the caravan-route from the Red Sea to the Persian Gulf, about 15 miles west of Riad. It was formerly the capital of the Wahabees, and had a population of about 30,000 inhabitants; but it has never recovered from the ruin inflicted on it by the army of Ibrahim Pasha in 1818.

DERHAM, WILLIAM (1657–1735), an eminent English divine and natural philosopher, was born at Stoughton, near Worcester, in 1657. He received his early education at Blockley, in his native county, and in 1679 graduated with much distinction at Trinity College, Oxford. Three years later he became vicar of Wargrave, in Berkshire; and in 1689 he was preferred to the living of Upminster, in Essex. In 1696 he published his *Artificial Clockmaker*, which went through several editions. The best known of his subsequent works are *Physico-Theology*, published in 1713; *Astro-Theology*, 1714; and *Christo-Theology*, 1730. In consideration of these contributions to science and theology he was, in 1716, made a canon of Windsor; and in 1730 he received the degree of D.D. from Oxford. His last work, entitled *A Defence of the Church's Right in Leasehold Estates*, appeared four years previous to his death, which happened in 1735. Besides the works published in his own name, Derham contributed a variety of papers to the *Philosophical Transactions*, revised the *Miscellanea Curiosa*, edited the correspondence of John Ray, and Albin's *Natural History*, and published some of the MSS. of Hooke, the natural philosopher.

DERVISH is a Persian word meaning "the sill of the door," or those who beg from door to door. The Arabic equivalent is fakir, or fuqueer. The dervishes of the Turkish empire may be said to constitute the regular religious orders, and are distinguished from the ulemas, or secular clergy. In Turkey, Egypt, Persia, Hindustan, and Central Asia, however, dervishes, or fakirs, are to be found in great number who belong to no society, but are simply mendicants or single devotees, many of whom subsist by professional jugglery. Especially is this true of the Byragis, the Dundis, the Bhikshooks, the Wanuprusts, the Sunyasis, the Aghorpunts, the Gosaens, the Jogis, the Oodassis, the Jutis, and the Lingaet Jungums of northern Hindustan, and still more emphatically of the Bonzes, or Buddhist monks. But in the more favourable sense of the word, the dervishes represent Sofism, or the spiritual and mystic side of Islam. Long before the time of Mahomet, Arabic thought was divided, as if by Greek and Indian influences, into the schools of the Meschaïouns (the walkers) and the Ischrachaïouns (the contemplators). When the Koran appeared, these became the Mutekelim (metaphysicians), and the Sofis (mystics). The latter put an esoteric interpretation on both the Koran and the Hadisât, or collected sayings of the Prophet; they dispense with the jemaat and other formalities of the mosque; they in many cases recognize the fact of spiritual religion outside Islam; and in general they observe the rules of poverty, abstinence from wine, and celibacy. The name fakir, indeed, comes from the saying of the Prophet, "El fakr fakhri," poverty is my pride. The six Erkiân, or pillars of the Tesavvuf, or spiritual life, are (1) the existence of God, (2) His unity, (3) the angels, (4) the prophets, (5) the day of resurrection, and (6) good and evil through God's predestination. But it is only the Tarikats, or orders (lit. paths), among the more orthodox or Sunnite Mahometans who attach much importance to positive dogma. The Shiite party, especially the Persian dervishes, who trace their descent through various sheikhs and peers from Ali, the fourth caliph, believe that "the paths leading to God are as many as the breaths of his creatures." These form the great majority of the orders; for it is stated in a work called the *Silsileh ul Evlia Ullah* (Genealogy of the Saints of God), last edited in 1783, that, out of 36 well-defined orders, 12 of which were in existence before the beginning of the Ottoman empire, only 3, viz., the Bestamis, the Nakshibendis, and the Bektashis. are descended from the congregation of Abu Bekr, the second caliph, and that all the others are descended from the caliph Ali. As the dervishes do not recognize the legal exposition which the ordinary tribunals give of the letter of the Koran, and acknowledge no authority but that of their spiritual guide, or of Allah himself speaking directly to their souls, the Ottoman sultans have always regarded them with jealousy; and in 1826 Mahmoud entirely suppressed the order of the Bektashis, which had for centuries been closely connected with the Janissaries, or Hoo Keshans (him scatterers), and which is said to have formed part of a Fermason (freemasonry) extending through Palestine, Syria, and Turkey.[1] The other orders, however, or most of them, have survived to the present day, and are generally popular,—one of them, the Mevlevis, being joined by persons from the highest and wealthiest ranks. But membership, when it does not proceed beyond the first stage of Shi'at or Sher'iat, *i.e.*, legal religion under the supervision of a murshid,[2] may be satisfied by the repetition of a few prayers at home and the wearing of the sacred cap for a few minutes each day.

The regular dervishes live in tekkiehs, khanakahs, or convents, which are endowed with lands or wakf, just as the Muths of Hindustan are endowed with enam lands, incapable of mortgage or alienation. Thus, in 1634, the sultan Amurath IV. gave to the Bektashis of Konieh the whole tribute paid by that city. Over each convent presides a sheikh, or murshid, who represents the pir, or original founder of the order. This corresponds to the mohunt, malik, or guru of Hindustan. Among the Persian Nosairis (who consider Mahomet an impostor, and perform no ablutions), the succession of sheikhs is hereditary—elsewhere by seniority or election, confirmed by the Sheikh ul Islam. In Hindustan the selection takes place in a dusname, or council of mohunts, called among the Sikhs a muta. The murid, or disciple, has to undergo a long initiation (called in Turkey *Ikrar*, in Egypt *Ahd*) before he obtains the taybend, or woollen belt, with its palenk or cabalistic "stone of contentment;" the mengusay, or ear-rings shaped like the horse shoe of Ali; the khirka, or mantle; the tesbeeh, or rosary, containing the ismi jelal, or the 99 beautiful names of God; and finally the tâj, or white cap, with the proper number of terks, or sections, belonging to the order. Similar distinctions are preserved in Hindustan by the barbarous method of marking on the forehead the sandal-wood stripes of Siva, or the white and red trident of Vishnu. In the Mevlevi order the murid goes through 1001 days of menial labour, and is during that time called the karra kolak, or jackal. It is not necessary, however, to give up one's private property; and many dervishes are permitted to remain in trade on the principle stated by the Prophet, that "the seeker of gain is the friend of God." Some also are permitted to marry, just as among the Sikh fakirs of Nanuk those named Beshara (with the law), or Salik (travellers), are allowed to marry and to move about; those named Beshara (without the law), or Majzub (the abstracted), are condemned to celibacy and seclusion. But their lives are mainly directed to the production in themselves of the ecstatic state in which the soul enters the Alem-i-misal, or world of dreams, and becomes one with God. This part of Sofism strongly resembles Vedantism. Keif, or quiescence, is often caused by the use of hashish (the Arabic khoshkhosh, sold at Constantinople in pastilles called *esrar*), or by khalwet, retirement, and the erba'cin, or fast for 40 days. Then they indulge in excessive and rapid repetitions of particular phrases, as the Esami Ilahi, or seven attributes of God, viz.—La ilaha ill' Allah (no God but Allah), Ya Allah (O God), Ya Hoo (O Him), Ya Hakk (O just God), Ya Hay (O living God), Ya Kayyoum (O living God), Ya Kahhar (O revenging God). The Zikr consists mainly in a chant, always becoming louder and more violent, of the first attribute; thus—

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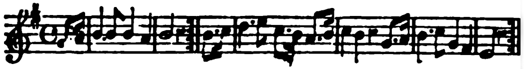
[1] This jealousy was not without foundation. The great political factions which disturbed Constantinople, the Reds, the Whites, the Masked, the Intimates, the Interpreters, the Hashashins (from Hashish, whence assassins), were to some extent connected with the dervish orders. The Kalenderis, founded by an Andalusian dervish who was expelled from the Bektashis, furnished several pretenders to the title of Mehdee, the 12th imam, whose second coming is looked for by all the mystics.

[2] The subsequent stages are Tarikat, mystical rites, Mearifat, knowledge, and Hakikat, truth.



This leads to the Devr, or rotation, in which the Rufai, or Howling Dervishes, stand in a circle, shoulder to shoulder, each on his right foot, and swaying the body and the left leg backwards and forwards or from side to side; the Sem'a of the Mevlevis, or Spinning Dervishes, in which a pirouette is performed all round the khaneh on the left heel, the eyes being closed, the arms outstretched; and other more violent dances, accompanied by the music of the nay, or flute, and tambourine, and by the cries of the dancers. In the Halet, or final ecstasy, the dervishes take hold of red-hot implements, place glowing charcoal in the mouth, and exhibit prodigies of muscular strength, which are in some cases the genuine and interesting effects of excitement, in others mere calculated imposture. At last the Jezbed, or attraction of God, begins to operate. Besides daily readings from the Koran, an infinity of small figurative prayers, or terjumans, is repeated. These are connected with the khirka, the palenk, the postaki, or seat, the seggadeh, or carpet, and with almost every act and motion of the dervish within the monastery. A rabouta, or silent prayer, is also practised. In return for these mystical rites the dervish obtains spiritual powers, of which the most remarkable is that called fascination, kuvveh iradat, the power of the will, which depends on certain physical conditions, and seems to include prophecy and the phenomena of mesmerism. By vifk, or the science of numbers, a charm, composed of the names of the matloob, or patient, and the arif, or knowing person (each letter of the alphabet has a numerical value), is placed on the knee of the latter, and by diligent blowing and mental concentration he is able to summon before him the spirit of the matloob. Some dervishes cure diseases, sell talismans, called tilsims and nushkas, charm snakes, and some are musicians and dancers. It is in Egypt and Hindustan that the extreme degrees of squalor, of imposture, and also of self-mortification are found. Some spend their lives in absolute nakedness, their bodies smeared with wood ash, their unkempt hair twisted into a turban; some roll head over heels for hundreds of miles; some contemplate the tip of the nose from 84 different postures; some live by the fraudulent sale of drugs or by feats of legerdemain. All Mahometan dervishes hold a powerful belief in the perpetual agency of the evlia, or saints, and the departed salihin (pure ones), the "unseen men or masters of destiny," who are sent forth from the kutb, or centre of the roof of the Kaaba, to control the spiritual affairs of the world. This closely connected with the doctrine of tenassuh, or meta psychosis, which, however, is held chiefly in a spirit sense. The Bektashis believe that every one has a mes or equal (doppel-gänger?), who watches over him from t unseen region.

For an account of dervishes in Persia, where mysticism h been refined by the poetry of Jelaleddin, Saadi, and Hafiz, a where the seven original orders of Hulullieh, Ittihadieh, Vusoolie Ashkieh, Telkinieh, Zurikieh, Wahdettieh, are still preserved, s Malcolm's *History of Persia*, and De Gobineau's *Three Years in As* 1859; for Central Asia, the works of Vambéry and other traveller for Hindustan, *The Peoples of India*, by Kaye and Watson, 186 72, and Steel's *Hindu Castes*. For Egypt, where four orders a presided over by the Sheikh el Bekri, and where the ceremony the Doseh, or the mounted sheikh riding over the bodies of t dervishes, is still practised, see Lane's *Modern Egyptians*; and f the general subject, *The Dervishes, or Oriental Spiritualism*, by J. Brown, Constantinople, 1868, which contains a number of val able translations of Dervish MSS. (W. C. S.)

DESAIX DE VOYGOUX, Louis Charles Antoin (1768–1800), one of the most eminent generals of th French republic, was born at the Chateau d'Ayat, nea Riom, in Auvergne, on the 17th August 1768. He studie at the military school founded by the Marshal d'Effiat, a distinguished himself by his eagerness in acquiring a kno- ledge of his chosen profession. After joining the army spent some time in garrison at Briançon and Huninge He was favourable to the Revolution, but was an object suspicion to the Convention, on account of his aristocra birth and his popularity with his men. He was twice pended, and on the earlier occasion he was imprisoned for months by order of Carnot. The first engagement in wh he took part was the battle of Lauterburg, in which he wounded; and when Moreau executed his masterly ret through the Black Forest, Desaix contributed not a li to the success of that memorable exploit. After gallant achievements, such as the repulse of the Archd Charles at Rastadt, and the defence of the bridge of K he accompanied Bonaparte (1798–9) to Egypt, whe dispersed the Arabs, and for his various services was commander of Upper Egypt. The campaign of months in which he completed the conquest of U Egypt was the great achievement of his military ca During his occupation he conducted himself in such a w as to win from the inhabitants the title of the Just Su and to be compared by his soldiers to Bayard. On h return to Europe he found Napoleon marching to the con quest of Italy. With a small squadron he hastened to jo the first consul, whom he overtook at Marengo at the ver moment when the Austrians had deemed themselves secu of the victory. His timely arrival changed the fortune o the day; but in the moment of victory he was shot throug the heart and immediately expired, 14th June 1800. His body was embalmed at Milan, and finally deposited in th convent of Mount St Bernard, where a handsome monumen is erected to his memory.

DESAUGIERS, Marc Antoine Madeleine (1772–1827), a French dramatist and song-writer, son of Marc Antoine Desaugiers, a musical composer, was born at Fréjus on the 17th November 1772. Being intended for the church, he studied at the Mazarin College in Paris, where he had for one of his teachers the celebrated critic Geoffroy. He did not continue his studies long, however, having shown signs of a decided dramatic talent, which his father thought it well to encourage. Ere he completed his twentieth year he had written a comedy in verse in one act, which was well received when produced on the stage in 1792. In the following year he wrote some verses which appeared in the *Almanach des Muses*. During the stormy period of the Revolution he emigrated to St Domingo with a sister who was about to marry a creole planter. He found that he had only escaped one danger for another equally great. During the negro revolt he was made prisoner, and barely escaped with his life. He took refuge in the United States, where he supported himself by teaching the piano. In 1797 he returned to his native country, and at once commenced to write for the stage. He was successful from the first, and in a very few years he became famous as a writer of comedies, operas, and vaudevilles, which were produced in rapid succession at the Théâtre des Variétés and the Vaudeville. During the same period he acquired a reputation of a still higher kind as a writer of convivial and satirical songs, which, though different in character, can only worthily be compared with those of Béranger. His singing of his own songs made his society eagerly sought for in many of the salons of Paris. In 1815 Desaugiers succeeded Barré as manager of the Vaudeville, and he was prosperous for some years, though not in all respects well-fitted for the position. In 1820, however, the opposition of the Gymnase proved too strong for him, and he resigned. Five years later he allowed himself to be persuaded to resume the position, but he had scarcely done so when he fell into bad health. He died in Paris of the result of an operation for stone on the 9th August 1827.

An edition of Desaugier's *Chansons et poésies diverses* appeared in three volumes in 1827. It contains a notice of his life by Brazier. See also Saint Beuve's *Portraits Contemporains.*

DESAULT, Pierre Joseph (1744–95), a distinguished French anatomist and surgeon, was born at Magny-Vernais, a village of Franche-Compté, in 1744. He was descended of humble parents, and received the early part of his education in a school of the Jesuits, being destined for the church. His own inclination, however, tended to the study of medicine; and, after learning something from the barber-surgeon of his native village, he was at length settled as an apprentice in the military hospital of Belfort. Here he acquired some knowledge of anatomy and military surgery; and, having previously made considerable progress in mathematical studies, he applied this knowledge, after the example of Borelli and others, to the investigation of physiological subjects. He early translated Borelli's *De Motu Animalium*, and added notes and illustrations, which, although founded on wrong principles, gave undeniable proofs of zeal and industry.

He went to Paris when about twenty years of age, and opened a school of anatomy in the winter of 1766, which was soon attended by about 300 pupils, a great proportion of whom were older than himself. His success excited the jealousy of the established teachers and professors, who, although he was patronized and protected by some surgeons of great eminence, would have obliged him to renounce public teaching, had he not resorted to the expedient of adopting the name of another as a sanction to his proceedings. In 1776 he was admitted a member of the corporation of surgeons; and so limited were his finances at this time, that he was allowed to pay his fees at his own convenience. He successively held the positions of honour in the corporation and academy of surgery; and in 1782 he was appointed surgeon-major to the hospital *De la Charité.*

Desault was now regarded as one of the first surgeons of Paris. He succeeded to the next vacancy at the Hôtel Dieu; and, after the death of Moreau, almost the whole surgical department of that hospital was intrusted to him. He instituted a clinical school of surgery there on a liberal and extensive plan, which attracted a great concourse of students, not only from every part of France, but also from other countries. He frequently had an audience of about 600; and most of the surgeons of the French army derived their knowledge from his lectures. He introduced many improvements into the practice of surgery, as well as in the construction of various surgical instruments.

In 1791 he published a work entitled *Journal de Chirurgerie*, edited by his pupils, which was a record of the most interesting cases that had occurred in his clinical school, with the remarks which he had made upon them in the course of his lectures. But in the midst of his valuable labours he became obnoxious to some of the Revolutionists, and he was, on some frivolous charge, denounced to the popular sections. After being twice examined, he was seized on the 28th May 1793, while delivering a lecture, carried away from his theatre, and committed to the prison of the Luxembourg. In three days, however, he was liberated, and permitted to resume his functions. When the school of health was established, he was appointed clinical professor for external maladies; and it was through his means that the Evêché was converted into an hospital for surgical operations. He died on the 1st June 1795 of an ataxic fever, which he had caught two days previously while attending the dauphin in the Temple. An opinion was prevalent among the populace that he was poisoned because he had refused to do anything against the dauphin's life. The autopsy which was held went to disprove the story, but it shows the opinion the public entertained of Desault's integrity. A pension was settled on his widow by the republic. The only work of which he is the sole author is entitled *Traité des Maladies Chirurgicales, et des Opérations qui leur conviennent*, in 2 vols. 8vo.

See Petit's *Éloge de Desault* (Lyons, 1795).

DESCARTES, René, was born at La Haye, in Touraine, on the 31st of March 1596, and died at Stockholm on the 11th of February 1650. The small town of La Haye lies on the right bank of the Creuse, about midway between Tours and Poitiers. The house is still shown where he was born, and a *métairie* about three miles off still retains the name of Les Cartes. His family on both sides was of Poitevin descent, and had its head-quarters in the neighbouring town of Châtellerault, where his grandfather had been a physician. Joachim Descartes, his father, having purchased a commission as counsellor in the Parlement of Rennes, introduced the family into that demi-noblesse of the robe, which, in stately isolation between the bourgeoisie and the high nobility, maintained a lofty rank in the hierarchy of France. For the one half of each year required for residence the elder Descartes removed with his wife, Jeanne Brochard, to Rennes. Three children, all of whom first saw the light at La Haye, sprung from the union—a son who afterwards succeeded to his father in the Parlement, a daughter who married a M. du Crevis, and a second son René. His mother, who had been ailing beforehand, never recovered from her third confinement; and the motherless infant was entrusted to a nurse, whose care Descartes in after years remembered by a small pension.

Descartes, who in the family circle was known as Du Perron, from a small estate destined for his inheritance, soon showed, say the chroniclers, an inquisitive mind, which made his father style him his philosopher. He was sent off at the age of eight to the school of La Flèche, which Henry IV. had lately founded and endowed for the Jesuits, and there he continued from 1604 to 1612. Of the education there given, of the equality maintained among the pupils, and of their free intercourse, Descartes at a later period spoke in terms of high praise.[1] He himself enjoyed exceptional privileges; his feeble health excused him from the morning duties, and thus early he acquired the habit of matutinal reflection in bed, which clung to him through-his life. Even then he had begun to distrust the authority of tradition and his teachers.

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[1] Œuvres (ed. Cousin), viii. 546.

Two years before he left school he was selected as one of the twenty-four gentlemen who went forth to receive the heart of the murdered king as it was borne to its resting-place at La Flèche. At the age of sixteen he went home to his father, who was now settled at Rennes, and had taken a second wife from Brittany. During the winter of 1612 he completed his preparations for the world by lessons in horsemanship and fencing; and then in the spring of 1613, he started as his own master to taste the pleasures of Parisian life. Fortunately the spirit of dissipation does not seem to have carried him any perilous lengths; the worst we hear of is a passion for gaming. Here, too, he made the acquaintance of Claude Mydorge, one of the foremost mathematicians of France, and renewed an early intimacy with Marin Mersenne, an old fellow-student, senior by some years, at La Flèche, and now become Father Mersenne, of the order of Minim Friars. The withdrawal of the latter in 1614 to a post in the provinces was the signal for Descartes to abandon social life and shut himself up for nearly two years in a secluded house of the Faubourg St Germain. Accident, however, betrayed the secret of his retirement; he was compelled to leave his mathematical investigations, and to take part in entertainments, where the only thing that chimed in with his theorizing reveries was the music. The scenes of horror and intrigue which marked the struggle for supremacy between the various leaders who aimed at guiding the politics of France made Paris no fit place for a student, and held out little honourable prospect for a soldier. Accordingly, in May 1617, Descartes, now twenty-one years of age, set out for the Netherlands and took service in the army of Prince Maurice of Orange, one of the greatest generals of the age, who had been engaged for some time in a war with the Spanish forces in Belgium. At Breda he enlisted as a volunteer, and the first and only pay which he accepted he kept as a curiosity through life. There was a lull in the war; and the Netherlands were distracted by the quarrels of Gomarists and Arminians. During the leisure thus arising, Descartes one day, as he roved through Breda, had his attention drawn to a placard in the Dutch tongue; and as the language, of which he never became perfectly master, was then strange to him, he asked a bystander to interpret it into either French or Latin. The stranger, who happened to be Isaac Beeckman, principal of the college of Dort, offered with some surprise to do so into Latin, if the inquirer would bring him a solution of the problem,—for the advertisement was one of those challenges which the mathematicians of the age, in the spirit of the tournaments of chivalry, were accustomed to throw down to all comers, daring them to discover a geometrical mystery known as they fancied to themselves alone. Descartes promised and fulfilled; and a friendship grew up between him and Beeckman—broken only by the literary dishonesty of the latter, who in later years took credit for the novelty contained in a small essay on music (*Compendium Musicæ*) which Descartes wrote at this period and intrusted to Beeckman.[1]

After thus spending two years in Holland as a soldier in a period of peace, Descartes, in July 1619, attracted by the news of the impending struggle between the house of Austria and the Protestant princes, consequent upon the election of the palatine of the Rhine to the kingdom of Bohemia, set out for Upper Germany, and volunteered into the Bavarian service. The winter of 1619, spent in quarters at Neuburg on the Danube, was the critica period in his life. Here, in his warm room (*dans u poêle*), he indulged those meditations which afterward led to the *Discourse of Method*. It was here that on the eve of St Martin's day, he "was filled wit enthusiasm, and discovered the foundations of a marvellous science." He retired to rest with anxious thought of his future career, which haunted him through the night in three dreams, that left a deep impression on his mind. "Next day," he continues,[2] "I began to understand the first principles of my marvellous discovery." The date of his philosophical conversion is thus fixed to a day. But the light was as yet dim; he had only glimpses of a method which should invigorate the syllogism by the co-operation of ancient geometry and modern algebra. For during the year that elapsed before he left Swabia (and whilst he sojourned at Neuburg and Ulm), and amidst his geometrical studies, he would fain have gathered some knowledge of the mystical wisdom attributed to the Rosicrucians; but the Invisibles, as they called themselves, kept their secret, and he found them not. His restlessness of spirit is well shown by a vow (which he himself records with the date of September 23, 1620), to make a pilgrimage to Loretto—"if possible, on foot from Venice; if not, in the most devout manner he could."[3] Soon after the Bavarian troops were ordered into active service. He was present at the battle of Prague, where the hopes of the elector palatine were blasted (9th November 1620), passed the winter with the army in Southern Bohemia, and next year served under Count Boucquoi in Hungary. On the death of this general Descartes quitted the imperial service, and in July 1621 began a peaceful tour through Moravia, the borders of Poland, Pomerania, Brandenburg, Holstein, and Friesland, from which he re-appeared in February 1622 in Belgium, and betook himself directly to his father's home in Brittany. The sole incident recorded of this excursion is his danger, when crossing in a small boat to Dutch Friesland, from the cupidity of the crew, who had taken him for a rich merchant, but at once abandoned their murderous designs when they saw him rise with drawn sword, in all the dignity of a French gentleman.

At Rennes, where the young family of his stepmother was growing up, Descartes probably found little to interest him; and, after he had visited the maternal estate which his father now put him in possession of, he took the opportunity of running up to Paris, where he found the Rosicrucians the topic of the hour, and heard himself credited with partnership in their secrets. A short visit to Brittany enabled him, with his father's consent, to arrange for the sale of his property in Poitou. The proceeds were invested in such a way at Paris as to bring him in a yearly income of between 6000 and 7000 francs, a sum probably equal to more than £500 at the present day. Towards the end of the year Descartes was on his way to Italy. The natural phenomena of Switzerland, and the political complications in the Valtellina, where the Catholic inhabitants had thrown off the yoke of the Grisons and called in the Papal and Spanish troops to their assistance, delayed him some time; but he reached Venice in time to see the ceremony of the doge's wedlock with the Adriatic. After paying his vows at Loretto, he came to Rome, which was then on the eve of a year of jubilee—an occasion which Descartes seized to observe the variety of men and manners which the city then embraced within its walls. In the spring of 1625 he returned home by Mount Cenis, observing the avalanches,[4] instead of, as his relatives hoped, securing a post in the French army in Piedmont.

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[1] It was only published after the author's death; and of it, besides the French version, there exists an English translation "by a Person of Quality."

[2] Œuvres Inédits, i. 8. [3] Œuvres Inédits, i. 12. [4] Œuvres, v. 255.

For an instant Descartes seems to have concurred in the plan of purchasing a post at Châtellerault, but easily gave up the idea, and settled in Paris (June 1625), in the quarter where he had sought seclusion before. By this time he had ceased to devote himself to pure mathematics, and in company with his friends Mersenne and Mydorge was deeply interested in the theory of the refraction of light, and in the practical work of grinding glasses of the best shape suitable for optical instruments. But all the while his aim was fixed on something beyond either mathematics or physics; he was engaged with reflections on the nature of man, of the soul, and of God; and it need cause no surprise that Descartes for a while remained invisible even to his most familiar friends. But their importunity made a hermitage in Paris impossible; and a graceless friend surprised the philosopher in bed at 11 o'clock in the morning meditating on some problem, and occasionally taking notes. In disgust at the apparent hopelessness of the position for a student, Descartes started for the west to take part in the siege of La Rochelle, and entered the famine-stricken city with the victorious troops on the 30th October 1628. A meeting at which he was present after his return to Paris decided his vocation. He had expressed an opinion that the true art of memory was not to be gained by technical devices, but by a philosophical apprehension of things; and the Cardinal de Berulle, the founder of the Congregation of the Oratory, was so struck by the tone of the remarks as to impress upon the speaker the duty of spending his life in the examination of truth. Descartes accepted the philosophic mission. In the end of 1628 he left Paris, and in the spring of 1629 he settled in Holland. His financial affairs he had intrusted to the care of the Abbé Picot, and as his literary and scientific representative he adopted Père Mersenne.

Between the ages of thirty-three and fifty-three (1629–1649) Descartes lived almost entirely in Holland. Thrice only did he revisit France during that period—in 1644, 1647, and 1648. The first of these occasions was in order to settle family affairs after the death of his father in 1640. The eldest brother seems to have been disposed to take all he could, and to have expected the philosopher to be yielding in money matters. So little notice did the family think it necessary to take of a brother who had sunk to the level of literature, that a letter of René to his father, affectionately excusing his long absence, reached Rennes only after that father was lying in the tomb. The second brief visit, in 1647, partly on literary, partly on family business, was signalized by the award of a pension of 3000 francs, obtained from the royal bounty by Cardinal Mazarin in consideration of the advantages which Descartes's investigations conferred upon mankind, and to aid him in continuing his experiments. The pension was punctually paid. The last visit in 1648 was less fortunate. A royal order summoned him to France for new honours—an additional pension and a permanent post—for his fame had by this time gone abroad, and it was the age when princes sought to attract genius and learning to their courts. But when Descartes arrived, he found Paris rent asunder by the civil war of the Fronde. He paid the costs of his royal parchment, and left for his Dutch home without a word of reproach. The only other occasions on which he was out of the Netherlands were in 1630, when he made a flying visit to England to observe for himself some alleged magnetic phenomena, and in 1634, when he took an excursion to Denmark.

During his residence in Holland he lived at thirteen different places, and changed his abode twenty-four times. In the choice of these spots two motives seem to have influenced him—the neighbourhood of a university or college, and the amenities of the situation. Franeker, one of the neatest towns in Friesland, was the seat of a university founded in 1585; Harderwyk contained a venerable gymnasium, of some note in the physical sciences and theology; Deventer possessed a seminary still well endowed, but less famous than it had been in the days of Erasmus;[1] Utrecht acquired a university so late as 1634; and Leyden had a notable one founded in 1575. Amersfoort, where he also lived, seems to be connected with a love affair,—the only one in his life; at least it was there that his daughter Francine died in 1640, at the age of five. Amsterdam, where he often lodged, Leeuwarden in Friesland, and Dort were also residences. He once settled near Utrecht, as well as in the town; but the three spots which seem to have been most attractive were—Endegeest, a country house more than a mile north-west of Leyden, of which Sorbière has given a pleasing description in one of his letters, and the two villages of Egmond op den Hoef and Egmond the Abbey, situated between Zaandam and the ocean, in one of the prettiest localities of North Holland.

The time thus spent seems to have been on the whole happy, even allowing for some warm discussions with the mathematicians and metaphysicians of France, and for some harassing controversies in the Netherlands. Friendly agents—chiefly Catholic priests—were the intermediaries who forwarded from Dort, Haarlem, Amsterdam, and Leyden his correspondence to his proper address, which he wished kept completely secret; and Father Mersenne was only too willing to send him loads of objections and questions. During the first twenty years of his life his health had been weak[2] and his complexion pale. After that time the disease in his frame seems to have worked itself off, not without some effervescence. This is the period of his camp life (due, as he himself says, to "heat in the liver"),[3] of his wanderings, enthusiasm, dreams, and vows. With his thirtieth year this struggle seems at an end; his health seems established; and the washed-out vermilion of his prime gives place to a dark olive complexion in his riper manhood. It is touching to hear his delight in the freedom from intruders. "I sleep here ten hours every night," he writes from Amsterdam, "and no care ever shortens my slumber." "I take my walk every day through the confusion of a great multitude with as much freedom and quiet as you could find in your rural avenues."[4] At his first coming to Franeker he arranged to get a cook acquainted with French cookery; but, to prevent misunderstanding, it may be added that his diet was mainly vegetarian, and that he rarely drank wine. New friends gathered round him who took a keen interest in his researches. Once only do we find him taking an interest in the affairs of his neighbours,—to ask pardon from the Government for a homicide.[5] He continued the profession of his religion. Sometimes from curiosity he went to the ministrations of anabaptists,[6] to hear the ranting of peasants and artisans. He carried few books to Holland with him, but a Bible and the *Summa* of Thomas Aquinas were amongst them.[7] One of the recommendations of Egmond the Abbey was the free exercise there allowed to the Catholic religion. At Franeker his house was a small château, "separated by a moat from the rest of the town, where the mass could be said in safety."[8] And one motive in favour of accepting an invitation to England lay in the alleged leanings of Charles I. to the older church.

The best account of Descartes's mental history during his life in Holland is contained in his letters, which extend over the whole period, and are particularly frequent in the latter half. The majority of them are addressed to Mersenne, and deal with problems of physics and musical theory (in which he took a special interest). Mathematical subjects are a common topic. Several letters between 1643 and 1649 are addressed to the Princess Elizabeth, the eldest daughter of the ejected elector palatine, who lived at the Hague, where her mother maintained the semblance of a royal court. The princess was obliged to quit Holland, but kept up a philosophical correspondence with Descartes. It is to her that the *Principles of Philosophy* were dedicated; and in her alone, according to Descartes, were united those generally separated talents for metaphysics and for mathematics which are so characteristically co-operative in the Cartesian system. Two Dutch friends, Zuylichem, the father of the more celebrated Huyghens, and Hoogheland, figure amongst the correspondents, not to mention various savants, professors, and churchmen (particularly Jesuits).

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[1] Œuvr. vi. 214.
[2] Œuvr. ix. 203.
[3] Œuvr. viii. 70.
[4] Œuvr. vi. 199.
[5] Œuvr. viii. 59.
[6] Œuvr. viii. 173.
[7] Œuvr. viii. 181.
[8] Œuvr. vi. 123.

His residence in the Netherlands fell on the most prosperous and brilliant days of the Dutch state, under the stadtholdership of Frederick Henry (1625–1647). Abroad its navigators monopolized the commerce of the world, and explored unknown seas; at home the Dutch school of painting reached its acme in Rembrandt (1607–1669); and the philological reputation of the country was sustained by Grotius, Vossius, and the elder Heinsius. And yet, though Rembrandt's Nightwatch is dated the very year after the publication of the *Meditations*, not a word in Descartes breathes of any work of art or historical learning. The contempt of æsthetics and erudition is characteristic of the most typical members of the Cartesian school, especially Malebranche. Though Descartes probably read more than some of his admirers supposed he was not in any strict sense a reader. His wisdom grew mainly out of his own reflections and experiments, calmly yet ceaselessly pursued. Of mere learning and scholarship he had no esteem. The story of his disgust, when he found that Queen Christina devoted some time every day to the study of Greek under the tuition of Vossius, is at least true in substance.[1] It gives no evidence of science, he remarks, to possess a tolerable knowledge of the Roman tongue, such as once was possessed by the populace of Rome.[2] In all his travels, and in the different places at which he settled, his interest seems untouched either by art or history; he looks only to the phenomena of nature and the actual aspects of human life. He was a spectator rather than an actor on the stage of the world. If he entered the army, it was merely because the position gave a vantage-ground from which to make his observations. In the political interests which these contests involved he took no part; his favourite disciple, the Princess Elizabeth, was the daughter of the banished king, against whom he had served in Bohemia; and Queen Christina, his second royal follower, was the daughter of Gustavus Adolphus.

In many ways Descartes is a type of that self-reliant, harsh, and abstract spirit of science to which erudition and all the heritage of the past seem but elegant and unworthy trifling. The science of Descartes was physics in all its branches, but especially as applied to physiology. Science, he says, may be compared to a tree; metaphysics is the root, physics is the trunk, and the three chief branches are mechanics, medicine, and morals,—the three applications of our knowledge to the outward world, to the human body, and to the conduct of life.[3]

Such then was the work, and such the ends, that Descartes had in view in Holland. His residence was generally divided into two parts—one his workshop for science, the other his reception-room for society.
are my books," hq is reported to have told a vis
pointed to the animals he had dissected. "I am
writes in 1630, "studying chemistry and
together; and every day I learn something whi
not find in books."[4] He is working har
book on refraction, and at the same time is
secting the heads of different animals in order
imagination and memory, which he considers ph
cesses.[5] It need not from this be supposed that
was a laborious student. "I can say with truth,"
to the Princess Elizabeth,[6] "that the principle wh
always observed in my studies, and which I b
helped me most to gain what knowledge I have,
never to spend beyond a very few hours daily in
which occupy the imagination, and a very few ho
in those which occupy the understanding, and to g
rest of my time to the relaxation of the senses and
of the mind." But his expectations from the st
tomy and physiology went a long way. "The co
of health," he writes in 1646, "has always been th
end of my studies."[7] In 1629 he asks Mersen
care of himself "till I find out if there is any
getting a medical theory based on infallible demo
which is what I am now inquiring."[8] And to
he writes in 1638,—[9] "I have never taken so
myself as at present; and whereas I used to
death could take from me only thirty or fort
most, it could not overtake me now without dep
of the hope of more than a century." And sim
seem to have been expressed by him to Sir Kene
who visited him in Holland. Astronomical i
connection with optics, meteorological pheno
in a word, the whole field of natural laws,
desire to explain them. His own observation
reports of Mersenne, furnished his data. O
demand for observation and collection of fact
imitator; and he wishes (in a letter of 1632) t
one would undertake to give a history of celestial
after the method of Bacon, and describe the sky
it appears at present, without introducing
hypothesis."[10]

He had several writings in hand during the
of his residence in Holland, but the main wo
period was a physical doctrine of the universe
termed *The World*. Shortly after his arrival h
Mersenne that it will probably be finished in
meanwhile asks him not to disclose the se
Parisian friends. Already anxieties appear
theological verdict upon two of his fundament
the infinitude of the universe, and the earth's rot
the sun.[11] But towards the end of year 163
him writing as follows:[12] "I had intended s
my *World* as a New Year's gift, and a fortnight
still minded to send you a fragment of the w
whole of it could not be transcribed in time.
just been at Leyden and Amsterdam to ask aft
cosmical system, as I imagined I had heard o
printed last year in Italy. I was told that it
printed, but that every copy had been at the
burnt at Rome, and that Galileo had been h
demned to some penalty." He has also seen
Galileo's condemnation at Liége (20th Septem
with the words—"Although he professes that
nican) theory was only adopted by him as a h
His friend Beeckman lent him a copy of Gal

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[1] Œuvr. x. 375.
[2] Œuvr. ix. 6.
[3] Œuvr. iii. 24.

[4] Œuvr. vi. 101.
[5] Œuvr. vi. 234.
[6] Œuvr. ix. 131
[7] Œuvr. ix. 341.
[8] Œuvr. vi. 89.
[9] Œuvr. vii. 412.
[10] Œu
[11] Œu
[12] Œu

which he glanced through in his usual manner with other men's books; he found it good, and "failing more in the points where it follows received opinions than where it diverges from them."[1] The consequence of these reports of the hostility of the church to the doctrine on which his theory reposed led him to abandon all thoughts of publishing. The *World* was consigned to his desk; and although doctrines in all essential respects the same constitute the physical portion of his *Principia*, it was not till after the death of Descartes that fragments of the work, including *Le Monde*, or a treatise on light, and the physiological tracts *L'Homme* and *La Formation du Fœtus*, were given to the world by Clerselier, in 1664. Descartes was not disposed to be a martyr; he had a sincere respect for the church and for authority, and had no wish to shock prejudices, or to begin an open conflict with established doctrines.

In 1636 Descartes had resolved to publish some specimens of the fruits of his method, and some general observations on its nature which, under an appearance of simplicity, might sow the good seed of more adequate ideas on the world and man. "I should be glad," he says, when talking of a publisher,[2] "if the whole book were printed in good type, on good paper, and I should like to have at least 200 copies for distribution. The book will contain four essays, all in French, with the general title of 'Project of a Universal science, capable of raising our nature to its highest perfection; also Dioptrics, Meteors, and Geometry, wherein the most curious matters which the author could select as a proof of the universal science which he proposes are explained in such a way that even the unlearned may understand them.'" The work appeared anonymously at Leyden (published by Jean Maire) in 1637, under the modest title of *Essais Philosophiques*; and the project of a universal science becomes the *Discours de la méthode pour bien conduire sa raison et chercher la verité dans les sciences*. In 1644 it appeared in a Latin version, revised by Descartes, as *Specimina Philosophica*. A work so widely circulated by the author naturally attracted attention, but in France it was principally the mathematicians who took it up, and their criticisms were more pungent than complimentary. Fermat, Roberval, and Desargues took exception in their various ways to the methods employed in the geometry, and to the demonstrations of the laws of refraction given in the Dioptrics and the Meteors. The dispute on the latter point between Fermat and Descartes was continued, even after the philosopher's death, as late as 1662. In the virgin soil of the youthful Dutch universities the effect of the Cartesian essays was greater.

The first public teacher of Cartesian views was Henri Renery, a Belgian, who at Deventer and afterwards at Utrecht had introduced the new philosophy which he had learned from personal intercourse with Descartes. Renery only survived five years at Utrecht; and it was reserved for Regius (Henri De Roy),—who in 1638 had been appointed to the new chair of botany and theoretical medicine at Utrecht, and who visited Descartes at Egmond in order more thoroughly to learn his views,—to throw down the gauntlet to the adherents of the old methods. With more eloquence and vigour than judgment or prudence, he propounded and defended theses bringing into prominent relief the points in which the new doctrines clashed with the old. The attack was opened by Gisbert Voët, foremost among the theological professors and clergy of Utrecht, a preacher of note and a stronghold of orthodoxy. In 1639 he published a series of arguments against atheism, in which the Cartesian views were not obscurely indicated as perilous for the faith, though no name was mentioned. Next year he persuaded the magistracy to issue an order forbidding Regius to travel beyond the received doctrine; for Regius, contrary to the advice of Descartes, had formulated his view of Cartesianism in the phrase that man was a unity merely by accident, and meddled in his lectures with topics not usually associated with a chair of medicine. The magisterial views seem to have prevailed in the professoriate, which formally in March 1642 expressed its disapprobation of the new and pretended philosophy as well as of its expositors. As yet Descartes was not directly attacked. Voët now issued, through the medium and under the name of Martin Schoock, one of his pupils, a pamphlet with the title of *Methodus novæ philosophiæ Renati Descartes*, in which atheism and infidelity were openly declared to be the effect of the new teaching. Descartes replied to Voët directly in a long and vigorous letter, published at Amsterdam in 1643. Yet notwithstanding, he was summoned before the magistrates of Utrecht to defend himself against charges of irreligion and slander. What might have happened we cannot tell; but Descartes threw himself on the protection of the French ambassador and the prince of Orange, and the city magistrates, from whom he vainly demanded satisfaction in a dignified letter,[3] were snubbed by their superiors. About the same time (April 1645) Schoock was summoned before the university of Groningen, of which he was a member, and forthwith disavowed the more abusive passages in his book. So did the effects of the *odium theologicum*, for the meanwhile at least, die away.

In the *Discourse of Method* Descartes had sketched the main points in his new views, with a mental autobiography which might explain their origin, and with some suggestions as to their applications. His second great work, *Meditations on the First Philosophy*, which had been begun soon after his settlement in the Netherlands, expounded in more detail the foundations of his system, laying especial emphasis on the priority of mind to body, and on the absolute and ultimate dependence of mind as well as body on the existence of God. In 1640 a copy of the work in manuscript was despatched to Paris, and Mersenne was requested to lay it before as many thinkers and scholars as he deemed desirable, with a view to getting their views upon its argument and doctrine. Mersenne was not slack in submitting the work to criticism, and Descartes soon had a formidable list of objections to reply to. Accordingly, when the work was published at Paris in August 1641, under the title of *Meditationes de prima philosophia ubi de Dei existentia et Animæ immortalitate* (though it was in fact not the *immortality*, but the *immateriality* of the mind, or, as the second edition described it, *animæ humanæ a corpore distinctio*, which was maintained), the title went on to describe the larger part of the book as containing various objections of learned men, with the replies of the author. These objections in the first edition are arranged under six heads:—the first came from Caterus, a theologian of Louvain; the second and sixth are anonymous criticisms from various hands; whilst the third, fourth, and fifth belong respectively to Hobbes, Arnauld, and Gassendi. In the second edition appeared the seventh—objections from Père Bourdin, a Jesuit teacher of mathematics in Paris; and subsequently another set of objections known as those of *Hyperaspistes*, was included in the collection of Descartes's letters. The anonymous objections are very much the statement of common sense against philosophy; those of Caterus criticise the Cartesian argument from the traditional theology of the church; those of Arnauld are an appreciative inquiry into the bearings and consequences of the meditations for religion and morality; while those of Hobbes and Gassendi—both somewhat senior to Descartes and with a dogmatic system of their own already formed—are a keen assault upon the spiritualism of the Cartesian position from a generally "sensational" stand-point. The criticisms of the last two are the criticisms of a hostile school of thought; those of Arnauld are the difficulties of a possible disciple.

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[1] Œuvr vi. 248.

[2] Œuvr. vi. 276.

[3] Œuvr. ix. 250.

In 1644 the third great work of Descartes, the *Principia Philosophiæ*, appeared at Amsterdam. Passing briefly over the conclusions arrived at in the *Meditations*, it deals in its second, third, and fourth parts with the general principles of physical science, especially the laws of motion, with the theory of vortices, and with the phenomena of heat, light, gravity, magnetism, electricity, &c., upon the earth. This work exhibits some curious marks of caution. Undoubtedly, says Descartes, the world was in the beginning created in all its perfection. "But yet as it is best, if we wish to understand the nature of plants or of men, to consider how they may by degrees proceed from seeds, rather than how they were created by God in the beginning of the world, so, if we can excogitate some extremely simple and comprehensible principles, out of which, as if they were seeds, we can prove that stars, and earth, and all this visible scene could have originated, although we know full well that they never did originate in such a way, we shall in that way expound their nature far better than if we merely described them as they exist at present."[1] The Copernican theory is rejected in name, but retained in substance. The earth, or other planet, does not actually move round the sun; yet it is carried round the sun in the subtle matter of the great vortex, where it lies in equilibrium,—carried like the passenger in a boat, who may cross the sea and yet not rise from his berth.

In 1647 the difficulties that had arisen at Utrecht were repeated on a smaller scale at Leyden. There the Cartesian innovations had found a patron in Adrian Heerebord, and were openly discussed in theses and lectures. The theological professors took the alarm at passages in the *Meditations*; an attempt to prove the existence of God savoured, as they thought, of atheism and heresy. When Descartes complained to the authorities of this unfair treatment,[2] the only reply was an order by which all mention of the name of Cartesianism, whether favourable or adverse, was forbidden in the university. This was scarcely what Descartes wanted, and again he had to apply to the prince of Orange, whereupon the theologians were asked to behave with civility, and the name of Descartes was no longer proscribed. But other annoyances were not wanting from unfaithful disciples and unsympathetic critics. The *Instantiæ* of Gassendi appeared at Amsterdam in 1644 as a reply to the reply which Descartes had published of his previous objections; and the publication by Regius of his work on Physical Philosophy gave the world to understand that he had ceased to be a thorough adherent of the philosophy which he had so enthusiastically adopted.

It was about 1648 that Descartes lost his friends Mersenne and Mydorge by death. The place of Mersenne as his Parisian representative was in the main taken by Claude Clerselier (the French translator of the Objections and Responses), whom he had become acquainted with in Paris. Through Clerselier he came to know Pierre Chanut, who in 1645 was sent as French ambassador to the court of Sweden. Queen Christina, the daughter of the great Gustavus, was not yet twenty, and took a lively, if a somewhat whimsical interest in literary and philosophical culture. Through Chanut, with whom she was on terms of familiarity, she came to hear of Descartes, and a c spondence which the latter nominally carried on with ambassador was in reality intended for the eyes of queen. The correspondence took an ethical tone. It b with a long letter on Love in all its aspects (Feb 1647),[3] a topic suggested by Chanut, who had been di sing it with the queen; and this was soon followe another to Christina herself on the Chief Good. An on the Passions of the Mind (*Passions de l'Âme*), w had been written originally for the Princess Elizabe development of some ethical views suggested by the *Vita Beata* of Seneca, was inclosed at the same time Chanut. It was a draft of the work published in 16 under the same title. Philosophy, particularly that Descartes, was becoming a fashionable *divertissement* the queen and her courtiers, and it was felt that presence of the sage himself was necessary to complete good work of education. An invitation to the Swed court was urged upon Descartes, and after much hesitat accepted; a vessel of the royal navy was ordered to w upon him, and in September 1649 he left Egmond the north.

The position on which he entered at Stockholm was c tainly no sinecure, and utterly unsuited for a man who h always tried to be his own master. The young queen, f of plans and energy, wanted Descartes to draw up a co for a proposed academy of the sciences, and to give her hour of philosophic instruction every morning at five. A in order to tie him down to the country she had alrea determined to create him a noble, and begun to look out estate in the lately annexed possessions of Sweden on t Pomeranian coast. But these things were not to be. H friend Chanut fell dangerously ill; and Descartes, who d voted himself to attend in the sick-room, was obliged t issue from it every morning in the chill northern air o January, and spend an hour in the palace library. Th ambassador recovered, but Descartes fell a victim to th same disease—an inflammation of the lungs. The las time he saw the queen was on the 1st of February 1650, when he handed to her the statutes he had drawn up for the proposed academy. Ten days after he was dead. The queen, in her first grief and enthusiasm, would have liked to bury him grandly at the feet of the Swedish kings, and to raise a costly mausoleum in his honour; but these pla were overruled, and a plain monument in the Catholi cemetery was all that marked the place of his rest. Sixtee years after his death the French treasurer D'Alibert mad arrangements for the conveyance of the ashes to his nativ land; and in 1667 they were interred in the church of St Geneviève du Mont, the modern Pantheon. In 1819, afte being temporarily deposited in a stone sarcophagus in th court of the Louvre during the Revolutionary epoch, the were transferred to St Germain-des-Près, where they no repose between Montfaucon and Mabillon. A monumen was raised to his memory at Stockholm by Gustavus III. and some years ago a statue was erected to him at Tour with the inscription *Je pense, donc je suis* on the pedestal.

Descartes was never married, and probably had little o the amorous in his temperament. He has alluded to a childish fancy for a young girl with a slight obliquity o vision; but he only mentions it *à propos* of the consequen weakness which led him to associate such a defect wit beauty.[4] Mythical rumours represent him as telling a bel that he found no beauty comparable to the beauty of truth In person he was a little man, with large head, projecting brow, prominent nose, and eyes wide apart, with black hai coming down almost to his eyebrows. His voice was feeble He usually dressed in black, with unobtrusive propriety.

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[1] Princip. L. iii. S. 46.

[2] Œuvr. x. 26.

[3] Œuvr. x. 3.

[4] Œuvr. x. 52.

The end of all study, says Descartes in one of his earliest writings, ought to be to guide the mind to form true and sound judgments on every thing that may be presented to it.[1] The sciences in their totality are but the intelligence of man; and all the details of knowledge have no value save as they strengthen the understanding. The mind is not for the sake of knowledge, but knowledge for the sake of the mind. This is the re-assertion of a principle which the Middle Ages had lost sight of—that knowledge, if it is to have any value, must be intelligence, and not erudition.

But how is intelligence, as opposed to erudition, possible? The answer to that question is the method of Descartes. That idea of a method grew up with his study of geometry and arithmetic,—the only branches of knowledge which he would allow to be "made sciences," those which the Jesuits best taught, and which he himself cultivated most zealously in early life. But they did not satisfy his demand for intelligence. "I found in them," he says, "different propositions on numbers of which, after a calculation, I perceived the truth; as for the figures, I had, so to speak, many truths put before my eyes, and many others concluded from them by analogy; but it did not seem to me that they told my mind with sufficient clearness why the things were as I was shown, and by what means their discovery was attained."[2] The mathematics of which he thus speaks included the geometry of the ancients, as it had been handed down to the modern world, and arithmetic with the developments it had received in the direction of algebra. The ancient geometry, as we know it, is a wonderful monument of ingenuity—a series of *tours de force*, in which each problem to all appearance stands alone, and, if solved, is solved by methods and principles peculiar to itself. Here and there particular curves, for example, had been obliged to yield the secret of their tangent; but the ancient geometers apparently had no consciousness of the general bearings of the methods which they so successfully applied. Each problem was something unique; the elements of transition from one to another were wanting; and the next step which mathematics had to make was to find some method of reducing, for instance, all curves to a common notation. When that was found, the solution of one problem would immediately entail the solution of all others which belonged to the same series as itself.

The arithmetical half of mathematics, which had been gradually growing into algebra, and had decidedly established itself as such in the *Logistica Speciosa* of Vieta (1540–1603), supplied to some extent the means of generalizing geometry. And the algebraists or arithmeticians of the 16th century, such as Lucas de Borgo, Cardan, and Tartaglia, had used geometrical constructions to throw light on the solution of particular equations. But progress was made difficult, in consequence of the clumsy and irregular nomenclature employed. With Descartes the use of exponents as now employed for denoting the powers of a quantity becomes systematic; and without some such step by which the homogeneity of successive powers is at once recognized, the binomial theorem could scarcely have been detected. The restriction of the early letters of the alphabet to known, and of the late letters to unknown quantities is also his work. In this and other details he crowns and completes, in a form henceforth to be dominant for the language of algebra, the work of numerous obscure predecessors, such as Étienne de la Roche, Stiefel, and others.

Having thus perfected the instrument, his next step was to apply it in such a way as to bring uniformity of method into the isolated and independent operations of geometry. "I had no intention," he says in the *Method*,[3] "of attempting to master all the particular sciences commonly called mathematics; but as I observed that, with all differences in their objects, they agreed in considering merely the various relations or proportions subsisting among these objects, I thought it best for my purpose to consider these relations in the most general form possible, without referring them to any objects in particular except such as would most facilitate the knowledge of them. Perceiving further, that in order to understand these relations I should sometimes have to consider them one by one, and sometimes only to bear them in mind or embrace them in the aggregate, I thought that, in order the better to consider them individually, I should view them as subsisting between straight lines, than which I could find no objects more simple, or capable of being more distinctly represented to my imagination and senses; and on the other hand that, in order to retain them in the memory or embrace an aggregate of many, I should express them by certain characters, the briefest possible." Such is the basis of the algebraical or modern analytical geometry. The problem of the curves is solved by their reduction to a problem of straight lines; and the locus of any point is determined by its distance from two given straight lines—the axes of co-ordinates. Thus Descartes gave to modern geometry that abstract and general character in which consists its superiority to the geometry of the ancients. In another question connected with this, the problem of drawing tangents to any curve, Descartes was drawn into a controversy with Fermat (1590–1663), Roberval (1602–1673), and Desargues (1593–1662). Fermat and Descartes agreed in regarding the tangent to a curve as a secant of that curve with the two points of intersection coinciding, while Roberval regarded it as the direction of the composite movement by which the curve can be described. Both these methods, differing from that now employed, are interesting as preliminary steps towards the method of fluxions and the differential calculus. In pure algebra Descartes expounded and illustrated the general methods of solving equations up to those of the fourth degree (and believed that his method could go beyond), stated the law which connects the positive and negative roots of an equation with the changes of sign in the consecutive terms, and introduced the method of indeterminate coefficients for the solution of equations.[4] Attempts have been recklessly made to claim some of these innovations for the English algebraists Oughtred and Harriot, and others for the mathematicians of the Continent; but such assertions are based upon no proof, and, if true, would only illustrate the genius of the man who could pick out from other works all that was productive, and state it with a lucidity which makes it look his own discovery.

The *Geometry* of Descartes, unlike the other parts of his essays, is not easy reading. It dashes at once into the middle of the subject with the examination of a problem which had baffled the ancients, and seems as if it were tossed at the heads of the French geometers as a challenge. An edition of it appeared subsequently, with notes by his friend De Beaune, calculated to smooth the difficulties of the work. All along mathematics was regarded by Descartes rather as the envelope than the foundation of his method; and the "universal mathematical science" which he sought after was only the prelude of a universal science of all-embracing character.[5]

The method of Descartes rests upon the proposition that all the objects of our knowledge fall into series, of which the members are more or less known by means of one

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[1] Regulæ, Œuvr. xi. 202.

[2] Œuvr. xi. 219.

[3] Disc. de Méthode, part ii.

[4] Geométrie, book iii.

[5] Œuvres, xi. 224

[illegible] in which the [illegible] one group [illegible] members of [illegible] may be [illegible] to the primi- [illegible] we recognise [illegible] is relative or [illegible] equivalent con- [illegible] must be clear [illegible] Having discovered [illegible] the groups we pro- [illegible] the other members [illegible] connection comes into [illegible] one term upon the [illegible] chain of intervening [illegible] so as to enunciate every [illegible] the connection that we may [illegible] the chain in one. In [illegible] bring the causal or primal [illegible] immediately together, [illegible] knowledge into one which is [illegible] Such are the four points of [illegible] Truth requires a clear and distinct [illegible] excluding all doubt; (2) the [illegible] naturally fall into series or groups; [illegible] investigation must begin with a [illegible] element, and pass from it to the [illegible] relative elements; (4) an exhaustive and [illegible] the relations and interconnection of [illegible] is necessary for knowledge in the fullest [illegible] word.[2]

[illegible] question," he says in anticipation of Locke [illegible] more important to solve than that of knowing [illegible] knowledge is and how far it extends." "This [illegible] question which ought to be asked at least once in their [illegible] all who seriously wish to gain wisdom. The [illegible] will find that the first thing to know is intellect, [illegible] on it depends the knowledge of all other things. [illegible] next what immediately follows the knowledge [illegible] intellect, he will pass in review all the other means [illegible] knowledge, and will find that they are two (or three), [illegible] imagination and the senses (and the memory). He will [illegible] devote all his care to examine and distinguish [illegible] three means of knowledge; and seeing that truth and [illegible] can, properly speaking, be only in the intellect, and that the two other modes of knowledge are only occasions, he will carefully avoid whatever can lead him astray."[3] This separation of intellect from sense, imagination, and memory is the cardinal precept of the Cartesian logic; it marks off clear and distinct (*i.e.*, adequate and vivid) from obscure, fragmentary, and incoherent conceptions.

The *Discourse of Method* and the *Meditations* apply what the *Rules for the Direction of the Mind* had regarded in particular instances to our conceptions of the world as a whole. They propose, that is, to find a simple and incomparable point, or absolute element, which gives to the world and thought their order and systematization. The grandeur of this attempt is perhaps unequalled in the annals of philosophy. The three main steps in the argument are the veracity of our thought when that thought is true to itself, the inevitable uprising of thought from its fragmentary aspects in our habitual consciousness to the infinite and perfect existence which God is, and the ultimate reduction of the material universe to extension and local movement. These are the central dogmas of logic, metaphysics, and physics, from which start the subsequent inquiries of Locke, Leibnitz, and Newton. They are also the direct antitheses to the scepticism of Montaigne an Pascal, to the materialism of Gassendi and Hobbes, and t the superstitious anthropomorphism which defaced the r awakening sciences of nature. Descartes laid down th lines on which modern philosophy and science were t build. But himself no trained metaphysician, and u susceptible to the lessons of history, he gives but fragment of a system which are held together, not by their intrins consistency, but by the vigour of his personal convictio transcending the weaknesses and collisions of his severa arguments. "All my opinions," he says, "are so conjoined and depend so closely upon one another, that it would b impossible to appropriate one without knowing them all."[4] Yet every disciple of Cartesianism seems to disprove th dictum by his example.

The very moment when we begin to think, say Descartes, when we cease to be merely receptive, when w draw back and fix our attention on any point whatever o our belief,—that moment doubt begins. If we even sto for an instant to ask ourselves how a word ought to b spelled, the deeper we ponder that one word by itself th more hopeless grows the hesitation. The doubts thu awakened must not be stifled, but pressed systematically on to the point, if such a point there be, where doubt confutes itself. The doubt as to the details is natural; it i no less natural to have recourse to authority to silence th doubt. The remedy proposed by Descartes is (while not neglecting our duties to others, ourselves, and God) to let doubt range unchecked through the whole fabric of ou customary convictions. One by one they refuse to render any reasonable account of themselves; each seems a mere chance, and the whole tends to elude us like a mirage which some malignant power creates for our illusion. Attacked in detail, they vanish one after another into as many teasing spectra of uncertainty. We are seeking from them what they cannot give. But when we have done our worst in unsettling them, we come to an ultimate point in the fact that it is we who are doubting, we who are thinking. We may doubt that we have hands or feet, that we sleep or wake, and that there is a world of material things around us; but we cannot doubt that we are doubting. We are certain that we are thinking, and in so far as we are thinking we are. *Je pense, donc je suis.* Of this we cannot doubt, and therefore this is true. In other words, the criterion of truth is a clear and distinct conception, excluding all possibility of doubt.

The fundamental point thus established is the veracity of consciousness when it does not go beyond itself, or does not postulate something which is external to itself. We are thinking; we are minds; and from the mere primary intuition, which results when we analyze our doubts, we cannot tell that we are more. At this point Gassendi arrested Descartes and addressed his objections to him as pure intelligence,—*O mens!* But even this *mens*, or mind, is but a point—we have found no guarantee as yet for its continuous existence. The analysis must be carried deeper if we are to gain any further conclusions.

Amongst the ideas or elements of our thought there are some which we can make and unmake at our pleasure; there are others which come and go without our wish; there is also a third class which is of the very essence of our thinking, and which dominates our conceptions. We find that all our ideas of limits, sorrows, and weaknesses presuppose an infinite, perfect, and ever-blessed somethin beyond them and including them,—that all our ideas, in all their series, converge to one central idea, in which they find their explanation. The formal fact of thinking is what constitutes our being; but this thought of which we

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[1] Œuvres, xi. 2[illegible]2

[2] Disc. de Méthode, part ii.

[3] Œuvres, xi. 243

[4] Œuvres, vii. 381.

are certain leads us back, when we consider its concrete contents, to the necessary pre-supposition on which our ideas depend, the ultimate totality in which they are all reconciled, the permanent cause on which they and we as conscious beings depend. We have therefore, says Descartes, the idea of an infinite, perfect, and all powerful being which cannot be the creation of ourselves, and must be given by some being who really possesses all that we in idea attribute to him. Such a being he identifies with God. But the ordinary idea of God can scarcely be identified with such a conception. "The majority of men," he says himself, "do not think of God as an infinite and incomprehensible being, and as the sole author from whom all things depend; they go no further than the letters of his name."[1] "The vulgar almost imagine him as a finite thing." The God of Descartes is not merely the creator of the material universe; he is also the father of all truth in the intellectual world. "The metaphysical truths," he says, "styled eternal have been established by God, and, like the rest of his creatures, depend entirely upon him. To say that these truths are independent of him is to speak of God as a Jupiter or a Saturn,—to subject him to Styx and the Fates."[2] The laws of thought, the truths of number, are the decrees of God. The expression is anthropomorphic, no less than the dogma of material creation; but it is an attempt to affirm the unity of the intellectual and the material world. Descartes establishes a philosophic monotheism,—by which the mediæval polytheism of substantial forms, essences, and eternal truths fades away before God, who is the ruler of the intellectual world no less than of the kingdom of nature and of grace.

To attach a clear and definite meaning to the Cartesian doctrine of God, to show how much of it comes from the Christian theology and how much from the logic of idealism, how far the conception of a personal being as creator and preserver mingles with the pantheistic conception of an infinite and perfect something which is all in all, would be to go beyond Descartes and to ask for a solution of difficulties of which he was scarcely aware. It seems impossible to deny that the tendency of his principles and his arguments is mainly in the line of a metaphysical absolute, as the necessary completion and foundation of all being and knowledge. Through the truthfulness of that God as the author of all truth he derives a guarantee for our perceptions in so far as these are clear and distinct. And it is in guaranteeing the veracity of our clear and distinct conceptions that the value of his deduction of God seems in his own estimate to rest. All conceptions which do not possess these two attributes—of being vivid in themselves and discriminated from all others—cannot be true. But the larger part of our conceptions are in such a predicament. We think of things not in the abstract elements of the things themselves, but in connection with, and in language which presupposes, other things. Our idea of body, *e.g.*, involves colour and weight, and yet when we try to think carefully, and without assuming anything, we find that we cannot attach any distinct idea to these terms when applied to body. In truth therefore these attributes do not belong to body at all; and if we go on in the same way testing the received qualities of matter, we shall find that in the last resort we understand nothing by it but extension, with the secondary and derivative characters of divisibility and mobility.

But it would again be useless to ask how extension as the characteristic attribute of matter is related to mind which thinks, and how God is to be regarded in reference to extension. The force of the universe is swept up and gathered in God, who communicates motion to the parts of extension, and sustains that motion from moment to moment; and in the same way the force of mind has really been concentrated in God. Every moment one expects to find Descartes saying with Hobbes that man's thought has created God, or with Spinoza and Malebranche that it is God who really thinks in the apparent thought of man. After all, the metaphysical theology of Descartes, however essential in his own eyes, serves chiefly as the ground for constructing his theory of man and of the universe. His fundamental hypothesis relegates to God all forces in their ultimate origin. Hence the world is left open for the free play of mechanics and geometry. The disturbing conditions of will, life, and organic forces are eliminated from the problem; he starts with the clear and distinct idea of extension, figured and moved, and thence by mathematical laws he gives a hypothetical explanation of all things. Such explanation of physical phenomena is the main problem of Descartes, and it goes on encroaching upon territories once supposed proper to the mind. Descartes began with the certainty that we are thinking beings; that region remains untouched; but up to its very borders the mechanical explanation of nature reigns unchecked.

The physical theory, in its earlier form in the *World*, and in its later in the *Principles of Philosophy* (which the present account follows), rests upon the metaphysical conclusions of the *Meditations*. It proposes to set forth the genesis of the existing universe from principles which can be plainly understood, and according to the acknowledged laws of the transmission of movement. The idea of force is one of those obscure conceptions which originate in an obscure region, in the sense of muscular power. The true physical conception is motion, the ultimate ground of which is to be sought in God's infinite power. Accordingly the quantity of movement in the universe, like its mover, can neither increase nor diminish. The only circumstance which physics has to consider is the transference of movement from one particle to another, and the change of its direction. Man himself cannot increase the sum of motion; he can only alter its direction. The whole conception of force may disappear from a theory of the universe; and we can adopt a geometrical definition of motion as the shifting of one body from the neighbourhood of those bodies which immediately touch it, and which are assumed to be at rest, to the neighbourhood of other bodies. Motion, in short, is strictly locomotion, and nothing else.

Descartes has laid down three laws of nature, and seven secondary laws regarding impact. The latter are to a large extent incorrect. The first law affirms that every body, so far as it is altogether unaffected by extraneous causes, always perseveres in the same state of motion or of rest; and the second law that simple or elementary motion is always in a straight line.[3] These doctrines of inertia, and of the composite character of curvilinear motion, were scarcely apprehended even by Kepler or Galileo; but they follow naturally from the geometrical analysis of Descartes.

Extended body has no limits to its extent, though the power of God has divided it in lines discriminating its parts in endless ways. The infinite universe is infinitely full of matter. Empty space, as distinguished from material extension, is a fictitious abstraction. There is no such thing really as a vacuum, any more than there are atoms or ultimate indivisible particles. In both these doctrines of *a priori* science Descartes has not been subverted, but, if anything, corroborated by the results of experimental physics; for the so-called atoms of chemical theory already presuppose, from the Cartesian point of view, certain aggregations of the primitive particles of matter. Descartes regards matter as uniform in character

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[1] Œuvres, vi. 132.

[2] Œuvres, vi. 109.

Princip., pt. ii. 37.

[illegible] the universe; he anticipates, as it were, from [illegible] transcendental ground, the revelations of spectrum [illegible] applied to the sun and stars. We have then to [illegible] universe of matter (and matter = extension) [illegible] figured with endless variety, and set (and [illegible] by God; and any sort of division, figure, [illegible] will serve the purposes of our supposition as [illegible] "Scarcely any supposition,"[1] he says, in [illegible] "can be made from which the same [illegible] possibly with greater difficulty, might not [illegible] by the same laws of nature; for since, in [illegible] these laws, matter successively assumes all the [illegible] it is capable, if we consider these forms [illegible] we shall at one point or other reach the [illegible] of the world, so that no error need here [illegible] from a false supposition." As the movement of [illegible] particle in a closely-packed universe is only [illegible] all other parts move simultaneously, so that [illegible] in the series steps into the place of the first; and as the figure and division of the particles varies in each [illegible] the universe, there will inevitably at the [illegible] instant result throughout the universe an innumerable host of more or less circular movements, and of vortices or whirlpools of material particles, varying in size and velocity. Taking for convenience a limited portion of the universe, we observe that in consequence of the circular movement the particles of matter have their corners pared off by rubbing against each other; and two species of matter thus arise,—one consisting of small globules which continue their circular motion with a (centrifugal) tendency to fly off from the centre as they swing round the axis of rotation, while the other, consisting of the fine dust—the filings and parings of the original particles—gradually becoming finer and finer, and losing its velocity, tends (centripetally) to accumulate in the centre of the vortex, which has been gradually left free by the receding particles of globular matter. This finer matter which collects in the centre of each vortex is the *first* matter of Descartes—it constitutes the sun or star. The spherical particles are the *second matter* of Descartes, and their tendency to propel [illegible] from the centre in straight lines towards the [illegible] of each vortex is what gives rise to the [illegible] light radiating from the central star. This [illegible] atmosphere or firmament, which envelops [illegible] and the central accumulation of first [illegible]

[illegible] matter is produced from the original [illegible] filings produced by friction seek to [illegible] between the rapidly revolving [illegible] vortex, they are detained and [illegible] in their passage, and when [illegible] of solar dust they [illegible] produced by the agita- [illegible] its surface. These form what [illegible] In some cases they come and [illegible] an ether round the sun; but in [illegible] until they form a dense [illegible] central nucleus. In course of time the [illegible] force diminished, suffers encroach- [illegible] neighbouring vortices, and at length they [illegible] velocity of the decaying star be greater [illegible] of the vortex which has swept it up, [illegible] out of the range of that vortex, and [illegible] from one to another. Such a star [illegible] the encrusted star settles in [illegible] vortex which has a velocity [illegible] continues to revolve in the [illegible] its own firmament. Such a reduced and impoverished star is a planet; and the several planets of our solar system are the several vortices which from time to time have been swept up by the central sun-vortex. The same considerations serve to explain the moon and other satellites. They, too, were once vortices, swallowed up by some other, which at a later day fell a victim to the sweep of our sun.

Such in mere outline is the celebrated theory of vortices, which for about 20 years after its promulgation reigned supreme in science, and for much longer time opposed a tenacious resistance to rival doctrines. It is one of the grandest hypotheses which ever have been formed to account by mechanical processes for the movements of the universe. While chemistry rests in the acceptance of ultimate heterogeneous elements, the vortex-theory assumed uniform matter through the universe, and reduced cosmical physics to the same principles as regulate terrestrial phenomena. It ended the old Aristotelian distinction between the sphere beneath the moon and the starry spaces beyond. It banished the spirits and genii, to which even Kepler had assigned the guardianship of the planetary movements; and, if it supposes the globular particles of the envelope to be the active force in carrying the earth round the sun, we may remember that Newton himself assumed an ether for somewhat similar purposes. The great argument on which the Cartesians founded their opposition to the Newtonian doctrines was that attraction was an occult quality, not wholly intelligible by the aid of mere mechanics. The Newtonian theory is an analysis of the elementary movements which in their combination determine the planetary orbits, and gives the formula of the proportions according to which they act. But the Cartesian theory, like the later speculations of Kant and Laplace, proposes to give a hypothetical explanation of the circumstances and motions which in the normal course of things led to the state of things required by the law of attraction. In the judgment of D'Alembert the Cartesian theory was the best that the observations of the age admitted; and "its explanation of gravity was one of the most ingenious hypotheses which philosophy ever imagined." That the explanation fails in detail is undoubted: it does not account for the ellipticity of the planets; it would place the sun, not in one focus, but in the centre of the ellipse; and it would make gravity directed towards the centre only under the equator. But these defects need not blind us to the fact that this hypothesis made the mathematical progress of Hooke, Borelli, and Newton much more easy and certain. Descartes professedly assumed a simplicity in the phenomena which they did not present. But such a hypothetical simplicity is the necessary step for solving the more complex problems of nature. The danger lies not in forming such hypotheses, but in regarding them as final, or as more than an attempt to throw light upon our observation of the phenomena. In doing what he did, Descartes actually exemplified that reduction of the processes of nature to mere transposition of the particles of matter, which in different ways was a leading idea in the minds of Bacon, Hobbes, and Gassendi. The defects of Descartes lie rather in his apparently imperfect apprehension of the principle of movements uniformly accelerated which his contemporary Galileo had illustrated and insisted upon, and in the indistinctness which attaches to his views of the transmission of motion in cases of impact. In modern times, it may be added, a theory of vortex atoms has been suggested to explain the constitution of matter. But except in name it has but slight analogy with Cartesian doctrine, and finds a parallel, if anywhere, in a modification of that doctrine by Malebranche.

Besides the last two parts of the *Principles of Philosophy*, the physical writings of Descartes include the *Dioptrics* and *Meteors*, as well as passages in the letters. His optical investigations are perhaps the subject in which he most contributed to the progress of science; and the lucidity of exposition which marks his *Dioptrics* stands conspicuous even amid the generally luminous style of his works. Its object is a practical one, to determine by scientific considerations the shape of lens best adapted to improve the capabilities of the telescope, which had been invented not long before. The conclusions at which he arrives have not been so useful as he imagined, in consequence of the mechanical difficulties. But the investigation by which he reaches them has the merit of first prominently publishing and establishing the law of the refraction of light. Attempts have been made, principally founded on some jealous remarks of Huyghens, to show that Descartes had learned the principles of refraction from the manuscript of a treatise by Willebrord Snell, but facts do not bear out the charge; and, so far as Descartes founds his optics on any one, it is on the researches of Kepler. In any case the glory of the discovery is to a large extent his own, for his proof of the law is founded upon the theory that light is the tendency or inclination of the subtle particles of ethereal matter to propagate their movement in straight lines from the sun or luminous body to the eye. And thus he approximates to the wave theory of light, though he supposed, like his contemporaries, that the transmission of light was instantaneous. The chief of his other contributions to optics was the explanation of the rainbow—an explanation far from complete, since the unequal refrangibility of the rays of light was yet undiscovered—but a decided advance upon his predecessors, notably on the *De radiis visus et lucis* (1611) of Marc-Antonio de Dominis, archbishop of Spalato, from whom careless critics have assumed that he derived his ideas.

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[1] Princip., pt. iii. 47

If Descartes had contented himself with thus explaining the phenomena of gravity, heat, magnetism, light, and similar forces by means of the molecular movements of his vortices, even such a theory would have excited admiration by its daring grandeur. But Descartes did not stop short in the region of what is usually termed physics. Chemistry and biology are alike swallowed up in the one science of physics, and reduced to a problem of mechanism. This theory, he believed, would afford an explanation of every phenomenon whatever, and in nearly every department of knowledge he has given specimens of its power. But the most remarkable and daring application of the theory was to account for the phenomena of organic life, especially in animals and man. "If we possessed a thorough knowledge," he says,[1] "of all the parts of the seed of any species of animal (*e.g.*, man), we could from that alone, by reasons entirely mathematical and certain, deduce the whole figure and conformation of each of its members, and, conversely, if we knew several peculiarities of this conformation, we could from these deduce the nature of its seed." The organism in this way is regarded as a machine, constructed from the particles of the seed, which in virtue of the laws of motion have arranged themselves (always under the governing power of God) in the particular animal shape in which we see them. The doctrine of the circulation of the blood, which Descartes adopted from Harvey, supplied additional arguments in favour of his mechanical theory, and he probably did much to popularize the discovery. A fire without light, compared to the heat which gathers in a haystack when the hay has been stored before it was properly dry—heat, in short, as an agitation of the particles—is the motive cause of the contraction and dilatations of the heart. Those finer particles of the blood which become extremely rarefied during this process pass off in two directions—one portion, and the least important in the theory, to the organs of generation, the other portion to the cavities of the brain. There not merely do they serve to nourish the organ, they also give rise to a fine ethereal flame or wind through the action of the brain upon them, and thus form the so-called "animal" spirits. From the brain these spirits are conveyed through the body by means of the nerves, regarded by Descartes as tubular vessels, resembling the pipes conveying the water of a spring to act upon the mechanical appliances in an artificial fountain. The nerves conduct the animal spirits to act upon the muscles, and in their turn convey the impressions of the organs to the brain.

Man and the animals as thus described are compared to automata, and termed machines. The vegetative and sensitive souls which the Aristotelians had introduced to break the leap between inanimate matter and man are ruthlessly swept away; only one soul, the rational, remains, and that is restricted to man. One hypothesis supplants the various principles of life: the rule of absolute mechanism is as complete in the animal as in the cosmos. Reason and thought, the essential quality of the soul, do not belong to the brutes; there is an impassable gulf fixed between man and the lower animals. The only sure sign of reason is the power of language—*i.e.*, of giving expression to general ideas; and language in that sense is not found save in man. The cries of animals are but the working of the curiously-contrived machine, in which, when one portion is touched in a certain way, the wheels and springs concealed in the interior perform their work, and, it may be, a note supposed to express joy or pain is evolved; but there is no consciousness or feeling. "The animals act naturally and by springs, like a watch."[2] "The greatest of all the prejudices we have retained from our infancy is that of believing that the beasts think."[3] If the beasts can properly be said to see at all, "they see as we do when our mind is distracted and keenly applied elsewhere; the images of outward objects paint themselves on the retina, and possibly even the impressions made in the optic nerves determine our limbs to different movements, but we feel nothing of it all, and move as if we were automata."[4] I will not believe, said the Cartesian Chanet, that a beast thinks until the beast tells me so itself. The sentience of the animal to the lash of his tyrant is not other than the sensitivity of the plant to the influences of light and heat. It is not much comfort to learn further from Descartes that "he denies life to no animal, but makes it consist in the mere heat of the heart. Nor does he deny them feeling in so far as it depends on the bodily organs."[5]

Descartes, with an unusual fondness for the letter of Scripture, quotes oftener than once in support of this monstrous doctrine the dictum that "The blood is the life;" and he remarks, with some sarcasm possibly, that it is a comfortable theory for the eaters of animal flesh. And the doctrine found acceptance among some whom it enabled to get rid of the difficulties raised by Montaigne and those who allowed more difference between animal and animal than between the higher animals and man. It also encouraged vivisection—a practice common with Descartes himself.[6] The recluses of Port Royal seized it eagerly, discussed automatism, dissected living animals in order to show to a morbid curiosity the circulation of the blood, were careless of the cries of tortured dogs, and finally embalmed the doctrine in a syllogism of their logic,—No matter thinks; every soul of beast is matter: therefore no soul of beast thinks.

But whilst all the organic processes in man go on mechanically, and though by reflex action he may repel attack unconsciously, still the first affirmation of the system was that man was essentially a thinking being; and, while we retain this original dictum. it must not be supposed that the mind is a mere spectator, or like the boatman in the boat. Of course a unity of nature is impossible between mind and body so described. And yet there is a unity of composition, a unity so close that the compound is "really one and in a sense indivisible." You cannot in the actual man cut soul and body asunder; they interpenetrate in every member. But there is one point in the human frame—a point midway in the brain, single and free, which may in a special sense be called the seat of the mind. This is the so-called conarion, or pineal gland, where in a minimised point the mind on one hand and the vital spirits on the other meet and communicate. In that gland the mystery of creation is concentrated; thought meets extension and directs it; extension moves towards thought and is perceived. Two clear and distinct ideas, it seems, produce an absolute mystery. Mind, driven from the field of extension, erects its last fortress in the pineal gland. In such a state of despair and destitution there is no hope for spiritualism, save in God; and Clauberg, Geulincx, and Malebranche all take refuge under the shadow of His wings to escape the tyranny of extended matter.

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[1] Œuvres, iv. 494.

[2] Œuvres, ix. 426.

[3] Œuvres, x. 204.

[4] Œuvres, vi. 339.

[5] Œuvres, iv. 452 and 454.

[6] Œuvres, x. 208.

In the psychology of Descartes there are two fundamental modes of thought,—perception and volition. "It seems to me," he says, "that in receiving such and such an idea the mind is passive, and that it is active only in volition; that its ideas are put in it partly by the objects which touch the senses, partly by the impressions in the brain, and partly also by the dispositions which have preceded in the mind itself and by the movements of its will."[1] The will, therefore, as being more originative, has more to do with true or false judgments than the understanding. Unfortunately, Descartes is too lordly a philosopher to explain distinctly what either understanding or will may mean. But we gather that in two directions our reason is bound up with bodily conditions, which make or mar it, according as the will, or central energy of thought, is true to itself or not. In the range of perception, intellect is subjected to the material conditions of sense, memory, and imagination; and in infancy, when the will has allowed itself to assent precipitately to the conjunctions presented to it by these material processes, thought has become filled with obscure ideas. In the moral sphere the passions or emotions (which Descartes reduces to the six primitive forms of admiration, love, hatred, desire, joy, and sadness) are the perceptions or sentiments of the mind, caused and maintained by some movement of the vital spirits, but specially referring to the mind only. The presentation of some object of dread, for example, to the eye has or may have a double effect. On one hand the animal spirits "reflected"[2] from the image formed on the pineal gland proceed through the nervous tubes to make the muscles turn the back and lift the feet so as to escape the cause of the terror. Such is the reflex and mechanical movement independent of the mind. But, on the other hand, the vital spirits cause a movement in the gland by which the mind perceives the affection of the organs, learns that something is to be loved or hated, admired or shunned. Such perceptions dispose the mind to pursue what nature dictates as useful. But the estimate of goods and evils which they give is indistinct and unsatisfactory. The office of reason is to give a true and distinct appreciation of the values of goods and evils; or firm and determinate judgments touching the knowledge of good and evil are our proper arms against the influence of the passions.[3] We are free, therefore, through knowledge: *ex magna luce in intellectu sequitur magna propensio in voluntate*, and *omnis peccans est ignorans*. "If we clearly see that what we are doing is wrong, it would be impossible for us to sin, so long as we saw it in that light."[4] Thus the highest liberty, as distinguished from mere indifference, proceeds from clear and distinct knowledge, and such knowledge can only be attained by firmness and resolution, *i.e.*, by the continued exercise of the will. Thus in the perfection of man, as in the nature of God, will and intellect must be united. For thought, will is as necessary as understanding. And innate ideas therefore are mere capacities or tendencies,—possibilities which apart from the will to think may be regarded as nothing at all.

The philosophy of Descartes fought its first battles and gained its first triumphs in the country of his adoption. In his lifetime his views had been taught in Utrecht and Leyden. In the universities of the Netherlands and of Lower Germany, as yet free from the conservatism of the old-established seats of learning, the new system gained an easy victory over Aristotelianism, and, as it was adapted for lectures and examinations, soon became almost as scholastic as the doctrines it had supplanted. At Leyden, taught by De Raey, Heerebord, Heidan, and Volder; at Utrecht, by De Bruyn and P. Burmann, and Lambert Welthuysen (the last a private student); at Groningen, by Maresius, Gousset, and Tobias André; at Franeker, by Ruardus Andala; at Breda, Nimeguen, Harderwyk, Duisburg, and Herborn, and at the Catholic university of Louvain, Cartesianism was warmly expounded and defended in seats of learning, of which many are now left desolate, and by adherents whose lucubrations have for the most part long lost interest for any but the antiquary.

The Cartesianism of Holland was a child of the universities, and its literature is mainly composed of commentaries upon the original texts, of theses discussed in the schools, and of systematic expositions of Cartesian philosophy for the benefit of the student. Three names stand out in this Cartesian professoriate,—Wittich, Clauberg, and Geulincx. Wittich (1625–1688), professor at Duisburg and Leyden, is a representative of the moderate followers, who professed to reconcile the doctrines of their school with the faith of Christendom, and to refute the theology of Spinoza. Clauberg (like Wittich, a German), professor of philosophy at Herborn and Duisburg, died while still young in 1665. Like a schoolman on Aristotle, he has, clause by clause, commented upon the *Meditations* of Descartes; but he specially claims notice for his work *De corporis et animæ in homine conjunctio*, where he maintains that the bodily movements are merely procatarctic causes (*i.e.*, antecedents, but not strictly causes) of the mental action, and sacrifices the independence of man to the omnipotence of God. The same tendency to absorb all particular causes and movements in God is still more pronounced in Geulincx (1625–1669), who for the last six years of his life taught privately at Leyden. With Geulincx the reciprocal action of mind and body is altogether denied; they resemble two clocks, so made by the artificer as to strike the same hour together. The mind can only act upon itself; beyond that limit, the power of God must intervene to make any seeming interaction possible between body and soul. Such are the half-hearted attempts at consistency in Cartesian thought, which eventually culminate in the pantheism of Spinoza.

Descartes occasionally had not scrupled to interpret the Scriptures according to his own tenets, while still maintaining, when their letter contradicted him, that the Bible was not meant to teach the sciences. Similar tendencies are found amongst his followers. Whilst Protestant opponents put him in the list of atheists like Vanini. and the Catholics held him as dangerous as Luther or Calvin. there were zealous adherents who ventured to prove the theory of vortices in harmony with the book of Genesis. It was this rationalistic treatment of the sacred writings which helped to confound the Cartesians with the allegorical school of John Cocceius. as their liberal doctrines in theology justified the vulgar identification of them with the heresies of Socinian and Arminian. The chief names in this advanced theology connected with Cartesian doctrines are Meyer, the friend and editor of Spinoza. author of a work termed *Philosophia Scripturæ Interpres* (1666); Balthasar Bekker. whose *World Bewitched* helped to discredit the superstitious fancies about the devil; and Spinoza, whose *Tractatus Theologico-Politicus* is in some respects the classical type of rational criticism up to the present day. Against this work and the *Ethics* of Spinoza the orthodox Cartesians (who were in the majority), no less than sceptical hangers-on like Bayle, raised an all but universal howl of reprobation, scarcely broken for about a century.

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[1] Œuvres, ix. 166. [2] Passions de l'Âme, 36. [3] Passions de l'Âme, 48.

[4] Œuvres, ix. 170.

In France Cartesianism won society and literature before it penetrated into the universities. Clerselier (the friend of Descartes and his literary executor), his son-in-law Rohault (who achieved that relationship through his Cartesianism), and others, opened their houses for readings to which the intellectual world of Paris—its learned professors not more than the courtiers and the fair sex,—flocked to hear the new doctrines explained, and possibly discuss their value. Grand seigneurs, like the prince of Condé, the Duc de Nevers, and the Marquis de Vardes, were glad to vary the monotony of their feudal castles by listening to the eloquent rehearsals of Malebranche or Regis. And the salons of Madame de Sevigné, of her daughter Mme. de Grignan, and of the Duchesse de Maine for a while gave the questions of philosophy a place among the topics of polite society, and furnished to Molière the occasion of his *Femmes Savantes*. The château of the Duc de Luynes, the translator of the *Meditations*, was the home of a Cartesian club, that discussed the questions of automatism and of the composition of the sun from filings and parings, and rivalled Port Royal in its vivisections. The Cardinal de Retz in his leisurely age at Commercy found amusement in presiding at disputations between the more moderate Cartesians and Don Robert Desgabets, who interpreted Descartes in an original way of his own. Though rejected by the Jesuits, who found peripatetic formulæ a faithful weapon against the enemies of the church, Cartesianism was warmly adopted by the Oratory, which saw in Descartes something of St Augustine, by Port Royal, which discovered a connection between the new system and Jansenism, and by some amongst the Benedictines and the order of Ste Geneviève.

The popularity which Cartesianism thus gained in the social and literary circles of the capital was largely increased by the labours of Pierre-Sylvain Regis (1632–1707). On his visit to Toulouse in 1665, with a mission from the Cartesian chiefs, his lectures excited boundless interest; ladies threw themselves with zeal and ability into the study of philosophy; and Regis himself, like a public benefactor in some old Greek town, was made the guest of the civic corporation. In 1671 scarcely less enthusiasm was aroused in Montpellier; and in 1680 he opened a course of lectures at Paris, with such acceptance that intending hearers had to secure their seats some time before the lecture began. Regis, by removing the paradoxes and adjusting the metaphysics to the popular powers of apprehension, made Cartesianism popular, and reduced it to a regular system.

But a check was at hand. Descartes, in his correspondence with the Jesuits, had shown an almost cringing eagerness to have their powerful organization on his side Especially he had written to Père Mesland. one of the order. to show how the Catholic doctrine of the eucharist might be made compatible with his theories of matter. But his undue haste to arrange matters with the church only served to compromise him more deeply. Unwise admirers and malicious opponents exaggerated the theological bearings of his system in this detail: and the efforts of the Jesuits succeeded in getting the works of Descartes. in November 1663. placed upon the Index of prohibited books,—*donec corrigantur*. Thereupon the power of church and state enforced by positive enactments the passive resistance of old institutions to the novel theories. In 1667, the oration at the interment was forbidden by royal order. In 1669, when the chair of philosophy at the Collége Royal fell vacant, one of the four selected candidates had to sustain a thesis against "the pretended new philosophy of Descartes." In 1671 the archbishop of Paris, by the king's order, summoned the heads of the university to his presence, and enjoined them to take stricter measures against philosophical novelties dangerous to the faith. In 1673 a decree of the Parliament against Cartesian and other unlicensed theories was on the point of being issued, and was only checked in time by the appearance of a burlesque mandamus against the intruder Reason, composed by Boileau and some of his brother-poets. Yet in 1675 the university of Angers was empowered to repress all Cartesian teaching within its domain, and actually appointed a commission charged to look for such heresies in the theses and the students' note-books of the college of Anjou belonging to the Oratory. In 1677 the university of Caen adopted not less stringent measures against Cartesianism. And so great was the influence of the Jesuits, that the congregation of St Maur, the canons of Ste Geneviève, and the Oratory laid their official ban on the obnoxious doctrines. From the real or fancied *rapprochements* between Cartesianism and Jansenism, it became for a while impolitic, if not dangerous, to avow too loudly a preference for Cartesian theories. Regis was constrained to hold back for ten years his *System of Philosophy*; and when it did appear, in 1690, the name of Descartes was absent from the title-page. There were other obstacles besides the mild persecutions of the church. Pascal and other members of Port Royal openly expressed their doubts about the place allowed to God in the system; the adherents of Gassendi met it by resuscitating atoms; and the Aristotelians maintained their substantial forms as of old; the Jesuits argued against the arguments for the being of God, and against the theory of innate ideas; whilst Huet, bishop of Avranches, once a Cartesian himself, made a vigorous onslaught on the contempt in which his former comrades held literature and history, and enlarged on the vanity of all human aspirations after rational truth.

The greatest and most original of the French Cartesians was Malebranche. His *Recherche de la Verité*, in 1674, was the baptism of the system into a theistic religion which borrowed its imagery from Augustine; it brought into prominence the metaphysical base which De la Forge, Rohault, and Regis had neither cared for nor understood. But this doctrine was a criticism and a divergence, no less than a consequence, from the principles in Descartes; and it brought upon Malebranche the opposition. not merely of the Cartesian physicists, but also of Arnauld, Fénelon, and Bossuet, who found, or hoped to find, in the *Meditations*, as properly understood, an ally for theology. Popular enthusiasm, however, was with Malebranche, as twenty years before it had been with Descartes; he was the fashion of the day; and his disciples rapidly increased both in France and abroad.

In 1705 Cartesianism was still subject to prohibitions from the authorities; but in a project of new statutes, [illegible] faculty of arts at Paris in 1720, the [illegible] Meditations of Descartes were placed beside [illegible] the *Metaphysics* of Aristotle as text-books [illegible] And [illegible] readings, both [illegible] were [illegible] Cartesian texts in some [illegible] But when this happened, [illegible] was [illegible] either interesting or dangerous; [illegible] taught as [illegible] and verified truths, were [illegible] in the systematic verbiage which preceded [illegible] resist the wit and [illegible] Voltaire in his *Lettres sur les Anglais* [illegible] the principles and results of [illegible] Newton. The old Cartesians, Mairan and [illegible] with his *Théorie des Tourbillons* [illegible] to refute Newton by styling [illegible] Fortunately, the Cartesian [illegible] already done its service, even where the [illegible] were rejected. The Port Royalists, Nicole and [illegible] to grammar and logic; Domat and [illegible] jurisprudence; Fontenelle, Perrault, and [illegible] literary criticism, and a worthier estimate of [illegible] Though it never ceased to influence [illegible] thinkers, it had handed on to Condillac its popu[illegible] the masses. A Latin abridgment of philosophy, [illegible] tells us that the innate ideas of Descartes are [illegible] no arguments, and are now universally aban[illegible] The ghost of innate ideas seems to be all that it [illegible]

In Germany a few Cartesian lecturers left their names at [illegible] and Halle, but the system took no root, any more than [illegible] where it had a brief reign at Geneva [illegible] In Italy the effects were more permanent. [illegible] the iatro-mechanical school of medicine, [illegible] 1679), as its most notable name, entered [illegible] the mechanical study of anatomy suggested by Descartes, but was probably much more dependent upon the positive researches of Galileo. At Naples there grew up a Cartesian school, of which the best known members are Michael Angelo Fardella (1650–1708) and Cardinal [illegible]–1802), both of whom, however, attached [illegible] to the characteristic views of Malebranche.

In England Cartesianism took but slight hold. Henry More, who had given it a modified sympathy in the life [illegible] author, became its opponent in later years; and [illegible] from it in most essential points. Antony [illegible] Ireland, attempted to introduce it into [illegible] He is the author of several works, [illegible] a system of Cartesian philosophy, where a [illegible] the methods of the schoolmen. [illegible] Parker, bishop of Oxford, [illegible] novelties of the [illegible] the irony of history) as [illegible] with Hobbes and Gassendi [illegible] physics was translated [illegible] of Cartesianism towards the [illegible] romance were an over[illegible] death [illegible] Locke [illegible] of Descartes [illegible] Malebranche and Spinoza, [illegible]

papers. An edition of the philosophical works in 4 vols. 8vo, edited by Garnier, appeared at Paris, 1835. There is a good English translation of the *Method*, *Meditations*, and a small part of the *Principles*, first published at Edinburgh, 1853.

For the life of Descartes the chief authority is Baillet, *Vie de Descartes*, in 2 vols. 4to, 1691; of which a small abridgment, afterwards translated into English, appeared in 1692. There is a summary of it in Garnier's edition, and in Kuno Fischer's *Geschichte der Neuern Philosophie*, Band i. Th. 1, 8vo, Mannheim, 1865. See the *Éloge* of Thomas in Cousin's edition.

For the philosophy of Descartes, see besides the works referred to under CARTESIANISM, Bordas-Demoulin, *Le Cartesianisme*, 2d ed. Par. 1874; Damiron, *Histoire de la Philosophie du XVII. Siècle*; Renouvier, *Manuel de Philosophie Moderne*, Paris, 1842; Cousin, *Fragments Philosophiques*, vol. ii., Paris, 1838. *Fragments de Philosophie Cartesienne*, Paris, 1845, and in the *Journal des Savants*, 1860–61. A good estimate of the physical and mathematical labours is given in Ersch and Gruber's *Encyclopädie*; and Professor Huxley has lately, in the *Fortnightly Review*, vol. xvi., called attention to automatism. There are also several German works treating of his theology and metaphysics. (W. W.)

DESCHAMPS, EUSTACHE, called **MOREL**, a distinguished mediæval poet of France, was born at Vertus, in Champagne, early in the 14th century. The date of his birth has been approximately given as 1328, 1340, and 1345, according to the interpretation put upon certain vague statements of his own. It is certain that he lived under four kings—Philip VI., John, Charles V., and Charles VI. He studied the seven liberal arts at the university of Orleans. Early in life he proceeded to the court of France, and, after first entering the service of a prelate whose name he has not recorded, for more than thirty years took an active and prominent part in the joyous society of the day. Charged with a succession of honourable offices, he served nearly all the princes his contemporaries. His life was a long and romantic series of tournaments, feasts, and battles, and he was one of the most popular persons of his time. But before settling down to this life, he had a stormy youth of vicissitude. He was an eye-witness of the English invasion in 1358; he was in the siege of Rheims, and witnessed the march on Chartres; he was present also at the signing of the treaty at Bretigny. In 1360, as Châteiain of Vertus, he became the vassal of the young princess Isabella, to whom he paid great poetic homage. But he was then already a travelled man; he had visited Italy, Germany, and Hungary. Later on he took a part in the Flemish wars, and it was on this occasion that, about 1385, he received the surname, or nickname, of Morel, which he sometimes himself adopted in later life. He is believed, but not on very strong evidence, to have travelled in Syria and Egypt, and to have been captured and imprisoned by the Saracens. In France he lived the true life of a *trouvère*, wandering from castle to castle with his poems. He had a violent hatred for the English nation, fostered no doubt by the experiences of his youth; and this he has expressed very abundantly in his writings, particularly in the famous prophecy that England would be destroyed so thoroughly that no one should be able to point to her ruins. He was *huissier d'armes* to King Charles V., and by him appointed bailli of Senlis and governor of [illegible] It was with great reluctance that, when he felt himself growing old, he retired from public life and went [illegible] mansion, where he occupied himself in the composition of a splenetic satire against women, entitled *Le M[illegible] de Mariage*; though 12,500 lines of this [illegible] he left it unfinished at his death, which took place about 1420. [illegible] Deschamps was an [illegible] extremely ugly, he [illegible] Le Roi de Laidure." [illegible] our day, the great [illegible] the Royal Library at [illegible] rondeaux, 80 virelays, 14[illegible] and satires. The [illegible] MSS. was [illegible] in 4to by M. G. A.

Crapelet in 1832, preceded by a literary and historical monograph. The value of his writings being recognized, another and more critical edition was brought out, in 1849, by M. Prosper Tarbé. The same editor published *Le Miroir de Mariage* in 1865, and a long poem entitled *Le Lay des douze Estats du Monde*, in 1870. Deschamps excelled in the use of the ballad and chanson royal. In each of these forms of verse he was the greatest master of his time. One of his ballads is addressed to the English poet "Geoffroy Chaucier," to whom he says—

> Tu es d'amours mondains dieux en Albie
> Et de la Rose en la terre Angélique.

In Eustache Deschamps the modern language of France first found a pure lyrical expression; his long life seems to connect the literature of Theobald IV. with that of Charles of Orleans.

DESERT. See PHYSICAL GEOGRAPHY.

DESFONTAINES, RENÉ LOUICHE (1751–1833), French botanist, was a native of Brittany, born at Tremblay, in the department of Ile-et-Vilaine, in 1751 or 1752. He was sent to the town school, but made slow progress in learning, and was at length dismissed by the schoolmaster as a dullard and a robber of apple orchards. This treatment left a life-long painful impression on his mind. At the college of Rennes, to which he was next sent, he applied himself heartily to study, and rejoiced in a success which falsified the judgment of his old master. From Rennes he passed to Paris, to study medicine; but this soon became a secondary pursuit, his chief attention being drawn to the study of plants. At Paris he acquired the friendship of Lemonnier, physician to the king, and of Jussieu. At the age of thirty he took his degree of M.D., and in 1783 he was elected member of the Academy of Sciences. In the same year he set out for North Africa, and spent two years in a scientific exploration of Barbary. In 1785 he returned to Paris, bringing with him a large collection of plants, animals, and other objects illustrative of natural history. The collection, it is stated, comprised 1600 species of plants, of which about 300 were described for the first time. His successful labours were rewarded, and a new congenial field of work was opened to him, by his nomination by Buffon to the post of professor at the *Jardin des Plantes*, vacated in his favour by his friend Lemonnier. The garden, says one of his biographers, now became his world. His life was thenceforth marked by few incidents. He devoted himself to his pupils, to his plants, and to the preparation of various botanical works. He purposed to publish a narrative of his African explorations, but the manuscript journal being lent to Lemonnier, and by him to the king, Louis XVI., was lost, and only a few fragments of the narrative appeared. His great work is entitled *Flora Atlantica sive historia plantarum quae in Atlante, agro Tunetano et Algeriensi crescunt.* It was published in 2 vols. 4to in 1798, and is esteemed for the singular clearness and precision of its descriptions and its nomenclature. Desfontaines, as a recluse student, escaped the perils of the Reign of Terror. On two occasions he courageously quitted his retirement to rescue the naturalists Ramond and Lheritier from prison and from death. He was admitted to the Legion of Honour at the time of its establishment. At the age of sixty-three he married a young wife, but the prospect of happiness thus opened was soon closed by her death. In 1831 he became blind, and was reduced to the recognition of his favourite plants by touch alone. Desfontaines was author of many valuable memoirs on vegetable anatomy and physiology, descriptions of new genera and species, &c., contributed to learned societies and scientific journals. One of the most important was the "Memoir on the Organization of the Monocotyledons," which gave him a high place among discoverers. He published in 1804 a *Tableau de l'école botanique du muséum d'histoire naturelle de Paris*, of which a third edition appeared in 1831, under the new title *Catalogus Plantarum Horti Regii Parisiensis.* His modesty, simplicity of life, and good humour endeared him to his friends and to his pupils. He died at Paris on the 16th November 1833, a daughter surviving him. His Barbary collection was bequeathed to the museum, and his general collection passed into the hands of the botanist Webb.

DESHOULIÈRES, ANTOINETTE DU LIGIER DE LA GARDE (1634–1694), a French poetess, born at Paris, was the daughter of the Chevalier de la Garde, *maître d'hôtel* to the queens Mary de' Medici and Anne of Austria. She received a careful and very complete education, acquiring while still young a knowledge of Latin, Spanish, and Italian, and studying prosody under the direction of the poet Hesnaut. At the age of eighteen she married the Seigneur Deshoulières, who had soon afterwards to go abroad along with the prince of Condé on account of his complicity in the Fronde. Madame Deshoulières returned for a time to the house of her parents, where she gave herself to writing poetry and studying the philosophy of Gassendi. She rejoined her husband at Rocroi, near Brussels, where, being distinguished for her personal beauty, she became the object of embarrassing attentions on the part of the prince of Condé, against which, however, she knew how to protect herself. Having made herself obnoxious to the Government by her urgent demand for the arrears of her husband's pay, she was imprisoned in the chateau of Wilworden, the hardships being increased by the refusal of all books except the Bible and some volumes of the fathers. After a few months she was freed by her husband, who attacked the chateau at the head of a small band of soldiers. An amnesty having been proclaimed, they returned to France, where Madame Deshoulières soon became a conspicuous personage at the court of Louis XIV. and in literary society. She won the friendship and admiration of the most eminent literary men of the age—some of her more zealous flatterers even going so far as to style her the tenth muse, and the French Calliope. Her poems were very numerous, and included specimens of nearly all the minor forms, odes, eclogues, idylls, elegies, chansons, ballads, madrigals, &c. Of these the idylls alone, and only some of them, have stood the test of time, the others being entirely forgotten. She wrote several dramatic works, the best of which do not rise to mediocrity, and the worst of which are worthy of the taste that could prefer the *Phèdre* of Pradon to that of Racine. Voltaire pronounced her, nevertheless, the most successful of the female poets of France; and her reputation with her contemporaries is indicated by her election as a member of the Academy of the Ricovrati of Padua, and of the Academy of Arles. In 1688 a pension of 2000 livres was bestowed upon her by the king, and she was thus raised from the poverty in which she had long lived. She died at Paris on the 17th February 1694. Complete editions of her works were published at Paris in 1797 and 1799. These include a few poems by her daughter Antoinette Thérèse Deshoulières (1662–1718), who inherited her talent.

DESIDERIO DA SETTIGNANO, sculptor, was born nearly at the beginning of the 15th century, and died in all probability in 1485. Vasari's statement, that he died at the age of twenty-eight, is altogether a mistake. Settignano is a village on the southern slope of the hill of Fiesole, still surrounded by the quarries of sandstone of which the hill is formed, and still inhabited, as it was 400 years ago, by a race of "stone-cutters," several of whom, though not disdaining the title of "lapicida," earned for themselves honoured places in the roll of Florentine sculptors. Desiderio was for a short time a pupil of Donatello, and he seems to have worked also with Mino da Fiesole, with the delicate and refined style of whose works those of Desiderio seem to have a closer affinity than with the perhaps more masculine tone of Donatello. Vasari especially praises the works of Desiderio for their grace and simplicity which, as the critic remarks, are a gift of nature, and can be acquired by no study. He particularly extols the sculptor's treatment of the figures of women and children, and the eulogy applies equally to the genius and manner of Mino da Fiesole. It does not appear that Desiderio ever worked elsewhere than at Florence; and it is there that those who are interested in the Italian sculpture of the Renaissance must seek the few but remarkable works of his chisel, which have survived the changes and chances of four centuries.

DES MOINES, formerly FORT DES MOINES, a city of the United States, capital of Iowa, at the confluence of the Raccoon with the Des Moines River, which is one of the right hand tributaries of the Mississippi, and is navigable thus far for steamboats. Its public buildings include the old capitol, erected in 1856, the new capitol, founded in 1870, the post-office, with a number of other United States offices under the same roof, the Baptist college, 15 churches, and 5 high schools; and among its industrial establishments are a paper-mill, a woollen factory, an oil-mill, besides foundries, machine-shops, flour-mills, and plough-factories. There are two public libraries in the town, one of which is maintained by the State, and numbers 15,000 volumes; and, besides several daily and weekly newspapers, no fewer than six monthly periodicals are published. Forty acres of ground have been appropriated for a public park; and another area of 100 acres belongs to a park-company. Coal, lime, and clay are abundant in the neighbourhood, and the town is supplied with water from the Raccoon. Des Moines, which dates from 1846, received incorporation in 1851, and was raised to the rank of a city and the capital of the State in 1857. Population in 1860, 3965; in 1873, 15,601.

DESMOULINS, LUCIE SIMPLICE CAMILLE BENOIST (1760-1794), was born at Guise, in Picardy, on the 2d of March 1760. His father was lieutenant-general of the bailiwick of Guise, and was desirous that Camille his eldest son, who from his earliest years gave signs of unusual intelligence, should obtain as complete an education as France could then bestow. His wishes were seconded by a friend obtaining a "bourse" for the young Desmoulins, who at the age of fourteen left home for Paris, and entered the college of Louis le Grand. In this school, in which Robespierre was also a bursar and a distinguished student, Camille laid the solid foundation of his learning, and made an acquaintance with the literature and history of the classical nations so deep and extensive that it furnished him throughout the whole of his short and chequered life with illustrations which he applied with brilliancy and effect to the social manners and political events of his time.

Desmoulins having been destined by his father for the law, and having completed his legal studies, was admitted an advocate of the Parliament of Paris in 1785. His professional success was not great; his manner was violent, his appearance far from attractive, and his speech was impaired by the natural defect of a painful stammer. He indulged and fostered, however, his love for literature, he was closely observant of the course of public affairs, and he was thus gradually being prepared for the main duties of his life—those of a political *littérateur*.

In March 1789 Desmoulins began his political career. Having been nominated deputy from the bailiwick of Guise, he appeared at Laon as one of the commissioners for the election of deputies to the States General summoned by royal edict of 24th January. Camille heralded its meeting by his *Ode to the States General*. It is, moreover, highly probable that he was the author of a radical pamphlet entitled *La Philosophie au peuple Français*. His hopes of professional success were now scattered, and he was living in Paris in extreme poverty and almost in squalor. He, however, shared to the full the excitement which attended the meeting of the States General. As appears from his letters to his father, he watched with exultation the procession of deputies at Versailles, and with violent indignation the events of the latter part of June which followed the closing of the Salle des Menus to the deputies who had named themselves the National Assembly. It is further evident that Desmoulins was already sympathizing, not only with the enthusiasm, but also with the fury and cruelty, of the Parisian crowds.

The sudden dismissal of Necker by Louis was the event which brought Desmoulins to fame. On the 12th of July 1789 Camille, leaping upon a table in one of the cafés of the Palais Royal, startled a numerous crowd of listeners by the announcement of the dismissal of their favourite. Losing in his violent excitement the stammer which impeded his ordinary speech, he inflamed the passions of the mob by his burning words and his call "To arms!" "This dismissal," he said, "is the tocsin of the St Bartholomew of the patriots." Drawing, at last, two pistols from under his coat, he declared that he would not fall alive into the hands of the police who were watching his movements. He descended amid the embraces of the crowd, and his cry "To arms!" resounded on all sides. This scene was the beginning of the actual events of the Revolution. Following Desmoulins the crowd surged through Paris, procuring arms by force; and on the 13th it was partly organized as the Parisian militia which was afterwards to be the National Guard. On the 14th the Bastille was taken.

Desmoulins may be said to have begun on the following day that public literary career which lasted till his death. In May and June 1789 he had written *La France libre*, which, to his chagrin, his publisher refused to print. The taking of the Bastille, however, and the events by which it was preceded, were a sign that the times had changed; and on the 15th of July Desmoulins's work was issued. It attracted immediate attention. By its erudite, brilliant, and courageous examination of the rights of king, of nobles, of clergy, and of people, it attained a wide and sudden popularity; it secured for the author the friendship and protection of Mirabeau, and the studied abuse of numerous royalist pamphleteers. Shortly afterwards, with his vanity and love of popularity inflamed, he pandered to the passions of the lower orders by the publication of his *Discours de la lanterne aux Parisiens*, which with an almost fiendish reference to the excesses of the mob he headed by a quotation from St John, *Qui male agit odit lucem*. Camille was dubbed "Procureur-général de la lanterne."

In November 1789 Desmoulins began his career as a journalist by the issue of the first number of a weekly publication—*Révolutions de France et de Brabant*. He conducted this alone till July 1790, and thereafter with the assistance of Stanislas Fréron till July 1792, when the publication ceased. Success attended the *Révolutions* from its first to its last number, Camille was everywhere famous, and his poverty was relieved. These numbers are valuable as an exhibition not so much of events as of the feelings of the Parisian people during the most stormy period of their history; they are adorned, moreover, by the erudition, the wit, and the genius of the author, but they are disfigured, not only by the most biting personalities and the defence and even advocacy of the excesses of the mob, but by the entire absence of the forgiveness and pity for which the writer was afterwards so eloquently to plead.

Desmoulins had now become an acknowledged leader of public opinion. Its sudden changes suited his fickle temperament, and form the only excuse for the glaring inconsistencies which disfigure his published writings. Mirabeau, for instance, whose genius and hospitality he had frequently and openly lauded, he afterwards thought fit to denounce as the "god of orators, liars, and thieves." He was powerfully swayed by the influence of more vigorous minds; and for some time before the death of Mirabeau, in April 1791, he had begun to be led by Danton, with whom he remained associated during the rest of his life. In July 1791 Camille appeared before the municipality of Paris as head of a deputation of petitioners for the deposition of the king. In that month, however, such a request was dangerous; there was excitement in the city over the presentation of the petition, and the private attacks to which Desmoulins had often been subject were now followed by a warrant for the arrest of himself and Danton. Danton left Paris for a little; Desmoulins, however, remained there, appearing occasionally at the Jacobins club. He resigned his functions as a journalist, and the issue of his *Révolutions* ceased.

Three months afterwards, however, he again appeared in public, having been appointed secretary to the Society of the Friends of the Constitution. His second attempt at journalism was made in April and May 1792, in the issue of several numbers of the *Tribune des Patriotes*, but success did not attend the effort, and it was in his pamphlet *Jean Pierre Brissot démasqué*, which abounded in the most violent personalities, that Desmoulins again secured the eager attention of the public. This pamphlet, which had its origin in a petty squabble, was followed in 1793 by a *Fragment de l'histoire secrète de la Révolution*, in which the party of the Gironde, and specially Brissot, were most mercilessly attacked.

On the nomination of Danton, after the excesses of the 10th of August 1792, to the post of minister of justice, Desmoulins was appointed his secretary general. On September the 8th he was elected one of the deputies for Paris to the lately created National Convention. He was not successful as an orator. He was of the party of "the Mountain," and voted for the abolition of royalty and the death of the king. With Robespierre he was now more than ever associated, and the *Histoire des Brissotins*, the fragment above alluded to, was inspired by the arch-revolutionist. The success of the *brochure*, so terrible as to send the leaders of the Gironde to the guillotine, alarmed Danton and the author. Not so with Robespierre; and the split was formed which was to end in the ruin of the Dantonists.

In December 1793 was issued the first number of the *Vieux Cordelier*, by which Danton's idea of a committee of clemency was formulated and upheld. From the first Robespierre, although revising the sheets, disapproved of it, and at the fifth number the actual rupture became visible. Robespierre took advantage of the popular indignation roused against the Hébertists to send them to death, but the time had come when Saint Just and he were to turn their attention not only to *les enragés*, but to *les indulgents*—the powerful faction of the Dantonists. On the 7th of January 1794 Robespierre, who on a former occasion had defended Camille when in danger at the hands of the National Assembly, in addressing the Jacobins club counselled not the expulsion of Desmoulins, but the burning of certain numbers of the *Vieux Cordelier*. Camille sharply replied that he would answer with Rousseau,—"burning is not answering," and a bitter quarrel thereupon ensued. By the end of March not only were Hébert and the leaders of the extreme party guillotined, but their opponents, Danton, Desmoulins, and the best of the moderates were arrested. On the 31st the warrant of arrest was signed and executed, and on the 3d, 4th, and 5th of April the trial took place before the Revolutionary Tribunal. It was a scene of terror not only to the accused but to judges and to jury. The retorts of the prisoners were notable. Camille on being asked his age, replied, "I am thirty-three, the age of the *sans-culotte* Jesus, a critical age for every patriot." This was false; he was thirty-four.[1] Tinville, alarmed at the eloquence of Danton, procured from the Committee of Public Safety a decree which closed the mouths of the accused. Armed with this and the false report of a spy who charged the wife of Desmoulins with conspiring for the escape of her husband and the ruin of the republic, Tinville by threats and beseechings at last obtained from the jury a sentence of death. It was passed in absence of the accused, and their execution was appointed for the same day.

Since his arrest the courage of Camille had miserably failed. He had exhibited in the numbers of the *Vieux Cordelier* almost a disregard of the death which he must have known hovered over him. He had with consummate ability exposed the terrors of the Revolution, and had adorned his pages with illustrations from Tacitus, the force of which the commonest reader could feel. In his last number, the seventh, which his publisher refused to print, he had dared to attack even Robespierre, but at his trial it was found that he was devoid of physical courage. He had to be torn from his seat ere he was removed to prison, and as he sat next to Danton in the tumbrel which conveyed them to the guillotine, the calmness of the great leader failed to impress him. In his violence, bound as he was, he tore his clothes into shreds, and his bare shoulders and breast were exposed to the gaze of the surging crowd. Of the fifteen guillotined together, including among them Hérault de Séchelles, Westermann, and Philippeaux, Desmoulins died third; Danton, the greatest, died last. With them also died the hope of the Revolution. But a few months were to pass ere it was to be solemnly decreed that they had "deserved well of humanity."

On the 29th of December 1790, Camille had married Lucile Duplessis, and among the witnesses of the ceremony are observed the names of Brissot, Pétion, and Robespierre. The only child of the marriage, Horace-Camille, was born on the 6th of July 1792. Two days afterwards Desmoulins brought it into notice by appearing with it before the municipality of Paris to demand "the formal statement of the civil estate of his son." The boy was afterwards pensioned by the French Government. Lucile, Desmoulins's accomplished and affectionate wife was, a few days after her husband, and on a false charge, condemned to the guillotine. She astonished all onlookers by the calmness with which she braved death.

See the biographies of Desmoulins by Edward Fleury and Jules Claretie. The latter, entitled *Camille Desmoulins and his Wife*, has been translated into English (London, 1876). The work of Roch Mercandier, *Histoire des hommes de proie*, is not trustworthy. See also the literature of the Revolution, and especially of the Dantonists. The standard edition of Desmoulins's works is that of Matton. (T. S.)

DE SOTO, FERDINANDO (1496 ?–1542), a Spanish captain and explorer, who is frequently accredited with the honour of being the discoverer of the Mississippi, and is certainly one of the most remarkable of the Eldorado adventurers of the 16th century. He was born at Xeres de Caballeros, in Estremadura, of an impoverished family of good position, and was indebted to the favour of Pedrarias Davila for the means of pursuing his studies at the university. He commenced active life in 1519 by joining his patron in his second expedition to Darien, where he distinguished himself by his ability and the independence of his demeanour. In 1528 we find him exploring the coast of Guatemala and Yucatan, and in 1532 he led a reinforcement of 300 volunteers to the assistance of Pizarro in Peru. To him was due the discovery of the pass through the mountains to Cuzco; and in the capture of that city and in other important engagements he bore a brilliant part. After the completion of the conquest De Soto, who had landed in America with "nothing else of his own save his sword and target," returned to Spain with a fortune of "an hundred and fourscore thousand duckets," which enabled him to marry the daughter of his old patron Davila, and to maintain "all the state that the house of a nobleman requireth." The Emperor Charles V., to whom he had lent a portion of his wealth, appointed him governor of the Island of Cuba, and adelantado or president of Florida, which was then the object of great interest, as possibly another Peru. In 1538 he set sail with an enthusiastic and richly furnished company of about 600 men, of whom several had sold all that they possessed to furnish their equipment. Landing in May 1539 at Espiritu Santo Bay, on the west coast of the present State of Florida, the explorers continued for nearly four years to wander from one point to another, ever deceived in their expectations, and ever allured by the report of the wealth that lay beyond. The exact line of their route is in many places difficult to identify, but it seems to have passed N. through Florida and Georgia as far as 35° N. lat., then S. to the neighbourhood of Mobile, and finally N.W. towards the Mississippi. This river was reached early in 1541, and the following winter was spent on the Washita. As they were returning in 1542 along the Mississippi, De Soto died (either in May or June), and his body was sunk in its waters. On the failure of an attempt which they made to push eastwards again, his men, under the leadership of Moscoso, were compelled in 1543 to trust themselves to the stream. A voyage of nineteen days brought them to the sea, and they then held along the coast to Panuco, in Mexico.

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[1] This is borne out by the register of his birth and baptism, and by words in his last letter to his wife,—"I die at thirty-four." The dates (1762–94) given in nearly every biography of Desmoulins are certainly inaccurate.

Of this unfortunate expedition three narratives are extant, of seemingly independent origin, and certainly of very different character. The first was published in 1557 at Evora, and professes to be the work of a Portuguese gentleman of Elvas, who had accompanied the expedition:—*Relaçam verdadeira dos Trabalhos q̃ h. Governador do Fernãdo d'Souto & certos Fidalgos Portugueses passarom no descobrimẽto da Provincia da Frolida. Agora nouamẽte feita per hũ Fidalgo Deluas.* An English translation was published by Hakluyt in 1609, and another by an anonymous translator in 1686, the latter being based on a French version which had appeared at Paris in 1685 from the pen of Citri de la Guette. The second narrative is the famous history of Florida by the Inca, Garcilasso de la Vega, who obtained his information from a Spanish cavalier engaged in the enterprise; it was completed in 1591, first appeared at Lisbon in 1605 under the title of *La Florida del Ynca*, and has since passed through many editions in various languages. The third is a report presented to Charles V. of Spain in his Council of the Indies in 1544, by Luis Hernandez de Biedma, who had accompanied De Soto as His Majesty's factor. It is to be found in Ternaux-Compans's *Recueil de Pièces sur la Floride* in the *Historical Collections of Louisiana*, Philadelphia, 1850, and in W. B. Rye's reprint for the Hakluyt Society of Hakluyt's translation of the Portuguese narrative.

See Bancroft's *History of the United States*, vol. i.; M'Culloch, *Researches Concerning the Aboriginal History of America*; Monette, *History of the Discovery and Settlement of the Valley of the Mississippi*.

DESSAIX, JOSEPH MARIE, COUNT (1764–1834), French general, was born at Thonon, in Savoy, September 24, 1764. He studied medicine, took his degree of doctor at Turin, and then went to Paris. When the Revolution broke out he served in the National Guard. Symp
with the extreme party, he attempted in 1791 to e
its principles in his native land; but, being prosec
order of the king, he escaped to France. He had or
the so-called *Legion of the Allobroges*, and as its
took part in the great conflict of August 10, 1792.
following years he served at the siege of Toulon,
army of the eastern Pyrenees, and in the army o
He was captured at the battle of Rivoli, but w
exchanged. In the spring of 1798 Dessaix was
member of the Council of Five Hundred. In cons
of his opposition to the revolution of 18 Brumai
November 1799), by which Napoleon became supr
was excluded from the council, retaining, howe
military command. He was appointed successive
mander of Frankfort and of Breda, and in Septemb
was promoted general of brigade, and soon after com
of the Legion of Honour. He distinguished himsel
capture of Ulm, at the passage of the Tagliamento,
the battle of Wagram. His brilliant courage at thi
procured him from the emperor the surname o
Intrepid," and the dignity of count of the empire.
also promoted general of division, and named gran
of the Legion of Honour. He took part in the ex
to Russia, and was twice wounded. For several
he was commander of Berlin, and afterwards deliv
department of Mont Blanc from the Austrians. I
conduct on this occasion earned him the title of the
of Savoy. After the first restoration, Dessaix was
chevalier of St Louis. He nevertheless joined Nap
the campaign of the Hundred Days, and in 18
imprisoned for five months. The rest of his life w
in retirement. He died October 26, 1834.

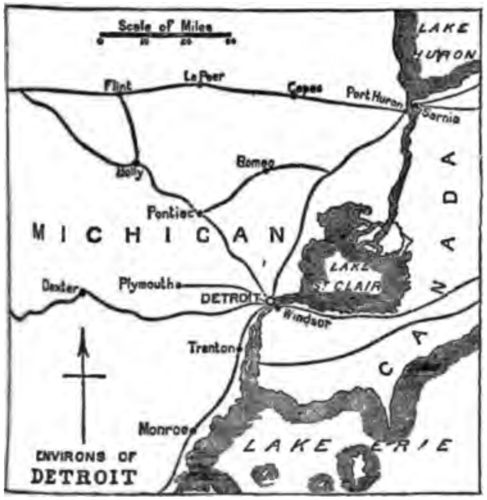
DESSAU, the chief town of the duchy of An
North Germany, is situated in 51° 51′ 6″ N. lat.
18′ E. long., on the left bank of the Mulde, nea
miles from its confluence with the Elbe, and 6
south-west of Berlin, with which it is connec
railway. The town has three suburbs. Of its g
Zerbster Thor, with the statues of Otto the Ri
Albert the Bear, alone remains. The ducal palace
stands in fine pleasure-grounds, contains a colle
historical curiosities, and a gallery of pictures, in
works by Cimabue, Lippi, Rubens, Titian, and V
Among the other buildings are the palace of the he
prince, the theatre and concert room, the admini
offices, bank, gymnasium, musical academy, Ame
Wilhelmine Institutes, two hospitals, and the Schlos
adorned with paintings by Lucas Cranach, in the
teresting of which (the Last Supper) are portraits of
Reformers. The manufactures of Dessau are
linen, and cotton goods, hats, leather, tobacco, and
and other musical instruments; and there is a c
able trade in corn. In the environs are the ducal
Georgium and Luisium, the gardens of which, as
those of the neighbouring town of Wörlitz, ar
admired. Dessau was probably founded by Al
Bear; it was already a town in 1213. It first
grow into importance at the close of the 17th ce
consequence of the religious emancipation of the
1686, and of the Lutherans in 1697. Moses Mend
the philosopher, was born at Dessau in 1729. T
lation in 1875 was 19,621.

DESTERRO, NOSSA SENHORA DO DESTERRO, o
CATHARINA, a city of Brazil, the chief town of the
of Santa Catharina, on the west coast of the isla
which the province derives its name, in 27° 30
and 48° 30′ W long. It is a small but strongly
place, with an excellent harbour, some foreign co
and regular intercourse with Rio de Janeiro, from

is distant about 460 miles. Its public buildings include a governor's palace, an arsenal, a court-house, and a hospital; but none of them have any architectural interest. In 1838 great damage was done to the town by a waterspout. Population from 7000 to 8000.

DETMOLD, the chief town of the principality of Lippe, in North Germany, is situated on the Werre, at the foot of the Teutoburger-Wald, in 51° 56′ N. lat. and 8° 50′ E. long. The foundations of the older portion of the town were laid in 1300, and those of the newer in 1709. Among the chief buildings and institutions are the new palace, in the Renaissance style, erected about 1550, the town-house, house of correction, penitentiary, military hospital, gymnasium, the industrial, commercial, and free schools, the theatre, museum of natural science, and public library. The leading industries are linen-weaving, tanning, brewing, horse-dealing, and the quarrying of marble and gypsum. About three miles to the south-west of the town is the Grotenburg, with Bandel's colossal statue of Hermann or Arminius, the leader of the Cherusci. Detmold (Thiatmelli) was in 783 the scene of a conflict between the Saxons and the troops of Charlemagne. The population in 1875 was 6982.

DETROIT, the most important city of Michigan, in the United States of America, capital of Wayne county, situated on the west bank of the Detroit River (from the French for a *strait*), opposite the Canadian town of Windsor. It is about 7 miles S.W. of Lake St Clair, 55 miles from Lake Huron, and 18 miles N. of Lake Erie, in 42° 20′ N. lat. and 83° 3′ W. long. The river, which there separates the United States from Canada, is about half a mile to three quarters of a mile wide, and 5½ fathoms deep, and flows with a pretty swift current. The population of Detroit has increased from 21,019 in 1850 to 45,619 in 1860, and 79,577 in 1870. Of this last number 35,381 were of foreign birth, including 12,647 Germans. According to the State census of 1874, the population of the city was 101,255; while in the neighbouring towns are not fewer than 15,000 persons whose business interests are in the city. Detroit with its suburbs stretches about five miles along the river, and the central part extends for about two miles back from the shore. The streets generally cross each other at right angles, and are from 50 to 100 feet wide. They are for the most part ornamented with rows of trees. A number of avenues, from 100 to 200 feet wide, diverge from the Grand Circus, a spacious park, semicircular in form, which is divided into two quadrants by Woodward Avenue. Connected with the Grand Circus is the Campus Martius, a public "place" about 600 feet long and 250 feet wide. The chief public building is the city hall, which faces the Campus Martius with fronts on four streets, and is one of the finest structures of the kind in the West. Built of sandstone, and designed after the Italian style of architecture, it measures 200 feet long, and 90 feet wide, and is surmounted by a tower 180 feet high. The cost of the building amounted to $600,000 (£120,000). Other noteworthy structures are the opera house, the office of the Board of Trade, the Roman Catholic cathedral, which is the most imposing of the many churches in the city, the custom house, containing also the post-office, and the Michigan Central Railroad freight depôt, which is 1250 feet long by 102 feet wide. On the Campus Martius stands the Michigan Soldiers' and Sailors' Monument. It is of bronze and granite, 55 feet high and about 20 feet in diameter at the base. It is surmounted by a colossal bronze statue of an Indian girl representing Michigan in defence of the Union. The design comprises numerous other bronze figures, all of which were cast in Munich.



The commercial facilities of Detroit are very extensive. The Detroit River is a connecting link in the great chain of lake navigation, and affords the best harbour on the lakes. The city is the centre of an extensive railroad system, which presents important channels of transportation in almost every direction. Not fewer than five trunk lines diverge to the eastern seaboard. More than 350 vessels are owned here, and from ten to thirteen daily lines of steamers run to various points on the lakes. There is a considerable foreign commerce with Canada, the imports in 1875 amounting to $1,680,922, and the exports to $2,340,015; 4426 vessels entered and 4355 cleared in the foreign trade; 3968 entered and 3000 cleared in the coastwise trade. The large quantities of produce, chiefly from Michigan, passing eastward through the city by rail and water, give to Detroit an extensive domestic commerce. The manufacturing industries of the city are extensive and important. The working of iron is carried on in numerous blast furnaces, foundries, and other establishments. In 1875, 9 mills manufactured 238,200 barrels of flour; 8 factories produced more than 4,000,000 ℔ of chewing and smoking tobacco; and 171 establishments made about 30,000,000 cigars. Twelve saw-mills annually cut from 45,000,000 to 50,000,000 feet of lumber; and 26 brick-yards make from 55,000,000 to 60,000,000 bricks a year. The extensive Pullman car works, with a capital of about $12,000,000, are situated here; also one of the seven pin factories in the United States. The city glass works produce about $200,000 worth of glass a year; and the copper smelting works more than $2,000,000 worth of ingot copper from Lake Superior ore. There are four ship-yards and three large dry docks.

Detroit has 10 lines of street railway, with more than 45 miles of track intersecting the city in every direction. It is divided into 11 wards, each returning 2 aldermen to the city council, and has a metropolitan police of 100 members; 7 steam fire-engines, the stations of which are connected by telegraphic alarm apparatus with all parts of the city; and ample supplies of water from the river. There are 64 churches, 14 asylums and hospitals, 18 public schools, 4 public libraries, the largest containing about 25,000 volumes; 2 medical colleges, and 3 medical societies; 8 daily newspapers, and 30 weekly and monthly papers and periodicals; several public parks; 10 banks, with an aggregate capital of $3,210,000; and 62 incorporated companies, representing capital stock to the amount of $23,445,000. The net city debt proper, January 1, 1875, amounted to $990,340, or about $9·78 per head of the population.

Detroit was settled by the French early in the 18th century, and passed into the hands of the English in 1763. It was then besieged for eleven months by the Indian chief, Pontiac. Ceded to the Americans in 1783, it was not occupied by them till 1796. It was incorporated as a city in 1824, and was the capital of Michigan from 1837 to 1847, when that honour was transferred to Lansing.

DEUCALION, in Greek legend, corresponds to the Biblical Noah. A great flood had destroyed the whole race of men except Deucalion and his wife Pyrrha, who saved themselves in a boat or ark, from which they landed on Mount Othrys, or, as it was afterwards said, on Mount Parnassus. They were then commanded by Zeus to cast behind them the bones of their mother, *i.e.*, the stones of the hill side, and from the stones thrown by Deucalion sprang men, from those thrown by Pyrrha, women. Hence men were called λαοί, "stone race." Deucalion's son Hellen was the founder of the race of Hellenes. The chief locality of this legend was Thessaly; it existed also at Dodona, where Deucalion was thought to have introduced the worship of Zeus.

DEUTERONOMY. See PENTATEUCH.

DEUTSCH, EMANUEL OSCAR MENAHEM (1829–1873), an eminent Oriental scholar, was born on the 28th of October 1829, at Neisse, a town in Prussian Silesia. He was of Jewish extraction; and the family had been settled in his native place for several generations. When six years old, Emanuel began to attend the gymnasium of Neisse, and continued a pupil for two years; after which, in compliance with the earnest wish of his uncle, David Deutsch of Mislowitz, the charge of the boy's education was transferred to him. Rabbi Deutsch was a first-rate scholar, deeply learned in the Talmud, with stern ideas of duty, as we may infer from the fact that he made his nephew rise the whole year round at 5 o'clock, study for the first two hours, and then spend an hour in prayer, before allowing him to taste food or light a fire. The rest of the day, with the exception of half an hour for exercise and recreation, was devoted to hard study. This dull routine, which proved at once the foundation of his accurate scholarship and of his ill-health, continued till Emanuel was thirteen years old, when he returned to Neisse, to solemnize his religious majority (Bar-mitzva). He proceeded once more to the gymnasium, where he enrolled in the highest class. On reaching his sixteenth year he began his studies in Berlin University, paying special attention to theology and the Talmud. Indeed the Talmud was seldom absent from his thoughts; and, after his death, a great accumulation of papers was found, containing parts of it, copied or translated, beginning in a child's hand-writing, and reaching down to a comparatively late period. Deutsch supported himself by teaching, and, about two years after going to Berlin, wrote some stories and poems on Jewish subjects for magazines. He also mastered the English language and studied English literature. In 1855 Deutsch was offered an appointment as assistant in the library of the British Museum, which he gladly accepted. "For nigh twenty years," he says, "it was my privilege to dwell in the very midst of that pantheon called the British Museum, the treasures whereof, be they Egyptian, Homeric, palimpsest, or Babylonian cuneiforms, the mutilated glories of the Parthenon, or the Etruscan mysterious grotesqueness, were all at my beck and call, all days, all hours." He worked intensely, always aiming at a book on the Talmud as his master-piece, and contributed no less than 190 papers to *Chambers's Encyclopædia*, in addition to essays in Kitto's and Smith's Biblical Dictionaries, and articles in periodicals. In October 1867 his article on "The Talmud," published in the *Quarterly Review*, at once made him famous. It was translated, within tw
into French, German, Russian, Swedish,
Danish. He was passionately desirous of tra
East; and, having obtained leave of absence fo
he left England on the 7th of March 1869.
and fatigue of the journey permanently injure
but he thoroughly enjoyed his visit to Palesti
intense patriotism and finely-strung poetical
much food for reflection. Never, to the en
did he mention his visit to the Wailing Place
in Jerusalem without profound emotion.
England on the 10th of May, submitted a va
of his travels to the trustees of the British
delivered a number of lectures, chiefly on Ph
article on "Islam" appeared in the *Quarterl*
October 1869; and, at the same time, overw
sciousness of approaching ill-health, and t
attached friends brought on terrible depress
health continued to drag him down; and, in th
1872, his old longing for the East returned s
upon him that, after obtaining six months leav
Italy and Egypt. There a cold moist winter
on his health. On the 30th of March 1873
Cairo, and was ultimately removed to Alexa
becoming rapidly worse, he died on the 1
He was buried next day in the Jewish
Alexandria, where a granite stone marks
place. Deutsch was one of the hardest wo
century, and added to his own special studies
Chaldaic, Aramaic, and Phœnician, a remarkal
ance with English literature. His *Litera*
edited by Lady Strangford, were publishe
consisting of nineteen papers on such subjec
Talmud," "Islam," "Semitic Culture," "Egypt,
Modern," "Semitic Languages," "The Targ
Samaritan Pentateuch," and "Arabic Poetry."

DEUTSCHKRONE, ARENSKRONE, or WA
of Prussia, at the head of a district in the go
Marienwerder, situated between the two lak
and Radau, about 15 miles north-west of Sch
railway junction 60 miles north of Posen. B
the seat of the public offices for the district, i
Jewish synagogue, and a progymnasium estab
old Jesuit College; and it manufactures wo
brandy, and beer. Population in 1871, 6146.

DEUTZ (Latin, *Tuitium*), an old town
Prussia, on the right bank of the Rhine, opposit
with which it is connected by two bridges.
the church of St Heribert, built in the 17t
Protestant church, cavalry barracks, artillery
and gas, porcelain, machine, and carriage fac
fortifications of the town form part of the
Cologne. The population in 1875 was 11,5
east of Deutz is the manufacturing suburb of
about 8,500 inhabitants. The old castle in
1002 made a Benedictine monastery by Heriber
of Cologne. Permission to fortify the town
granted to the citizens by the archbishop
between whom and the counts of Berg it
divided. It was burnt in 1376, 1445, and 1
1678, after the peace of Nimeguen, the fortifi
demolished. They were rebuilt in 1816. Se

DEUX PONTS, in German *Zweibrücken*, o
Bipontium, a town of Bavaria, in the Palatina
west of Spires, on the Erbach, which ultimat
way to the Moselle. Besides a court of ap
Palatinate, a penitentiary, and various ad
offices, it possesses a public library, a gymn
synagogue. Its most important buildings are
palace, greatly damaged by the French in the

was in 1868 transformed into a court-house. Alexander's Church, with the ducal burial-place, and the church which was built by Charles XI. of Sweden. The industry of the inhabitants is mainly devoted to the manufacture of cotton, silk-plush, tobacco, and oil. Population in 1875, 9349.

Deux Ponts, which derives its name from the two bridges over the Erbach, was before 1394 the seat of an imperial countship. On the partition of the Palatinate, with which it had been incorporated, it became in 1410 an independent duchy, which in 1654 furnished a king to Sweden in the person of Charles Gustavus. The death of Charles XII. in 1718 broke its connection with the Swedish crown; and the extinction of the Klenburg line, to which it was next transmitted, passed it on to the present ruling family of Bavaria. In literary history it is interesting as the place where the Bipontine editions of the Greek, Latin, and French classics were published by a learned society in the latter part of the 18th century. See J. C. Crollius, *Origines Bipontinæ*, 1761–1769; Lehmann, *Vollständige Geschichte des Herzogthums Zweibrücken*, Munich, 1867.

DEVAPRAYAGA, a town of British India, in the presidency of Bengal and province of Gurhwal, in 30° 9′ N. lat. and 78° 39′ E. long. It is one of the five sacred towns of the Hindus,—a pre-eminence which it owes to its position at the confluence of the Alakananda and the Bhagirathi, whose united waters constitute the Ganges proper. It stands at an elevation of 2266 feet above the sea.

DEVELOPMENT. See EMBRYOLOGY and EVOLUTION.

DEVENTER, or, by corruption, DEMTER, a town of Holland, in the province of Overyssel, about 25 miles north of Arnheim, on the right bank of the Yssel, which there receives the waters of the Schipbeek, and is crossed by a bridge of boats. It is a clean, prosperous place, and at the same time preserves a large number of ancient buildings as well as its fortifications. Of special interest are the Protestant church of St Leiviu, which dates from 1334, occupies the site of an older structure of the 11th century, and possesses some fine stained glass; the Roman Catholic *Broerekerk*, with three ancient gospels; the *Bergkerk*, which belonged to the Premonstratensians; the town-hall, built in 1693, containing a remarkable painting by Terburg, who was for some time burgomaster of the town; and the weigh-house, which dates from 1528. There are also cavalry-barracks, an arsenal, a court-house, a hospital, and a lunatic asylum; while among the scientific and educational institutions, an observatory, a gymnasium, and a high school may be mentioned. The last, known as the "Athenæum" down to 1864, dates from 1830, and has a library of 6000 volumes, inclusive of a number of Oriental MSS., several *incunabula*, and a 13th century copy of *Reynard the Fox*. The archives of the town are of considerable value from the fact that it was the chief town of a province. Besides a good agricultural trade, the inhabitants carry on the weaving of carpets, woollens, and silks, cotton-printing, and iron-founding; and their honey-cakes are exported in large quantities to all parts of the Netherlands. Population in 1869, 17,983.

Deventer is mentioned in 778 in connection with a Saxon inroad, but its importance only dates from the 11th century. In 1123 it was relieved by the emperor Henry V. from an investment by the duke of Saxony and the bishop of Munster. To Queen Eleanor of England it was indebted for the monastery of the Recollets, and in 1356 she breathed her last within its walls. During the War of Independence it was treacherously surrendered to the Spaniards by Edward Stanley, an Englishman, but was recaptured in 1591 by Prince Maurice of Orange. Its bishopric, which had been established only in 1559, was then abolished; and in the following year it was found necessary to destroy its wooden bridge over the Yssel. In 1813 it was invested by the Allies; and in 1814 the French withdrew in terms of the peace.

DEVEREUX. See ESSEX, EARLS OF.

DE VIGNY, ALFRED VICTOR, COUNT (1797–1863), a distinguished French poet and novelist, was born at Loches, in Touraine, March 27, 1797 (or 1799). His father, a man of noble descent, was a cavalry officer, who had served with distinction in the Seven Years' War. His mother was the daughter of an admiral. Tales of military achievements and traditions of the *ancien régime* were familiar to him in his childhood, and furnished the most powerful influences towards the formation of his character and the direction of his early ambition. He received his education at Paris, at the school of M. Hix; but, his royalist sympathies being threatened by the prevailing admiration for the empire, he was removed and placed under a private tutor. After the first restoration of the Bourbons he was admitted, at the age of sixteen, into the musqueteers of the royal household, and in this capacity he accompanied the royal family to Ghent in 1815. In the following year, on the suppression of the musqueteers, he passed into the royal guard. He remained in the army about thirteen years, and attained the rank of captain, but without seeing active service; and, wearied with the dulness of the life which he had desired, resigned his commission in 1827. He had not long before married a rich English lady. The leisure of his soldier-life had not been wasted. Not only was he gaining knowledge by observation of men and experience of life, but he meditated much, and, as he says, had all his works in his head,—"ils marchaient avec moi . . . et quand on m'arrêtait, j'écrivais." His first publication was a volume of poems, which appeared in 1822. Some of these had already been published in periodicals; and he was therefore starting on his poetical career about the same time that Victor Hugo was writing his earliest *Odes* and Lamartine his earliest *Méditations*. Two years later (1824) he published the poem of *Eloa*, a graceful embodiment of a delicate fancy. It is the story of a bright creature, "sister of the angels," born of a tear of the Saviour, and whose tender pity for the evil spirit becomes the occasion of her own fall. This was followed by several other poems, *Le Déluge*, *Moïse*, *Dolorida*, &c. In these later pieces De Vigny shows himself to have been under the powerful influence of Victor Hugo. Hitherto, however, notwithstanding the evident tokens of his genuine inspiration as a poet, he had not attained general recognition. This he first secured, won it even by storm, by the publication, in 1826, of his historical romance, *Cinq-Mars*, the story of a conspiracy under Louis XIII. This work appeared one year before Manzoni's famous novel, *I Promessi Sposi*; and both works were among the most noteworthy productions of the school of Walter Scott, whose Continental reputation was then at its height. The book had an immense run, and passed through many editions. In its pages the author shows himself qualified to present in a masterly and truthful way the character of an age, to draw vigorous portraits of great historical figures, and to depict feeling with delicacy and simplicity. It was about this time that De Vigny's friendship with Lamartine began. He was now one of the recognized chiefs of the new school, the Romantic, and one of the editors of the *Muse française*. In 1829 he produced a translation of *Othello*, which was acted at the Théâtre Français, but was not very warmly received. His next dramatic attempt was *La Maréchale d'Ancre*, performed at the Odéon in 1831. It is characterized as a learned study of the period, wanting the breath of life and the fire of poetic passion. These qualities were present in superabundance in his next and last dramatic work, *Chatterton*, produced in 1835. Although faulty in construction, and better fitted for the closet than for the stage, this powerful play has kept its place in the theatrical repertory. De Vigny's remarkable prose work, entitled *Stello, ou les Diables bleus*, appeared in 1832. It consists of three biographical studies, the subjects of which are three unfortunate poets, Gilbert, Chatterton, and André Chénier, whose fate is narrated to Stello, an invalid poet, by a philosophical physician, le *docteur noir.* True in spirit while inaccurate in detail, these stories, exquisitely told, are intended to teach poets the lesson of self-renunication. *Stello* was followed, in 1835, by another prose work of equal, perhaps superior, literary merit, entitled *Servitude et grandeur militaire.* This too, like *Stello*, is composed of three stories; and in these is depicted the soldier's life, his sufferings, his duty, and his true reward. "The poem of human life," says J. S. Mill, in his review of De Vigny's works (*Dissertations*, vol. i.), "is opened before us, and M. de Vigny does but chant from it, in a voice of subdued sadness, a few strains telling of obscure wisdom and unrewarded virtue,—of those antique characters which, without self-glorification or hope of being appreciated, carry out, as he expresses it, 'the sentiment of duty to its extremest consequences.'" De Vigny's latest gift to the world was his *Poëmes philosophiques*, or *Les Destinées*, part of which appeared in his life-time in the *Revue des Deux Mondes;* the rest, with these, were published after his death by his literary executor. These poems are mainly utterances of unbelief and despondency, intermixed with exhortations to a stoical resignation and self-reliance. De Vigny was received at the French Academy in January 1846; but, in consequence of the coldness of the reception and the offensive speech of M. Molé on the occasion, he refused to be presented to the king. He died at Paris, after severe and prolonged sufferings bravely borne, September 17, 1863. (W.L. R.C.)

DEVIL is the name which has been given in the New Testament and in Christian theology to a supreme evil personality supposed to rule over a kingdom of evil spirits, of whom he is the chief, and to be the restless and unfailing adversary of God and man. The Hebrew term denoting "adversary," or *Satan*, is also applied to this supreme evil spirit, or prince of the kingdom of evil. There can be no question that such an evil spirit is frequently spoken of in the New Testament. He is designated by various names in addition to these mentioned, such as "the Tempter," "Beelzebub," "the Prince of Devils," "the Strong One," "the Wicked One," "the Enemy," or "the Hostile One." Throughout the Gospels these terms are used interchangeably, and in all cases seem to denote the same active power or personality of evil outside man and exercising influence over him. It may be a question how far Jesus Christ himself acknowledges the existence of such an evil power, but there can be no question that such a being was recognized in the current belief of the Jews in His time.

But it is also certain that this belief amongst the Jews was one of gradual growth, and is not to be traced in the Old Testament in any such definite form as we meet with it in the New. The expression "Satan" is indeed found in the Old Testament, but only five times, if so frequently, as a proper name,—thrice in the book of Job (i. 6, 12; ii. 1), once in the opening of the 21st chap. of 1 Chronicles (although here the allusion to a distinct personality may be held doubtful), and in Zechariah (iii. 1). In all other places where the word occurs, "Satan" is used in its common sense of "adversary," a sense in which it also occurs in the Gospels, in the well-known passage (Matt. xvi. 23) where our Lord addresses St Peter, "Get thee behind me, Satan," or "adversary." The books of Chronicles and Zechariah are indisputably amongst the latest writings of the Old Testament; and, although the date of Job is unsettled, it may also be presumed to belong to a late period in the history of revelation. In the earlier prophetic literature of the Hebrews there is no recognition of any spirit of evil at war with Jehovah. All power and dominion are, on the contrary, clearly ascribed to Jehovah himself, who is supreme in heaven, on earth, and under the earth. The connection of Satan with the serpent in the garden of Eden in Genesis (iii. 1–7) is an inference of later dogmatic opinion, arising probably out of the use of the expression "Old Serpent" applied to Satan in Rev. (xx. 2), but receives no countenance from the scriptural narrative itself, which speaks of the serpent purely as an animal, and pronounces a curse against him with reference to his animal nature solely. The idea of a distinct personality of evil, therefore, is not to be found in the earlier Hebrew Scriptures, and is, in fact, inconsistent with the cardinal principle of the older Hebrew theology that Jehovah was the sole source of all power, the author both of good and evil, who hardened Pharaoh's heart (Exod. x. 27), and sent a lying spirit among the prophets of Ahab (1 Kings xxii. 20–3). Even in the later Scriptures in which "Satan" is spoken of as a distinct person, there is little or no analogy betwixt what is said of such a person in these Scriptures and what is said of him in the New Testament. The "Satan" of the book of Job is described as coming among the "sons of God" to present himself before the Lord. He is the image of malice, restlessness, and envy—the willing messenger of evil to Job; but he is not represented as the impersonation of evil, or as a spiritual assailant of the patriarch. He is really a delegated agent in the hands of Jehovah to execute His will, and the evils with which he assails Job are outward evils. The picture is quite different from that of the "Archangel ruined," or the devil, or Satan, of later theology.

The question then arises as to the special source of the conception of the devil as a fallen and evil spirit. The explanation commonly given of this conception by our modern critical schools is that it sprang out of the intercourse of the Jews with the Persians during their period of exile. In the Persian, or Iranian, mythology it is well known that a personal power of evil was conspicuously recognized. The Iranian religion divided the world betwixt two opposing self-existent deities, the one good and the other evil, but both alike having a share in creation and in man. Ormuzd, or Ahuramazda, was holy and true, and to be honoured and worshipped. But Ahriman, or Anramainyu, the evil-minded, the spirit of darkness, was no less powerful, and claimed an equal share of man's homage. These were the good and the evil in thought, word, and deed. Man has to choose betwixt the two. He cannot serve both. With this dualistic system the Jews came in contact during their captivity at Babylon, and are supposed to have retained permanent traces of it in their subsequent theology. The conception of the devil, and of a lower kingdom of demons, or devils, is the evident illustration of this. The case is put in this way by a Christian writer of moderation and knowledge:—"That the Hebrew prophets had reiterated their belief in one God with the most profound conviction is not to be questioned; but as little can it be doubted that, as a people, the Jews had exhibited little impulse towards monotheism, and that from this time (the period of their captivity) we discern a readiness to adopt the Zoroastrian demonology" (Cox's *Aryan Mythology*, ii. 356). The conception of Satan in the later canonical books of Chronicles and Zechariah is even attributed to this source. "Thus far Satan had appeared, as in the book of Job, among the ministers of God; but in later books we have a closer approximation to the Iranian creed. In Zechariah and the first book of Chronicles, Satan assumes the character of Ahriman, and appears as the author of evil. Still later he becomes the prince of devils, the source of wicked thoughts, the enemy of the Word and Son of God" (*Ibid.*, p. 351).

The process by which the Jewish mind worked out this conception and the whole scheme of demonology found in the New Testament was of course gradual. The Book of

Wisdom, a product of Alexandrian-Jewish thought in the 2d century before Christ, which speaks of the devil having "through envy introduced evil into the world" (ii. 24), is supposed to represent a stage in this development; and the apocryphal books of Enoch and Esdras (IV.), the former of which is pre-Christian, indicate further stages. Another stage is supposed to be marked by the recognition of a "devil," or evil spirit, under the name of Asmodeus, in the book of Tobit (150 B.C.) There is certainly a remarkable analogy betwixt parts of the eschatological teaching of the book of Enoch and other apocryphal books and that of the gospels. But the development of Jewish theology as a whole, in the ages immediately antecedent to Christianity, is still involved in considerable obscurity; and it is difficult to say how much of the eschatology and demonology of the New Testament is to be regarded as original, and how much as derived or inherited from prior modes of thought.

It must also be conceded that, even should we accept the modern critical theory of the rise of the New Testament conception of the devil and of demons, there is much in it that must be pronounced very different from the Zoroastrian or Iranian conception. The devil of the gospels is in some respects very unlike the Ahriman of Zoroastrianism. He is in no sense a twin-creator of man. He has no original share in him, and no right to his homage. In the Persian system the warfare of good or evil is a warfare of balanced forces. But the evil personality of the New Testament, powerful as he is, and always the enemy of the divine, is yet a subordinated and inferior being. He is the tempter of the Son of God and the enemy of man. He has power on earth, and even a certain power over the Son of man; and yet the Son can restrain and bid him get behind Him. The subordinated forces of evil—the demons—are all subject to Christ. They hear His word and obey it. In short, the devil of the New Testament is, in comparison with the source of evil recognized by Zoroastrianism, a limited power. He is a subordinate although insurrectionary spirit, working by spiritual means upon the heart of man, and in no sense a native power having an original or creative hold of him. This sets the evangelical conception on a higher level than the Persian, and proves that the Jewish mind, supposing that it did borrow certain impulses from the Iranian dualism with which it came in contact in the period of exile, yet wrought out the conception in the depth of its own religious and moral consciousness within the sphere of revealed truth which was its great educational medium.

The idea of an evil personality was therefore so far a native growth of the Jewish mind, working upon hints contained, although not developed, in the earlier Hebrew Scriptures. It is evident from various passages, both of the Pentateuch (Lev. xvii. 17; Deut. xxxii. 17) and of the prophetic Scriptures and the Psalms (Isa. xiii. 21, xxxiv. 14; Jer. xv. 36; Ps. cvi. 37), that the Hebrews were cognizant of evil beings supposed to dwell in darkness and waste places. The names applied to those beings in the passages referred to are various, sometimes seirim—lit. goats (Lev. xvii. 7; Isa. xiii. 21), and sometimes shedim (Deut. xxxii. 17), probably a name for demigods, both phrases being translated "devils" in our authorized version of the Pentateuch. This translation suggests later associations; but such expressions plainly denote a belief in evil beings, the survival, probably, in the Hebrew consciousness of fragments of an older native faith which deified the powers of evil as well as of good. Some have traced a similar survival in the name Azazel, translated in our version scape-goat (Levit. xvi. 8, 10, 26), and which has been supposed to represent an evil being haunting the desert, to which was devoted the goat sent away on the great day of atonement. This opinion is disputed by others on grounds both philological and theological. But it may be almost certainly assumed that, with all the jealous monotheism of the Jews, there was an undergrowth of darker conceptions, pointing to evil existences opposed to the divine, and that to some extent the later idea of the devil sprang out of this natural growth in the Hebrew mind of an evil side to nature and to life. This process of growth may have been greatly aided by contact with the Persian dualism, and especially the idea of a kingdom and hierarchy of evil powers seems to have been indebted to this source. But it was also largely original, and at the end, as at the beginning, the Jewish and Christian conceptions of the devil and his angels were very distinct from those of the Persian faith. They belong to a higher level of thought, and are the product of a more advanced stage of moral and spiritual feeling.

The idea of the devil so clearly expressed in the New Testament passed as a dominant factor into the early Christian theology, acquiring for many centuries an always deeper hold on the popular religious imagination. In the writings of the fathers of the 2d and 3d centuries the devil plays an important part. The whole of the Roman imperial system, and all that opposed the progress of the gospel, was identified with his kingdom. Satan was the "prince of this world," he was the rival and caricature of the divine. "Satan," said Tertullian, "is God's ape;" and the saying passed into a proverb. He fell by pride and arrogance and envy of the divine creation (Iren., *Adv. Hær.*, iv. 40). He was, according to Cyprian (*De Unitate Eccl.*), the author of all heresies and delusions; he held man by reason of his sin in rightful possession, and man could only be rescued from his power by the ransom of Christ's blood. This extraordinary idea of a payment or satisfaction to the devil being made by Christ as the price of man's salvation is found both in Irenæus (*Adv. Hær.*, v. 1. 1.) and in Origen, and may be said to have held its sway in the church for nearly a thousand years. And yet Origen is credited with the opinion that, bad as the devil was, he was not altogether beyond hope of pardon. In this as in other respects the early Alexandrian school showed a milder and broader type of thought than the prevailing theology of the church. Occasionally in later times the milder opinion was expressed, as by Gregory of Nyssa in the 4th century; but gradually it vanished, and the devil was drawn by the theological pencil in darker and more terrible colours. Augustine greatly helped to strengthen and confirm the darker view, and to give in this as in other things a gloomier tinge to religious thought. During the Middle Ages the belief in the devil was absorbing—saints conceived themselves and others to be in constant conflict with him. It is hardly possible for us now, as M. Reville says in his short treatise on the subject, "to imagine to what a degree this belief controlled men's whole lives. It was the one fixed idea with every one, particularly from the 13th to the 15th century—the period at which we may consider this superstition to have reached its climax." The superstition showed certainly but slight signs of yielding in the 15th, or even in the 16th or 17th centuries. Luther lived in a constant consciousness of contact and opposition with the evil one. At his study, in bed, or in his cell, the devil was incessantly interfering with his work or rest. As he was going to begin his studies he heard a noise which he immediately interpreted as proceeding from his enemy. "As I found he was about to begin again, I gathered together my books and got into bed. Another time in the night I heard him above my cell walking in the cloister; but as I knew it was the devil I paid no attention to him and went to sleep." Again he says: "Early this morning, when I awoke the fiend came and began disputing with me. 'Thou art a great sinner,' said he. I replied, 'Canst thou not tell me something new, Satan?' "

This realism of belief in an evil power near to man, and constantly assailing him, continued more or less all through the 17th century, and was especially strong, as Mr Buckle has shown in his well-known volumes, in Scotland. He has somewhat overcharged his picture; but he presents at the same time indisputable facts which leave no doubt that the clergy and people alike imagined that "the devil was always and literally at hand—that he was haunting them, speaking to them, and tempting them. Go where they would he was there." With the rise of a rationalistic temper throughout Europe, in the 18th century, this belief in the pervading influence of diabolic agency began to disappear. The sense of the supernatural decayed in all directions, and especially the old belief in the arbitrary control exercised by an evil power over human destiny. And while the religious impulse has gained greatly since then, and shown renewed vigour both in an evangelical and catholic direction, it cannot be said that the earlier faith in the operations of a personal devil has acquired reascendency. It may be still the prevailing opinion of Christendom that there is an evil power working in the world opposed to the divine; but whether this power is personal, or how far it touches the human will, or again, whether there is a subterranean kingdom of demons with a prince of demons or devil at their head, and how far such a kingdom has any relation to human destiny, are all questions that must be held to be very unsettled, or maintained with very doubtful confidence in any section of the Christian church. It is our business simply to note such a change in the attitude of Christian belief, and not to express any opinion as to its advantage or otherwise. It is too much to speak with M. Reville of Satan as a "fallen majesty;" but the idea of the devil certainly no longer bulks in Christian thought as it once did, nor is his reign the recognized influence that it once was over human life and experience. (J. T.)

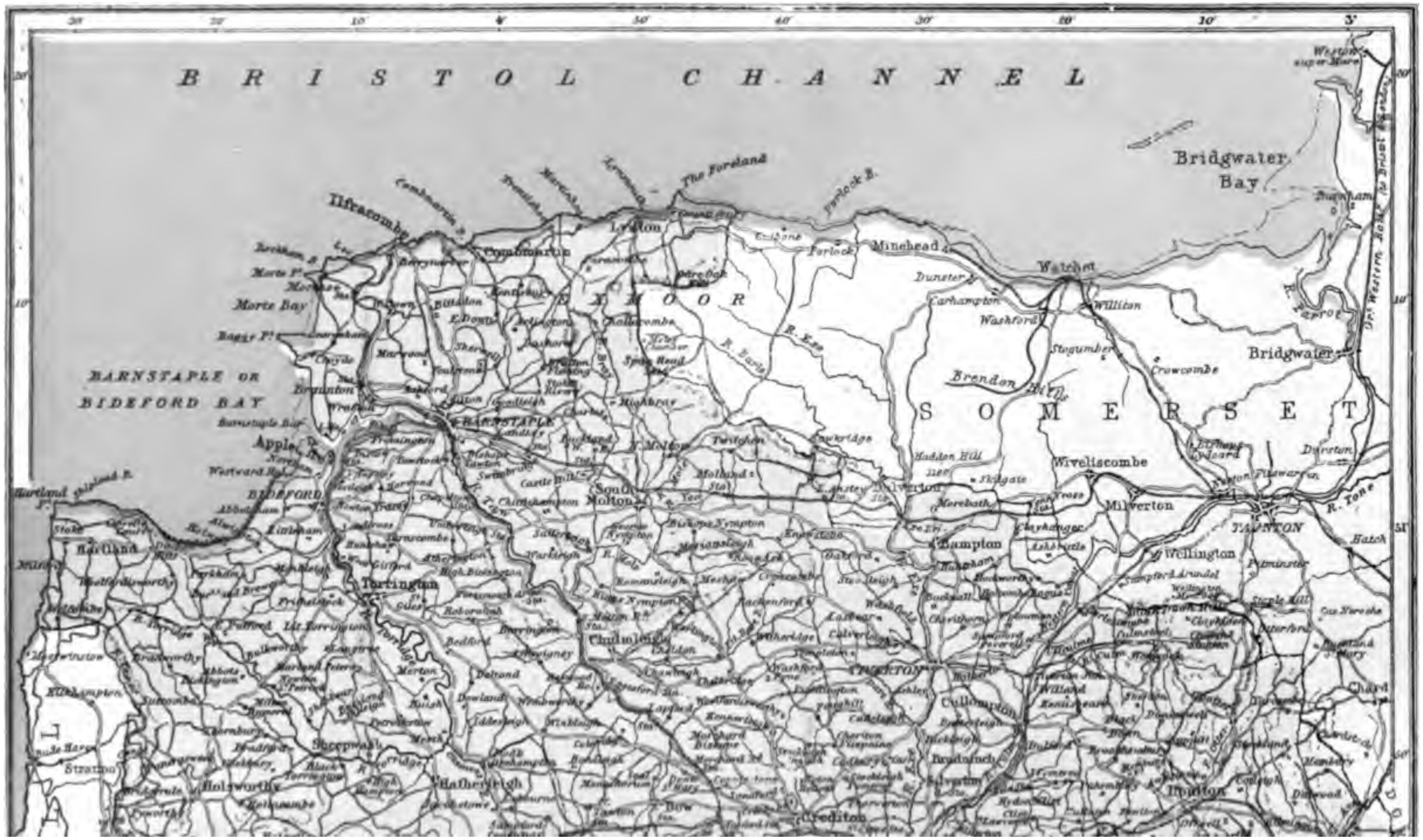
DEVIL FISH, or SEA DEVIL (*Lophius piscatorius*), an Acanthopterygian fish belonging to the family *Pediculati*, so named from its hideous aspect, produced mainly by the enormous size of its head in proportion to the rest of its body. The latter tapers off rapidly towards the tail, and gives the creature the appearance of a gigantic tadpole—a resemblance to which it owes the name of frog-fish, applied to it from the earliest times. The cleft of the mouth is also exceedingly wide, measuring 14 inches in a specimen 4½ feet long; and when the mouth is open the lower jaw protrudes beyond the upper, while both jaws are armed with several rows of formidable teeth. The pectoral fins are broad, and are rendered conspicuous by the prolongation of the carpal bones to which they are attached; the ventral fins are palmate, and are placed far forward on the body. The sea devil is a sluggish fish, and, being at the same time exceedingly voracious, is said to have recourse to stratagem in order to satisfy its inordinate appetite. Three anterior dorsal spines, isolated from the others, and attached to the head in front of the eyes, are so modified as to form long filiform appendages, two of these being articulated to the skull by means of a bony ring, and thus capable of being moved in all directions by appropriate muscles, while the end of the front tentacle is broad and flattened, and of a shining, silvery aspect. Concealing itself in the mud of the sea-bottom, it waves these tentacles aloft, and the silvery extremity of the front filament acts as a bait in tempting the smaller fishes to approach near enough to be seized by the capacious jaws beneath. On this account the creature has received the name of angler, or fishing frog. The lobes, which form a fringe around the anterior part of the body, probably perform, although in a minor degree, the same function as the angling apparatus
on the head. Although its prey is usually taken
bottom, it has been known to ascend and float upo
surface of the water in search of food, and thus som
to capture sea fowl. Not unfrequently, also, it lay
on cod or other fish as these are being drawn up hoo
the fisherman's line, and when caught with other fi
the net it busies itself in devouring as many as poss
its fellow-prisoners. As a food fish the sea devil is
less, but as the process of its digestion proceeds but
the fishermen often capture it for the fish contained
stomach. Couch tells of one which, when o
contained nearly three-fourths of a hundred of herri
of them fit for the market. It attains a length of
ordinary specimens measuring about 3½ feet. It
inhabitant of the seas of the temperate regions of E
North America, Asia, and Africa.

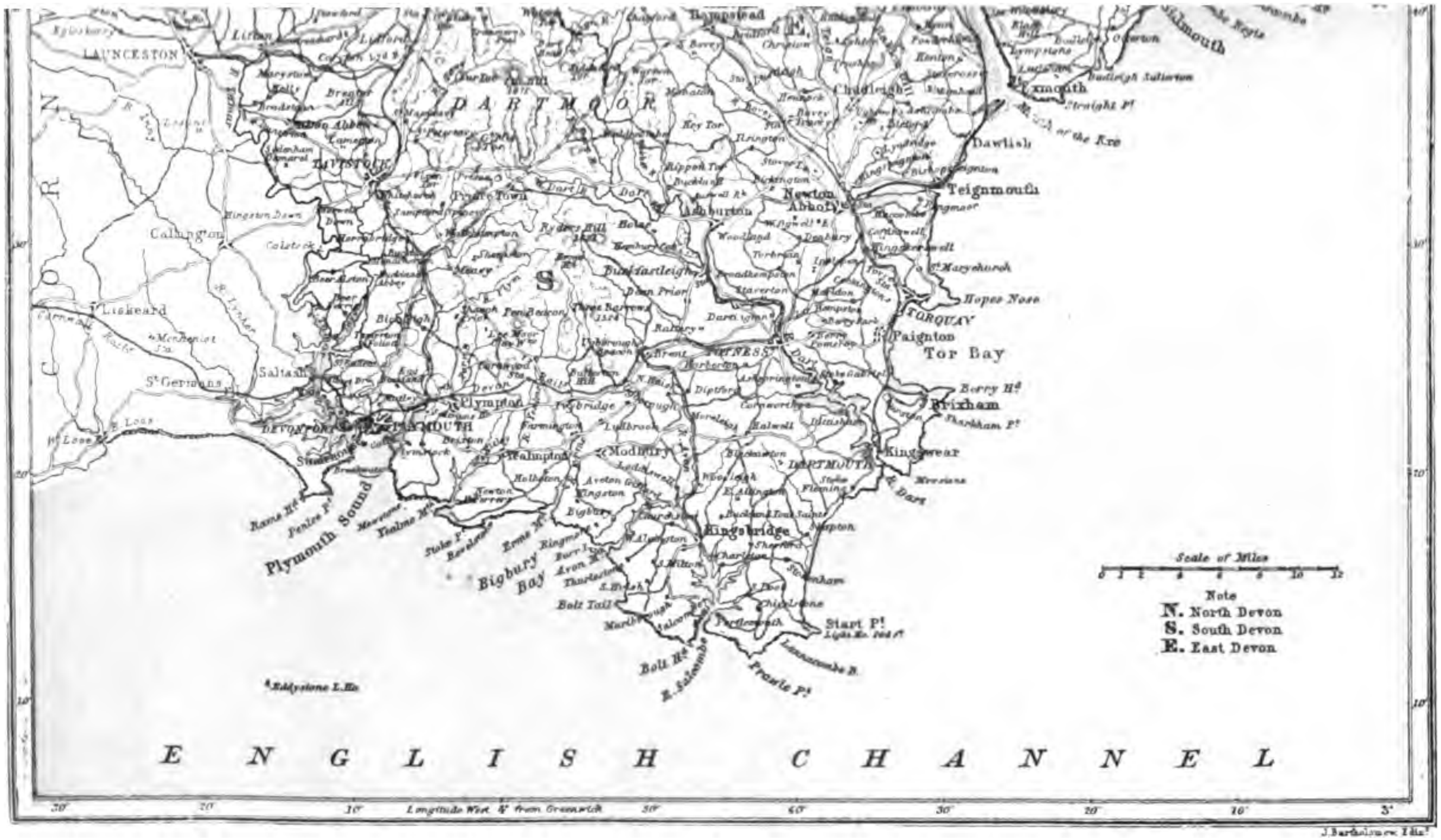
DEVISE. See WILL.

DEVIZES, a municipal and parliamentary boroug
market town of England, in North Wilts, situated
Kennet and Avon canal, 86 miles west of London b
It stands on a plateau in the centre of the county, no
northern limit of Salisbury Plain. The town, whic
considerable antiquity, consists of a market-place
streets diverging therefrom. Some of the houses
their antique timber construction. In the middle
market-place there stands a large cross erected by
Sidmouth in 1815. The principal public buildings a
town hall, the corn exchange (a spacious and hand
building), the county jail, the Bear Club charity s
and the churches. St John's Church dates from the
of Henry I., but has received numerous addition
repairs, and was restored in 1863; it belongs to the N
Perpendicular style of architecture. The building is
plete, with nave, transept, chancel, and chantry ch
St Mary's is also of ancient origin, but was mostly
in the 15th century. Besides these there are chap
longing to the various nonconformist bodies. Devizes
time was famous for its woollen manufactures, but thes
long been discontinued, and the only articles now
factured are silk and snuff. Ale is also brewed. Th
however, a large trade in grain carried on; and the D
corn-market is one of the most important in the w
England. The town is said to have taken its rise aft
erection of the formidable castle which once stood
but has now entirely disappeared. This fortress wa
about the year 1132 by Bishop Roger of Salisbury,
reign of Henry I. In 1138 it was seized by Step
his campaign against the bishops, and three
thereafter was taken and held by Robert Fitz Herb
behalf of Queen Maud. He did not, however,
possession of it for any length of time. It was ever
dismantled in 1376. During the wars of the co
wealth Devizes was unsuccessfully besieged by Wa
1643, but was taken by Fairfax and Cromwell two
later. It received its borough charter from Maud
the name of *De Vies*; and it is governed by a m
aldermen, and 18 councillors. From the time of E
III. it was represented in Parliament by two membe
the Reform Act of 1868 reduced its representation
member. The borough, which has an area of 90
is divided into two wards—north and south. Pop
in 1851, 6554; and in 1871, 6839.

DEVONPORT, a municipal and parliamentary b
of England, in the county of Devon, contiguous
towns of East Stonehouse and Plymouth, the seat
of the royal dockyards, and an important nav
military station. It is situated immediately abov
mouth Sound, occupying a triangular peninsula form
Stonehouse Pool on the east and the Hamoaze on the
The town proper is inclosed by a line of ramparts

DEVON


BRISTOL CHANNEL
Bridgwater Bay
BARNSTAPLE OR BIDEFORD BAY
SOMERSET
EXMOOR
The Foreland
Porlock B.
Morte Bay
Ilfracombe
Combmartin
Lynton
Porlock
Minehead
Dunster
Watchet
Williton
Carhampton
Washford
Stogumber
Crowcombe
Brendon Hills
Bridgwater
Burnham
Weston super Mare
Wiveliscombe
Milverton
Taunton
Wellington
Durston
R. Tone
Hatch
Chard
Barnstaple
Bideford
Appledore
Braunton
Hartland Pt.
Hartland
Torrington
South Molton
North Molton
Chulmleigh
Tiverton
Bampton
Dulverton
Cullompton
Crediton
Honiton
Holsworthy
Hatherleigh
Stratton
Great Western Railway



ENCYCLOPÆDIA BRITANNICA. NINTH EDITION.

high, protected by a ditch of about 15 feet in depth, excavated out of the solid limestone. Three gates—the Stonehouse gate, the Stoke barrier, and the North barrier—afford communication respectively with East Stonehouse, Stoke, and Morice Town, the last two being suburbs of Devonport. The streets are laid out with regularity, and are paved with a peculiarly white limestone that gives an air of great cleanliness to the town. A copious supply of water is provided by means of a conduit from Dartmoor. The public buildings are both handsome and numerous. The town hall, erected in 1821–22 partly after the design of the Parthenon, is distinguished by an elegant Doric portico; while near it are the public library, in the Egyptian style of architecture, and a conspicuous column or Doric pillar built of Devonshire granite. This monument, which is 100 feet high, was raised in commemoration of the naming of the town in 1824. There are numerous churches belonging to the different religious denominations. Besides the parish church, which is small, several chapels of ease have within the present century been erected in various parts of the town. One of them, a handsome edifice built in 1814–15 at a cost of £24,000, is situated in the dockyards, and was erected for the special use of those employed there. Of the Government buildings the principal are a spacious hospital outside the barriers, the Raglan barracks, and the residences of the military and naval chief officers. On Mount Wise, which is defended by a battery, stands the military residence, or Government house, which is occupied by the commander of the western district; and near at hand is the other residence, the port admiral's house. Mount Wise itself and the parade form interesting features of the place, and tend greatly to the amenity of the town—the prospect from the former being one of the finest in the south of England. The most noteworthy object, however, in connection with Devonport is the royal dockyard, which extends along the shore of the Hamoaze from Mutton Cove to Keyham Lake, a distance of about 1¾ miles. The naval dockyard, which formed the nucleus of the town, is situated within the ramparts, and covers an area of 75 acres, with a wharfage of 1160 yards; while beyond the ramparts, and higher up the Hamoaze, is the more recently constructed Keyham steam yard, connected with the former by means of a tunnel 900 yards long. Keyham steam yard occupies an area of 100 acres; and its docks are built of granite. In connection with the dockyards are the gun wharf, and extensive store-houses and factories. The number of hands employed in the works is very large, varying from 3000 to 4000, according to circumstances; and it may be said that, with the exception of a brewery in the suburb of Morice Town, the only manufactory of the place is that belonging to the Government. The history of Devonport is of comparatively recent date. After the outbreak of war with France in 1689 William III. established an arsenal there in connection with the neighbouring naval station of Plymouth, and it received the name of Plymouth Dock. Its proportions were, however, somewhat limited until in 1761 and in 1771 extensive additions were made, and since then it has steadily increased in importance. In 1824 it received its present distinctive name, and by the Reform Act of 1832 it was erected into an independent borough returning 2 members to Parliament. The municipal borough, which is co-extensive with the parish of Stoke-Damerel, is subdivided into 6 wards, and covers an area of 1760 acres; while the area of the parliamentary borough, which includes East Stonehouse, extends to 1950 acres. The town is governed by a mayor, 12 aldermen, and 35 councillors, and has a separate commission of the peace. The ground on which Devonport stands is for the most part the property of the St Aubyn family, whose steward holds a court leet and a court baron annually. The population of the municipal borough was, in 1851, 38,180; in 1861, 50,440; and in 1871, 49,449—the males being slightly more numerous than the females. The population of the parliamentary borough in 1871 was 64;034. See PLYMOUTH and DOCKYARDS.

Plate II

DEVONSHIRE, one of the south-western counties of England, the third in extent in the country, being exceeded only by York and Lincoln. According to the latest survey, it contains 1,594,852 acres—equal to about 2492 square miles. On the N. and N.W. the county is bounded by the Bristol Channel, on the S. by the English Channel; on the W. it adjoins Cornwall, on the E. Dorset and Somerset. In form, Devonshire is very irregular; but it sends out one long promontory towards the S., and on the N. the coast line trends sharply southward near Ilfracombe, and is broken into the deep hollow of Bideford Bay.

General aspect.—Nearly the whole area of Devonshire is uneven and hilly. It contains the highest land in England, south of the Yorkshire Ingleborough; and the scenery, much varied, is in most parts of the county very striking and picturesque. The great feature of Devonshire is the granitic district of Dartmoor, so named from the principal river which rises on it, the Dart, and occupying an area of about 130,000 acres. This great plateau, the mean height of which is about 1500 feet, rises in the southern division of the county, and is more or less conspicuous from all the lower tracts. It is the highest and easternmost in a broken chain of granite elevations, which extends to the Scilly Islands. Steep heights, crested with masses of broken granite, locally named *tors*, break up from the main table land in all directions, and are often singularly fantastic in outline. The highest of these is Yestor, 2050 feet, in the northern quarter; whilst one of the most conspicuous is Heytor, 1501 feet, in the south. Dartmoor is a region of heather, and the central portion has been a royal forest from a period before the Conquest. Its grand wastes contrast finely with the wild but wooded region which immediately surrounds the granite (and along which occurs the most picturesque scenery in Devonshire), and with the rich cultivated country lying beyond. It is this rich country which has given Devonshire the name of the Garden of England. The most noticeable districts are the so-called Vale of Exeter, covering an area of about 200 square miles, and including the meadows which surround Crediton, the richest in the county; and the South Hams, the extent of which is not very clearly defined, but which covers the deep projection between the mouths of the Dart and the Erme. Another very picturesque division extends eastward of Exeter as far as the Dorsetshire border. The north and south coasts of the county differ much in character and climate, the north being by far the more bracing. Both have grand cliff and rock scenery, not exceeded by any in England or Wales; and, as a rule, the country immediately inland is of great beauty. The general verdure of Devonshire, and its broken hilly character, are the features which everywhere most strongly assert themselves. The least picturesque part of the country is that toward the centre, which is occupied by some portions of the Carboniferous formation.

The principal *rivers* rise on Dartmoor, and are—the Teign, the Dart, the Plym, and the Tavy, falling into the English Channel, and the Taw and the Torridge, flowing north towards Bideford bay. The lesser Dartmoor streams are the Avon, the Erme, and the Yealm, all running south. The Exe rises on Exmoor in Somersetshire; but the main part of its course is through Devonshire (where it gives name to Exeter), and it is joined on its way to the English channel by the lesser streams of the Culm, the Creedy, and the Clyst. The Otter, rising on the Blackdown hills, also runs S., and the Axe, for part of its course, divides the counties of Devon and Dorset. These eastern streams are comparatively slow and still-flowing. The Dartmoor rivers, rapid, dashing, and rocky, are famous trout streams. None of the streams are of any great length.

The [illegible] of Devonshire are of course [illegible] of the general appearance of the county. [illegible] has been said, is a granite region. By far the greater part of central Devon is occupied by Carboniferous [illegible] chiefly of sandstones, often siliceous, and [illegible]. All this formation has been subjected to great [illegible] and the strata (as may be seen on every part [illegible] between Barnstaple and the mouth of the Taw [illegible] in a manner which defies description, [illegible] very extraordinary and picturesque [illegible]. True coal does not exist, but anthracite [illegible]. These rocks are also associated with [illegible], which bear a striking analogy to [illegible]. Underlying the carbonaceous [illegible] greywacke or Devonian rocks, forming the [illegible] of the county, and great part of the South Hams. They extend west of Plymouth, and cover the [illegible] of Cornwall. These rocks are generally held [illegible] of the "Old Red" system, although [illegible] Old Red rocks, so largely developed in [illegible] and elsewhere, are not found at [illegible]. The Devonian rocks consist of clay-[illegible] sandstones, and flags. The [illegible] differ; but although these [illegible] complexities, this and other differ-[illegible] of explanation. The third great [illegible] is the New Red, which occupies [illegible] of the county, extends along [illegible] to Torbay, and sends out a long [illegible] the Carboniferous district. The upper [illegible] principally of marls, the middle [illegible] of breccias or coarse conglo-[illegible] peroxide of iron. The formation [illegible] of organic remains, and by [illegible] of the soil.

[illegible] of the Carboniferous and New [illegible], near Tiverton, on the N. [illegible] masses of igneous [illegible]. These traps are for the most part [illegible] and many of the quarries have [illegible] and elvans are also [illegible]. Greensand strata [illegible] near Axminster, [illegible] of chalk, occupy a [illegible] the eastern border of [illegible] of the sea at Beer [illegible] Tertiary deposit, [illegible] at Bovey [illegible] of Dartmoor. It [illegible]

[illegible]

geological history. The most important is Kent's Hole, near Torquay, which has been carefully explored, and appears to have been frequented by bears, hyænas, and, at last, by primitive man. There are others at Brixham, at Chudleigh, and at Oreston near Plymouth.[1]

Minerals.—The minerals of most account are tin and copper. Iron occurs, but to no great extent. The *silver-lead* mines at Combe Martin on the N. coast, and at Beer Alston, on the Devonshire side of the Tamar, were formerly worked to advantage; but the former have long been abandoned, and the latter, since 1860, have been swamped by water from the river, under the bed of which the principal mine extended. *Tin* has been found on Dartmoor (in stream works) from an unknown period. *Copper* was not much worked before the end of the last century. Tin occurs in the granite of Dartmoor, and along its borders, but rather where the Devonian than where the Carboniferous rocks border the granite. It is found most plentifully in the district which surrounds Tavistock, which, for tin and other ores, is in effect the great mining district of the county. Here, about 4 miles from Tavistock, are the Devon Great Consols mines, which from 1843 to 1871 were among the richest copper mines in the world, and by far the largest and most profitable in the kingdom. The divided profits during this period amounted to £1,192,960. But the mining interests of Devonshire are affected by the same causes, and in the same way, as those of Cornwall. The quantity of ore has greatly diminished, and the cost of raising it from the deep mines prevents competition with foreign markets. In many mines tin underlies the general depth of the copper, and is worked when the latter has been exhausted. The metalliferous character of the Tavistock district is indeed very mixed, and besides tin and copper, ores of *zinc* and *iron* are largely distributed, but these have as yet received no great attention. At the Devon Great Consols more than 2000 tons of refined *arsenic* are annually produced by elimination from the iron pyrites contained in the various lodes. This amount is calculated to be about one-third of the arsenic produced throughout Europe. *Manganese* occurs in the neighbourhood of Exeter, in the valley of the Teign, and in N. Devon; but the most profitable mines, which are shallow, are, like those of tin and copper, in the Tavistock district.

The other mineral productions of the county consist of marbles, building-stones, slates, and potters' clay. *Marbles* occur in the Carboniferous series at Chudleigh and elsewhere, but of very inferior character and beauty to those among the Devonian rocks, at Ipplepen, Babbacombe near Torquay, and Plymouth. These are largely worked, and are used extensively in the decoration of churches and other buildings. Among *building stones*, the granite of Dartmoor holds the foremost place. It is much quarried near Prince Town, near Moreton Hampstead on the N. of Dartmoor, and elsewhere. The annual export is considerable. There are very large and ancient quarries of a [illegible] at [illegible] the eastern border of the county. The [illegible] stone, nearly white, [illegible] with argillaceous [illegible] matter, and with particles of green silicate of iron. [illegible], which [illegible] many places, are also [illegible], as are the [illegible] of Buckfastleigh and of [illegible]. The [illegible] from an early [illegible] near Tavistock, [illegible]. Ex-[illegible] round the [illegible] are near Ashburn and Plymouth (Cann quarry), but none of them are extensive or important as those at Delabole in Cornwall. *tters' clay* is worked at King's Teignton, whence it is gely exported, at Bovey Tracy, and at Watcombe ar Torquay. The Watcombe clay is of the finest quality, d is capable of retaining the most delicate form. *China y* or kaolin, is found on the S. side of Dartmoor, at e Moor, and near Trowlesworthy. There is a very large posit of *umber*, as yet little known, close to Ashburton.

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[1] [illegible] with the caverns, [illegible] Mr W. Pengelly, of [illegible] in 18[illegible].

Climate.—The climate varies greatly in different parts of e county but everywhere it is more humid than that the eastern or south-eastern parts of England. Both evon and Cornwall have a mean annual temperature out 1°·5 above that of the midland counties; but in the ummer they are cooler than the whole range of country om the south coast to the 53° of lat. The air of the Dart- oor highlands is sharp and bracing. Mists are frequent, nd snow often lies long. On the south coast frost is little nown, and many half hardy plants, such as hydrangeas, yrtles, geraniums, and heliotropes, live through the inter without protection. The climate of Sidmouth, eignmouth, Torquay, and other watering places on this oast, is very equable, and the mean temperature of the inter months is about 47°. The N. coast, exposed to he storms and swell of the Atlantic, is far more bracing; lthough there also, in the more sheltered nooks (as at ombe Martin), myrtles of great size and age flower freely, nd produce their annual crop of berries.

Agriculture.—While the eastern division of England, anging from Yorkshire to Hampshire and Sussex, s essentially a corn-growing country, the south-western s as specially the grazing or pasture-land division. The otal amount of land in Devonshire under corn crops in 1876 was 283,332 acres, of which 112,652 were under wheat, 152,370 under green crops, 189,761 under clover, anfoin, and grasses under rotation; and the permanent nbroken pasture (exclusive of the moors) extended to 42,406 acres. Of horses used solely for agricultural urposes, the number returned in 1876 was 51,753; of ttle, 217,111; of sheep, 943,542, of pigs, 90,773. hese numbers, as compared with those of former years, ow a steady progress, and an annual increase in the tent of permanent pasture. In the small farms on Dart- oor and along its borders grain crops are very uncertain, d on Dartmoor itself even oats do not ripen in unfavour- e seasons. The root and other crops obtained on the d attached to the convict prison are due to the amount manual labour expended on them, which in ordinary s would be altogether without profit. Devonshire is of the cider-producing counties of England, soil and ate being favourable to the growth and bearing of the e. The acreage of Devonshire orchards in 1876 was 97. The two other principal cider counties had ctively—Hereford, 24,616 acres planted with fruit (apples and pears), and Somerset, 21,029.

respects the ownership of the land. according to wners of Land Return for 1873, the county was d among 31,809 proprietors, whose aggregate esti- rental amounted to £2,881,665. Of that number or 68 per cent. owned less than 1 acre—the pro- of small proprietors in all England being 71 per and the rental per acre averaged £1, 18s. 0d, as £3, 0s. 2d. in all England. Nearly one fifth of was owned by 15 proprietors:—To the Duchy of l belonged 48,457 acres; Hon. Mark Rolle. Steven- rrington, 45,088; Duke of Bedford, 22,607; Earl , Powderham Castle. 20,558; Earl Fortescue. ll, 20,171; Lord Poltimore, Court Hall, 17,047; ight, Exmoor, 16,903; Earl of Portsmouth. Egges- e, 16,414, Sir George Stucley, Bart., Hartland Abbey, 15,144; Sir T. D. Acland, Bart., Killerton, 15, Lord Clinton, Heanton Satchville, 14,431; Sir Ma Lopes, Bart., Maristow, 11,977; M. Preston, Chulmlei 11,280; Sir W. P. Carew, Bart., Newton Abbot, 10,8 and Sir Lawrence Palk, Bart., Haldon House, 10,109.

Industries.—Devonshire has few manufactures, and very important industrial works. There is a considerab pottery at Bovey Tracy, manufacturing white, printed, an painted ware; and another at Watcombe, where the pr ductions are finer and more artistic. Blankets and serge are made at Backfastleigh and at Ashburton, and th factories employ many hands. At Tiverton there is an extensive lace-making factory. The manufacture of Honiton lace, made by hand on the pillow, is now confined to Beer and some other villages on the S.E. coast. Shoes and boots, chiefly for export, are made at Crediton. The greatest industrial works in the county however, are the vast Government establishments at Plymouth and Devonport—the victualling yard, and the dockyard. The convict prisons in Dartmoor may also be regarded as an industrial establishment. They were built for French prisoners in 1809, and in 1850 were adapted for receiving convicts. Since that year more than 100 acres round the prisons have been brought into cultivation under convict labour; and 1000 acres more were added to the prison lands in 1871. In addition to the old buildings, a large prison, arranged on the latest principles, was erected in 1872.

The fisheries of Devonshire are in no way so important as those of Cornwall. About 200 trawlers belong to the port of Brixham, the head quarters of the fisheries of Tor Bay. Herrings and mackerel visit the coasts in their seasons, but not in the vast shoals known farther west. It may be said that trawling is the main feature of the Devonshire fishery whilst seining and driving characterize that of Cornwall.

History.—The British tribes inhabiting this western portion of the island are called *Dumnonii* by Ptolemy; and *Dumnonia*, or *Dammonia*, the Latinized name of a kingdom which long remained independent after the arrival and early conquests of the West Saxons, seems to be identical with the Cymric Dyfnaint, which survives in the present Devon. The Saxon settlers, as they advanced into the country, called themselves Defenas, *i.e.*, men of Devon or Dyfnaint, thus adopting the British name, and indicating the broad difference between their settlements in such a district as Devon, where British influence so long survived, and where they came as Christians, and those in southern or eastern England, where the Britons were either expelled or exterminated. In Devonshire the Christian Britons became subjects of the Christian Saxons. "The Celtic element can be traced from the Somersetshire Axe, the last heathen frontier, to the extremities of Cornwall, of course increasing in amount as we reach the lands which were more recently conquered, and therefore less perfectly Teutonized. Devonshire is less Celtic than Cornwall, and Somersetshire is less Celtic than Devonshire; but not one of the three counties can be called a pure Teutonic land, like Kent or Norfolk" (E. A. Freeman). Celtic names are accordingly found in various parts of Devonshire, and especially on Dartmoor, side by side with those which are truly Saxon.

For some time after the landing of William I. and the battle of Hastings, the western counties remained undisturbed. In the spring of 1068 Exeter was besieged and taken by the Conqueror, who built a castle there, which was besieged in 1137 by Stephen for three months. In 14[illegible] Exeter, which was Lancastrian, was besieged for twelve days by the Yorkists, but held out successfully; and in 1497 the city was again besieged by Perkin Warbeck. A more important siege occurred in 1549, when the western counties rose in defence of what was called the "old religion." This lasted for 35 days. Both Exeter and Plymouth were besieged for many months during the civil war of the Commonwealth. This was a period of considerable disturbance in the west. The golden age of Devonshire is, however, that of Elizabeth. Drake, Hawkins, Raleigh, and the Gilberts, besides a host of others, were all of Devonshire; and the history of the county at that time is bound up with the story of its harbours and seaside towns, and is in close connection with the general history of England. It was from Plymouth that the English ships sailed for the attack and dispersion of the Armada, the near approach of which was there first made certain. The landing of William of Orange at Brixham, November 5, 1688, is perhaps the event most fraught with important results which has taken place in the western counties.

Antiquities.—In primeval antiquities Devonshire is not so rich as Cornwall; but Dartmoor abounds in remains of the highest interest, the most peculiar of which are the long parallel alignments of upright stones, which, on a small scale, resemble those of Carnac in Brittany. On Dartmoor the lines are invariably straight, and are found in direct connection with cairns, and with circles which are probably sepulchral. These stone avenues are very numerous. Of the so-called sacred circles the best examples are the "Longstones" on Scorhill down, and the "Grey Wethers" under Sittaford tor. By far the finest cromlech is the "Spinster's Rock" at Drewsteignton, a three-pillared cromlech which may well be compared with those of Cornwall. There are numerous maenhirs or single upright stones; a large dolmen or holed stone lies in the bed of the Teign, near the Scorhill circle; and rock basins occur on the summit of nearly every tor on Dartmoor (the largest are on Kestor, and on Heltor, above the Teign). It is, however, tolerably evident that these have been produced by the gradual disintegration of the granite, and that the dolmen in the Teign is due to the action of the river. Clusters of hut foundations, circular, and formed of rude granite blocks, are frequent; the best example of such a primitive village is at Batworthy, near Chagford; the type resembles that of East Cornwall. Walled inclosures, or pounds, occur in many places; Grimspound is the most remarkable. Trackways, or boundary lines, run across Dartmoor in many directions; and the rude bridges, formed of great slabs of granite, deserve notice. All these remains are on Dartmoor. Scattered over the county are numerous large hill castles and camps,—all earthworks, and all apparently of the British period. Roman relics have been found from time to time at Exeter (*Isca Damnoniorum*), the only large Roman station in the county.

Buildings.—The churches are for the most part of the Perpendicular period, dating from the middle of the 14th to the end of the 15th century. Exeter Cathedral is of course an exception, the whole (except the Norman towers) being very beautiful Decorated work. The special features of Devonshire churches, however, are the richly carved pulpits and chancel screens of wood, in which this county exceeded every other in England, with the exception of Norfolk and Suffolk. The designs are rich and varied, and the skill displayed often very great. Granite crosses are frequent, the finest and earliest being that of Coplestone, near Crediton. Monastic remains are scanty; the principal fragments are those at Tor, Buckfast, Tavistock, and Buckland Abbeys. Among domestic buildings the houses of Wear Gifford (15th century), Bradley (15th century), Dartington (15th), Bradfield (Elizabethan), and Holcombe Rogus (Elizabethan) deserve notice. The ruined castles of Okehampton (Edward I.), Exeter (with vast British earthworks), Berry Pomeroy (Henry III., and with ruins of a large Tudor mansion), Totnes (Henry III.), and Compton (early 15th century), are all interesting and picturesque.

The *dialect* of Devonshire belongs, of course, to the West Saxon division; but the mixture of races here was, as has been said, considerable; and in the language as well as in the folk-lore of the people Celtic words and ideas are found closely united with those of Teutonic origin.

The *episcopal see* for Devonshire was at first established at Crediton, in 909. The ancient Cornish see, which had existed during the British independence of Cornwall, was afterwards united to that of Crediton; and in 1050 the place of the united sees was removed by the Confess[illegible] from Crediton to Exeter. There was no further chan[illegible] until 1876, when the Cornish see was again separat[illegible] from that of Devonshire, and the place of it fixed [illegible] Truro. The diocese of Exeter is now therefore confined [illegible] Devonshire.

Devonshire is in the western circuit, and the assizes are held at Exeter. It has one court of quarter sessions and 2[illegible] petty sessional divisions. The city of Exeter, a county of itself, and the boroughs of Barnstaple, Bideford, Dartmouth, Devonport, Plymouth, South Molton, Tiverton, and Totnes have commissions of the peace, and, with the exception of Totnes, separate courts of quarter sessions. The jurisdiction of the court of the vice-warden of the stannaries extends over the county of Devon as well as that of Cornwall. There are 23 lieutenancy subdivisions. For the purposes of parliamentary election, Devonshire is divided into east, north, and south—each of which division returns 2 county members. The city of Exeter, in East Devon, returns 2; Barnstaple and Tiverton, in North Devon, 2 each; Devonport and Plymouth, in South Devon, 2 each; and Tavistock, also in South Devon, returns 1 member. There are thus altogether 17 members returned for Devonshire.

One of the earliest *railways* in England was that from Plymouth to the prisons at Prince Town on Dartmoor, opened in 1825. It was, and is, used only by horse [illegible]. The county is now well intersected by railways. Of *canals*, the most important (and, except "Morton's Leam," running from near Peterborough to the sea, the most ancient in England) is the Exeter Ship canal, cut in the reign of Henry VIII., and extended in 1826. It is about six miles in length, and connects the city of Exeter with the mouth of the River Exe. Tiverton is connected with Taunton by the Grand Western canal, 23 miles long; and a canal completed in 1817 connects Tavistock with the Tamar.

The principal *gentlemen's seats* in Devonshire are Saltram (earl of Morley), Maristow (Sir Massey Lopes, Bart.), Kitley (Baldwin Bastard, Esq.), Stover (duke of Somerset), Ugbrooke (Lord Clifford), Haldon (Sir Lawrence Palk, Bart.), Mamhead (Sir Lidstone Newman, Bart.), Powderham Castle (earl of Devon), Killerton (Sir Thomas Acland, Bart.), Bicton (Lady Rolle), Castle Hill (Earl Fortescue), Tawstock (Sir Bourchier Wrey, Bart.), and Eggesford (earl of Portsmouth). There are many lesser houses noticeable for beauty of situation or for the ornamental grounds in which they stand. Of these by far the most remarkable are Endsleigh (duke of Bedford), near Tavistock, commanding some of the finest scenery in the upper valley of the Tamar, and Buckland Court, on the Dart (Baldwin Bastard, Esq.).

The principal *towns* in the county are those already mentioned as returning members to Parliament, or as possessing courts of quarter sessions. Besides these are the watering-places of Teignmouth, Torquay, and Ilfracombe, and the smaller towns of Crediton, Honiton, Axminster, Ashburton, and Newton Abbot.

Population.—The total population of Devonshire in 1851 amounted to 567,098 persons; in 1861 to 584,373; and in

374. of whom 285.248 were males, and 316.126
iere were, at the last census, on an average
to an acre, or 2·75 acres to each person. The
habited houses was 105.200. There were 480
33 hundreds. The population of the county
340.308 persons; so that the increase since
s been at the rate of 77 for every hundred.
ounties in England and Wales. Devonshire is
th in point of population. The comparative
e population is considerably below the average.
;enerally there are 389 persons to every square
vonshire the number is not more than 232.

/.—The best general history of the county is still
orms part of Lysons's *Magna Britannia* (1822).
st. of Devon (1793–98) was never completed, and
Westcote's *Survey of Devon*, written about 1630,
ted in 1845, is curious and important. Prince's
evon, a very valuable book, was first published in
s reprinted in 1810. Oliver's *Monasticon Diœcesis*
145) is valuable for the history of the monastic
both Devon and Cornwall. There are very good
lymouth (1871) and of Devonport (1872) by R. N.
Bray's *Borders of the Tamar and Tavy*, 3 vols.,
id interesting, and contains much information relat-
or. Rowe's *Perambulation of the Forest of Dartmoor*
er editions) is still the most complete book on that
, great amount of important matter relating to Dart-
e county in general will be found in the annual volumes
*ctions of the Devonshire Association for the Promo-
ure, Science, and Art*, beginning in 1862. The
gton's poem of *Dartmoor* should also be mentioned.
logy of the county reference should be made to the
papers of Mr Pengelly in the *Transactions of the
ociation*, and in the *Journal of the Geological Society*.
Mr Ormerod and of Mr Vicary in the same Journals
t importance. The fullest general notice is, however,
in the *Report on the Geology of Cornwall, Devon,
erset*, by Sir H. J. De la Beche, 1839. Murray's
Travellers in Devon and Cornwall (8th ed., 1872)
ientioned as full of useful information. (R. J. K.)

**;HIRE, William Cavendish, Fourth Earl
Duke of** (1640–1707), distinguished as a
d patriot, born in 1640, was the eldest son of
rl. After completing his education he made
Europe according to the custom of young men
, being accompanied on his travels by Dr
On his return he obtained, in 1661, a seat in
or the county of Derby, and soon became con-
one of the most determined and daring
the general policy of the court. In 1678 he
he committee appointed to draw up articles of
t against the lord-treasurer Danby. In 1679
ected for Derby, and made a privy councillor
I.; but he soon withdrew from the board with
ord Russell, when he found that the Romish
ormly prevailed. He carried up to the House
e articles of impeachment against Lord Chief-
ggs, for his arbitrary and illegal proceedings in
f King's Bench; and when the king declared
n not to sign the bill for excluding the duke
erwards James II., he moved in the House of
at a bill might be brought in for the association
ajesty's Protestant subjects. He also openly
he king's counsellors, and voted for an address
iem. He appeared in defence of Lord Russell
at a time when it was scarcely more criminal
omplice than a witness. After the condemna-
the utmost possible proof of his attachment by
exchange clothes with Lord Russell in the
in in his place, and so allow him to effect his
November 1684 he succeeded to the earldom
of his father. He opposed arbitrary govern-
James II. with the same consistency and high
ring the previous reign. He was withdrawn
life for a time, however, in consequence of a hasty and imprudent act of which his enemies knew how to avail themselves. Fancying that he had received an insulting look in the presence chamber from Colonel Colepepper, a swaggerer whose attendance at court the king encouraged, he immediately avenged the affront by challenging the colonel, and, on the challenge being refused, striking him with his cane. This offence was punished by a fine of £30.000, which was an enormous sum even to one of the earl's princely fortune. Not being able to pay he was imprisoned in the King's Bench, from which he was released only on signing a bond for the whole amount. This was afterwards cancelled by King William. After his discharge the earl went for a time to Chatsworth, where he occupied himself with architectural improvements on his mansion. The Revolution again brought him into prominence. He was one of the seven who signed the original paper inviting the Prince of Orange from Holland, and was the first nobleman who appeared in arms to receive him at his landing. He received the Order of the Garter on the occasion of the coronation, and was made lord high steward of the new court. In 1691 he accompanied King William on his visit to Holland. He was created marquis of Hartington and duke of Devonshire in 1694 by William and Mary, on the same day on which the head of the house of Russell was created duke of Bedford. Thus, to quote Macaulay, "the two great houses of Russell and Cavendish, which had long been closely connected by friendship and by marriage, by common opinions, common sufferings, and common triumphs, received on the same day the highest honour which it is in the power of the Crown to confer." His last public service was assisting to conclude the union with Scotland, for negotiating which he and his son, the marquis of Hartington, had been appointed among the commissioners by Queen Anne. He died on the 18th August 1707, and ordered the following inscription to be put on his monument:—

Willielmus Dux Devon,
Bonorum Principum Fidelis Subditus,
Inimicus et Invisus Tyrannis.

DEW. See Meteorology.

DEWBERRY. *Rubus cæsius*, a deciduous trailing plant, allied to the bramble, of the natural order *Rosaceæ*. It is common in woods, hedges, and the borders of fields in England and other countries of Europe. The leaves are trifoliate, hairy beneath, and of a dusky green; the flowers, which appear in June and July, are white, or pale rose-coloured. The fruit is large, and closely embraced by the calyx, and consists of few grains, which are black, with a glaucous bloom; it has an agreeable acid taste, and is used for making a kind of wine.

D'EWES, Sir Simonds (1602–1650), antiquarian, chronicler, and collector of historical records, was born at Coxden, in the parish of Chardstock, in Dorsetshire, on the 18th December 1602. His father, one of the six clerks of Chancery, possessed a large official income, and gave him a liberal education at the grammar-school of Bury St Edmunds, and at St John's College, Cambridge. Called to the bar in 1623, he did not enter upon practice, being possessed of independent means, and having already resolved to devote himself to historical research. His intention seems to have been to compile a history of Britain from original documents, and in endeavouring to carry it out he spent much of his time in examining historical records, which he describes as "the most ravishing and satisfying part of human knowledge," in the Tower of London and elsewhere. The chief results of this labour were his valuable collection of records—originals and transcripts—which now form part of the Harleian collection in the British Museum, and his *Journals of all the Parliaments in the reign of Queen Elizabeth*, which, though completed in

1629, was first published by his nephew, Paul Bowes, in 1682. His means had been considerably increased by his marriage with an heiress in 1626, soon after which he procured the honour of knighthood. One of his many foibles was a desire to establish for himself an aristocratic lineage, and his efforts to do this, in spite of the fact he is forced to admit, that he does not know who his great-grandfather was, are very amusing. In 1639 he became high sheriff of Suffolk, and in 1641 he was made a baronet. In the intervening year he entered the Long Parliament as member for Sudbury. Here he obtained a peculiar place for himself by his whimsicality, and his parade of his knowledge of records, which he quoted at first in nearly every debate, sometimes relevantly, but oftener not. He was treated for a time with a sort of amused tolerance, but ultimately his innumerable interferences with the conduct of business had to be checked. He was not a very warm adherent of the cause of the Parliament against the king. Belonging to the Presbyterian section of the Puritan party, he was excluded from the House of Commons by "Pride's Purge" in 1648. He died on the 18th April 1650. The *Autobiography and Correspondence of Sir Simonds D'Ewes*, edited by J. O. Halliwell, was published in 1845, and possesses considerable historical value. Much more important, however, are his manuscript notes of the Long Parliament, describing its sittings between 1640 and 1645 with great graphic power and minuteness of detail. They form five volumes of the Harleian manuscripts in the British Museum, and have been largely drawn upon by John Forster and other writers on the period of the Long Parliament.

DE WETTE, Wilhelm Martin Leberecht (1780–1849), a distinguished German theologian, was born on the [illegible] January 1780, at Ulla, near Weimar, where his father was a clergyman. After receiving his preliminary education at a [illegible] school he was sent to the gymnasium at Weimar, a town which was then at the height of its literary glory. Here, as he himself testified in glowing terms many years later, he was much influenced by intercourse with Herder, who as "ephorus" frequently visited the gymnasium and examined the pupils. In 1799 he entered on his theological studies at the university of Jena, his principal teachers being Griesbach and Paulus, from the latter of whom more than any other he derived the tendency to free critical inquiry which characterized him as an expositor. His relation to Paulus was thus in a measure his spiritual [illegible] relationship was entirely one of spirit and [illegible] and results he occupied an independent [illegible] position among the German theologians. [illegible] doctor's degree, De Wette at once commenced, according to German custom, the career of a [illegible] at Jena, which, however, he was not [illegible]. In 1807 he became professor [illegible] and in 1810 he was transferred [illegible] 1819 [illegible]

[illegible]

invitation to a pastoral charge in Brunswick was under his consideration, when the offer in 1822 of the chair of theology in the university of Basel, which had been reorganized four years before, opened up to him a still more congenial sphere. Though his appointment had been strongly opposed by the orthodox party, De Wette soon won for himself a position of great influence both in the university and in the community of Basel. He was early admitted a citizen, and received many proofs of the esteem of his fellow-townsmen; and the university owed much of its recovered strength, particularly in the theological faculty, to his individual efforts. He died on the 16th June 1849, being rector of the university at the time.

De Wette's chief work as a theologian was in the department of biblical criticism and exegesis, though he made valuable contributions to other branches of theology. In fact his range was unusually extensive, and he did much by precept as well as by example to widen the limits of theological culture. He had considerable poetic faculty, and wrote a drama in three acts, entitled *Die Entsagung* (Berlin, 1823). He had an intelligent interest in art, and devoted much attention to ecclesiastical music and architecture. As a biblical critic he is sometimes classed with the destructive school, but his position was unique, and cannot be accurately defined by merely referring him to a leader or a school. In the work of interpretation he strove to keep himself entirely free from dogmatic prepossessions, and he was fearless in recognizing and grappling with difficulties; but he was prevented by his deeper spirituality from identifying himself with the hard and uncompromising rationalism of Paulus, and on the other hand his unfettered critical method separated him distinctly from the supernaturalist or strictly orthodox school of interpreters. Thus it has happened that each school has classed him with the followers of the other, as he himself predicted would be the case in the preface to his *Christliche Sittenlehre*. His works are generally admitted to be marked by great exegetical skill, unusual power of condensation, and uniform fairness. Accordingly they possess an element of permanent value which is little affected by the progress of criticism. The following is a list of the most important of them:—

Beiträge zur Einleitung in das Alte Testament (2 vols. 1806–7); *Commentar über die Psalmen* (1811), which has passed through several editions, and is still regarded as of high authority; *Lehrbuch der Hebräisch-Jüdischen Archäologie* (1814); *Ueber Religion und Theologie* (1815), a work of great importance as showing its author's general theological position; *Lehrbuch der Christlichen Dogmatik* (1813–16); *Christliche Sittenlehre* (1819–21); *Einleitung in das Neue Testament* (1826); *Religion, ihr Wesen, ihre Erscheinungsformen und ihr Einfluss auf das Leben* (1827); *Das Wesen des* [illegible] (1846); and *Kurzgefasstes exegetisches Handbuch zum Neuen Testament* (1836–48). De Wette also edited Luther's works.

See Hagenbach in Herzog's *Real-Encyklopädie*; Lücke's *W. M. L. de Wette*, [illegible] 1850, and Schenkel's *W. M. L. de Wette und die Bedeutung seiner Theologie für* [illegible] 1849.

DE WINTER, Jan Willem (1750–1812), Dutch admiral, was born at the Texel in 1750. He entered the [illegible] of twelve, but after twenty-five years of [illegible] he had attained no higher rank than [illegible]. In 1787 he took part with the Revolutionary [illegible] the failure of their efforts fled to France. [illegible] the French army, and served under [illegible] the campaigns of 1792 and [illegible] 1795 [illegible] Holland and was appointed [illegible] he attained the rank [illegible] commander of the fleet at [illegible] in his career was the [illegible] the 11th of October 1797, in [illegible] the Dutch fleet was defeated and the admiral taken prisoner by the English under admiral Duncan. De Winter was in a few months liberated by exchange; and his conduct in the battle was declared by a council of investigation to have nobly maintained the honour of the Dutch flag. He held the post of minister-plenipotentiary to the French republic from 1798 to 1802, when he reassumed the command of the Dutch fleet. He was employed in suppressing the piracies of the Tripolitans, and negotiated a treaty of peace with the Government. He enjoyed the confidence of Louis Bonaparte, king of Holland, and afterwards of the emperor Napoleon I. By the former he was created count of Huessen and made commander-in-chief of his armies by sea and land; and by the latter he was named grand officer of the Legion of Honour, inspector-general of the coasts of the North Sea, and in 1811 commander of the Texel fleet. De Winter died at Paris, June 2, 1812, and his remains were buried in the Pantheon at the public expense.

DE WITT, Cornelius (1623–1672), brother of the more celebrated John De Witt, was born at Dort in 1623. In 1650 he became burgomaster of his native town, and member of the states of Holland and West Friesland. He was throughout life closely associated with his brother, whose opinions he shared, and whom he supported with great ability and vigour. Of the eight deputies appointed in 1672 to accompany the naval and military commanders, he was the one selected to go with De Ruyter, and in action he displayed remarkable courage, as he had done under similar circumstances in 1667. Compelled by sickness to leave the fleet, he found on his return to Dort that the revocation of the Perpetual Edict had been signed by his fellow magistrates. He was forced in his sick-room to follow their example, but added after his name the initials V.C. (*vi coactus*). See next article.

DE WITT, John (1625–1672), an illustrious Dutch statesman, was born at Dort in 1625. He was carefully educated, and early displayed remarkable talents. A work entitled *Elementa Linearum Curvarum*, published in 1650, is attributed to him. His father was a member of the States General of Holland and West Friesland, and well known as a bitter opponent of the house of Orange, which had gradually acquired almost regal functions. William II., prince of Orange, died in 1650; and as his son, afterwards William III. of England, was an infant, the Republican party easily won predominance. De Witt was made pensionary of Dort, and in that position so distinguished himself by his eloquence, firmness, and sagacity, that in 1652, although only twenty-seven years of age, he became grand pensionary of Holland. He held this position for about twenty years, during which he controlled the policy of the United Provinces. He inherited his father's intense jealousy of the Orange family, and steadily laboured to prevent it from ever again rising to power. When he became grand pensionary the United Provinces were at war with England. He had always disapproved of this conflict, and in 1654 succeeded in bringing about peace, conceding to Cromwell his demands with respect to the honours due to the English flag. The treaty included a secret article, providing that no member of the house of Orange should in future be elected stadtholder or grand admiral. De Witt was afterwards accused of having suggested this condition to Cromwell; but the latter was also opposed to the claims of a family which was nearly allied to the Stuarts.

After the restoration of Charles II., who had been exposed to many affronts during his residence in Holland, De Witt cultivated the friendship of France; and in 1661 a treaty was concluded by which that country and the United Provinces granted to each other freedom of commerce in their respective ports,—the Dutch guaranteeing to the French the possession of Dunkirk, and the French guaranteeing to the Dutch the right of fishing off the coasts of Great Britain and Ireland. The latter provision caused much irritation in England; and it was increased by the incessant quarrels of English and Dutch merchants on the Guinea Coast, each desiring to have a monopoly in the trade of slaves and gold dust. War was declared in 1665; and in a battle off Lowestoft the Dutch fleet was defeated, the remnant taking shelter in the Texel. Antwerp was the only port at which it could be refitted, and the most experienced pilots decided that it was impossible the vessels could be removed thither. De Witt himself, however, with splendid courage, undertook the task, and not only accomplished it, but in a very short time had the fleet once more ready for action. After two more battles, in which the Dutch well sustained their fame for skill and bravery, De Witt entered upon negotiations which resulted in the Peace of Breda in 1667.

Meanwhile, by dint of severe labour, he introduced order into the financial system of the country; and in 1667 the chief object of his life seemed to be attained, for owing to his efforts a Perpetual Edict was passed proclaiming the office of stadtholder for ever abolished. At this time, however, a great danger threatened the Republic. In 1667 Louis XIV. invaded the Spanish Netherlands; and it was clear that if the war ended in the annexation of that country to France it would be difficult to maintain the independence of the United Provinces. De Witt made secret but rapid preparations for resistance, and appealed to England to support Holland in curbing French ambition. Notwithstanding the prejudices of Charles II., Sir William Temple was sent to propose an alliance between England, Holland, and Sweden. De Witt entered so heartily into this scheme that in the spring of 1668 the Triple Alliance was concluded. Louis XIV. saw that for the time his plans were foiled, and with as good a grace as possible signed the Peace of Aix-la-Chapelle. At heart, however, he bitterly resented the course which the States General, guided by De Witt, had taken, and slowly prepared for revenge. By artful diplomacy England and Sweden were detached from the alliance, and several German princes were persuaded to promise that they would join France in an attack on Holland in order to restore certain towns which, it was pretended, properly belonged to the empire.

While Louis was maturing his plans the power of De Witt was being steadily undermined. The Calvinist clergy, who had always been his enemies, excited their congregations against him and his party; and, as the Prince of Orange approached manhood, the people recalled the obligations of the country to his ancestors, and freely expressed doubts whether his rule would not be preferable to that of nobles and wealthy burgesses. The state of public feeling rendered it impossible for De Witt to make ready for the approaching peril. When, therefore, France, England, and the German allies of France proclaimed war against the United Provinces in 1672, and it was found that no effectual resistance could be offered to their attack, popular indignation turned against the grand pensionary. The Prince of Orange was appointed captain and admiral general; and De Witt could only secure that a council of eight deputies of the States General should be associated with the military and naval commanders, one to go with De Ruyter, the other seven with Prince William. This plan added to the confusion, and in a few months after the declaration of war a large part of the country was overrun, and the French were within five leagues of Amsterdam. To save themselves the humiliation of surrender, the towns of Holland and Brabant broke the dykes and laid the surrounding land under water.

The Orange party so profited by these disasters that the Perpetual Edict was revoked, and Prince William assumed the office of stadtholder. De Witt's policy was thus finally defeated, and he himself became an object of general and intense hatred. All sorts of monstrous charges were brought against him, and believed; and his brother Cornelius was falsely accused of conspiring against the life of the stadtholder. Brought to the Hague, Cornelius was there, on July 24, 1672, tortured and condemned to perpetual banishment. In the same town De Witt was assaulted by a band of assassins, who left him lying on the ground under the impression that he was dead. Summoned by a pretended message from Cornelius, De Witt went to visit him in prison, when a mob assembled and murdered the brothers amid circumstances of revolting cruelty.

De Witt is one of the greatest figures of Dutch history. His action in connection with the Triple Alliance proves that he thoroughly understood the central tendencies of European politics; and, whether he is to be praised or blamed for his life-long opposition to the house of Orange, there can be no doubt as to the greatness and purity of his motives. As an administrator he displayed extraordinary energy and resource; and personally he was a man of steady, upright character, loyal and fearless. His *Memoirs* were published at the Hague in 1667; and in 1725, at Amsterdam, appeared *Lettres et Négociations entre Jean De Witt et les Plenipotentiaires des Provinces Unies aux Cours de France, &c., depuis l'an* 1652 *jusqu'a* 1669." A Life of the two brothers, by Madame Zoutelande, was published at Utrecht in 1709. (J. SI.)

DEWSBURY, a market-town in the West Riding of Yorkshire, situated at the foot of a hill, on the left bank of the Calder, eight miles S. by W. of Leeds, on the Manchester and Leeds railway. The chief industries are the making of blankets, carpets, druggets, and worsted yarn. A mile from the town is Batley, the centre of the shoddy manufacture. Coal is worked in the neighbourhood of Dewsbury. The parish church of All Saints was for the most part rebuilt in the latter half of the 18th century; the portions still preserved of the original structure are of great antiquity. Paulinus, first archbishop of York, about the year 627 preached in the district of Dewsbury, where Edwin, king of Northumbria, whom he converted to Christianity, had a royal mansion. Dewsbury is said to have been originally called *Duis burgh*, or the town of *Dui*, the tutelar god of the Brigantes. At Kirklees, in the parish of Dewsbury, is the tomb of Robin Hood. The population of the municipal borough of Dewsbury in 1851 was 14,049; in 1871 it was 24,764, while that of the parliamentary borough, which has an extended area, was 54,940. The municipal charter of the town was granted in 1862. It returns one member to Parliament.

DEXTRIN, or British gum, $C_6H_{10}O_5$, is a substance produced from starch by the action of dilute acids, alkalies, and diastase or malt extract, and by roasting it at a temperature between 140° and 160° C. (284°–320° Fahr.) till it is of a light brown colour, and smells like over-baked bread. Its name has reference to its powerful dextro-rotatory action on polarized light. The purest dextrin is prepared by boiling 25 parts of sulphuric acid with 125 of water, and adding by degrees a mixture of 100 parts of starch and 125 of cold water. The liquid is then lowered in temperature to 60° or 70° C. (140°–158° Fahr.), at which it is kept for some time; it is next neutralized with chalk, filtered, and evaporated. Dextrin is an uncrystallizable, insipid, odourless, yellowish white, translucent substance, brittle and friable when thoroughly dried. It dissolves in water and dilute alcohol; by strong alcohol it is precipitated from its solutions as the hydrated compound,
$C_6H_{10}O_5.H_2O$. Unlike starch it is not coloured l
iodine. Diastase converts it eventually into n
$C_{12}H_{22}O_{11}$; and by boiling with dilute acids and
it is transformed into dextrose, or ordinary
$C_6H_{12}O_6$. It does not ferment in contact with yea
in the pure state has probably no reducing action
alkaline copper solution. If heated with strong nit
it gives oxalic, and not mucic acid. Limpricht has
that dextrin is present in the flesh-juice of the
Dextrin much resembles gum arabic, instead of whi
generally substituted for a great variety of purpo
is employed for sizing paper, for stiffening cotton
and for thickening colours in calico printing, also
making of lozenges, adhesive stamps and labe
surgical bandages. In most technical operations th
solution only is used.

DHAR, a small native state of Malwá, in Centra
under the political superintendence of the British
ment. Area, 2500 square miles; population,
souls. The state contains much fertile ground, th
cipal agricultural products being wheat, opium, gram
cane, Indian corn, and cotton. The Rájá is a
Pramar Rájput, who claims descent from the famou
Vikramáditya; but the family only received pos
of Dhar in 1749, by gift from the Marhattá Peshw
Ráo. Towards the close of the last, and in the ear
of the present century, the state was subject to a s
spoliations by Sindhia and Holkar, and was only pr
from destruction by the talents and courage of the a
mother of the fifth Rájá. By a treaty in 1819
passed under British protection, and bound itself t
subordinate co-operation. The state was confisca
rebellion in 1857, but subsequently restored t
Anand Ráo Puar, then a minor, with the exceptio
detached district of Bairusia, which was granted
Begam of Bhopál. The revenue of the state is es
at £80,000 per annum, inclusive of *jagirs*. The
force consists of 276 cavalry, with 800 infantry (in
police), 2 guns, and 21 artillery. Road-making i
pushed on. Fifteen schools were attended in 1874
scholars. Two charitable dispensaries afford gr
medical relief. The town of Dhar, situated on t
from Mau (Mhow) to Baroda, extends 3¼ miles in
by half a mile in breadth, and is surrounded by
wall. The fort, built of red stone, forms a cons
object outside the city, and contains the Rájá's pal

DHÁRWÁR, a district of British India in the pre
of Bombay, situated between 14° 6′ and 15° 53′
and 74° 50′ and 75° 58′ E. long. It contains a to
of 4536 square miles, and a population of 988,037
tants. The district is about 116 miles long, with an
width of 77 miles. It is bounded on the N.
Belgaum and Kaládgi districts, on the E. by the
territory and Bellári district, on the S. by Myso
on the W. by Belgaum and North Kanara district
western portions of the district, in the neighbour
the Sahyádri range, are rugged and hilly; but tow
east, the land falls away into plains of black soil
parts very fertile and well suited to the growth of
with occasionally a detached peak or group o
The chief rivers are the Malprabhá on the north
Tungbhadrá on the south. The hills are principa
posed of hornblende and chloritic schists, gneiss, a
slate, large interstratified beds of silicious and fer
schists (as at and near Dhárwár) often forming thei
Seams and beds of a crystalline white marble occu
near their junction with the hornblende slate, a
coloured green. Gold is found sparingly in the
hills, and chick mulgund, and also iron pyrites.
is worked to a small extent at Tegur, where there

onsiderable trade in native iron. The most influential asses of the community are Brahmans and Lingáyats. he Lingáyats number 380,919, or 44 per cent. of the indu population; they worship the symbol of Siva, and ales and females both carry this emblem about their erson in a silver case. The manufactures of the district re not numerous; they consist of cotton and silk cloth, lass bracelets, and articles of ironware. In four towns of he district cotton and mixed silk and cotton fabrics, for ale and female attire, are delicately and tastefully woven. griculture is the chief industry of the district, the princi- al products being cotton, exotic and native *jawári*, olasses, and oil of various kinds. Of a total of 1,662,040 cres of Government arable and assessed land, 1,530,235 cres were in 1874 under cultivation as follows:--Rice, 0,896 acres; cotton, 283,810; *jawári*, 497,312; *bájri*, 126; wheat, 112,169; sugar-cane, 2909; tobacco, 790; seed, 29,647; linseed, 7966; gram, 23,411; miscella- eous products, 294,491; fallow land, 182,869 acres. he cotton trade of Dhárwár has great commercial import- nce. The land revenue realized in 1875 amounted to 196,064. The district contains six municipalities.

The territory comprised within the district appears at e earliest recorded period to have formed part of the ahmanical realm of Vijayanagar. On the overthrow of king at Talikot in 1565, the lands of Dhárwár became rt of the Mussulman kingdom of Bijápur. In 1675 the strict seems to have been overrun and partially conquered Siváji, becoming thereby subject to the king of Satára, d subsequently to the Peshwá. In 1776 the province s overrun by Hyder Ali, the usurping sultan of Mysore. 1778 Dhárwár was taken from the Marhattás by yder Ali, and in 1791 retaken by a British force. On e final overthrow of the Peshwá in 1818, Dhárwár s incorporated with the territory of the East India mpany.

DHOLPUR, a native state of Rájputáná, in Upper dia, under the political superintendence of the British vernment, is situated between 26° 30′ and 26° 57′ N. ., and 77° 32′ and 78° 20′ E. long. The state is unded on the N. and N.E. by the British district of ra, on the E. and S. by the Gwalior state, from which it is arated by the Chambal river, and on the W. by the state Karauli. It contains an area of about 1600 square les, and an estimated population of upwards of 500,000 ls. It is a crop-producing country, without any special nufactures. All along the bank of the Chambal the untry is deeply intersected by ravines; low ranges of ls in the western portion of the state supply inexhaust- e quarries of fine-grained and easily-worked red sand- ne. The chief, who has the title of Ráná, belongs, like st of his subjects, to the tribe of Deswáli Játs, who are lieved to have formed a portion of the Indo-Scythian ve of invasion which swept over Northern India about 0 A.D. The earliest recorded ancestor of the family one Jeyt Sinh, who in 1068 held certain territories uth of Alwar. His descendant in 1505, Singan Deo, ving distinguished himself in an expedition against the ebooters of the Deccan, was rewarded by the sovereignty the small territory of Gohad, with the title of Ráná. e family gradually extended their possessions until they cluded 56 estates, yielding an annual revenue said to ount to 66 lakhs of rupees (£660,000). Upon the feat of the Marhattás at Panipat in 1761, Ráná Bhim nh, the tenth in descent from Ráná Singan Deo, seized on the fortress of Gwalior. Political relations between e Ráná and the East India Company commenced in 1779 ring the Marhattá war, wl [illegible] an offensive and defensive liance was entered into. [illegible] Ráná joined the British ces against Sindhia, on receiving a promise that, at the conclusion of peace between the English and the Marhattás, all the territories then in his possession should be guaranteed to him, and protected from invasion by Sindhia. This protection was subsequently withdrawn, the Ráná having been guilty of treachery. In 1783, Madhoji Sindhi succeeded in recapturing the fortress of Gwalior, and crushed his Ját opponent by seizing the whole of Gohad. In 1803, however, the family were restored to their ancestral possessions of Gohad by the British Government; but, owing to the opposition of Sindhia, the Ráná agreed to relinquish possession of Gohad, in exchange for his present territory of Dholpur. By the treaty of 1804, the state was taken under the protection of the British Government,—the chief becoming bound to act in subordinate co-operation with the paramount power, and to refer all disputes with neighbouring princes to the British Government. The annual revenue of Dholpur, including *jagirs*, amounts to about £110,000. The military force consists of 2000 men. The town of Dholpur is situated on the Agra and Gwalior road.

DIABETES (from διά, through, and βαίνω, to pass), a disease characterized by a habitually excessive discharge of urine. Two forms of this complaint are described, viz.—Diabetes Mellitus, or Glycosuria, where the urine is not only increased in quantity, but also contains a greater or less amount of sugar, and Diabetes Insipidus, or Polyuria, where the urine is simply increased in quantity, and contains no abnormal ingredient. The former of these is the disease to which the term diabetes is most commonly applied, and is by far the more serious and important ailment.

Although sometimes classed by medical writers among diseases of the kidneys, *diabetes mellitus* is rather to be regarded as a constitutional disorder. Its cause is still a matter of uncertainty, but there is sufficient evidence to connect it with a defect in the process of the assimilation of food, more especially that stage in which the function of the liver is concerned. The important researches of Claude Bernard, and subsequently those of Schiff, Harley, Pavy, M'Donell, and others, have shown that this organ, besides the secretion of bile, has the additional function of forming in large quantity a substance to which the names of glycogen, dextrin, or amyloid substance have been given. This matter is capable of being converted by the action of ferments into glucose, or grape sugar, and such a change is supposed by some to take place normally in the blood where the sugar thus formed is consumed by oxidation in the course of the circulation, while by other authorities it is held that the glycogen is not directly converted into sugar, but is transformed into other compounds.

The theories of diabetes founded on these views ascribe its production either to an excessive formation of glycogen or to some defect in its transformation, the result being that grape sugar passes out of the body by the kidneys. It has long been known, both by experiment and by observation in disease, that injuries to certain parts of the nervous system, particularly the floor of the fourth ventricle in the brain, and that portion of the sympathetic nerve which sends branches to the liver and regulates its blood supply, are followed by the appearance of sugar in the urine. Hence certain pathologists seek an explanation for the disease in a morbid state of the parts of the nervous system whereby these particular nerves are either irritated or paralyzed and the flow of blood through the liver temporarily or permanently increased. It must, however, be remarked that, although in some instances the portions of the nervous system above mentioned are found after death to be involved in disease, this is by no means constant, and that in many cases of diabetes the *post mortem* appearances are entirely negative. While, therefore, considerable light has by modern research been thrown upon this disease, its pathology cannot be regarded as yet settled.

It ought to be mentioned that small quantities of sugar are frequently found in the urine in many diseases, and even in health after articles of food rich in sugar or starch have been eaten, as also in some forms of poisoning.

Little is known regarding the exciting causes of diabetes. Exposure to wet and cold, privation, depressing mental emotions, or mental overwork, the abuse of alcohol and of saccharine and starchy substances, have all been assigned as causes. It appears to be in some instances hereditary. It is most common among adults, and occurs much more frequently in males than in females.

The symptoms of diabetes are usually gradual in their onset, and the patient may suffer for a length of time before he thinks it necessary to apply for medical aid. The first symptoms which attract attention are failure of strength, and emaciation, along with great thirst and an increased amount and frequent passage of urine. From the normal quantity of from two to three pints in the twenty-four hours it may be increased to 10, 20, or 30 pints, or even more. It is usually of pale colour, and of thicker consistence than normal urine, possesses a decidedly sweet taste, and is of high specific gravity (1·03 to 1·05). It frequently gives rise to considerable irritation of the urinary passages.

By simple evaporation crystals of sugar may be obtained from diabetic urine, which also yields the characteristic chemical tests of sugar, while the amount of this substance can be accurately estimated by certain analytical processes. The quantity of sugar passed may vary from a few ounces to two or more pounds per diem, and it is found to be markedly increased after saccharine or starchy food has been taken. Sugar may also be found in the blood, saliva, tears, and in almost all the excretions of persons suffering from this disease. One of the most distressing symptoms is intense thirst, which the patient is constantly seeking to allay, the quantity of liquid consumed being in general enormous, and there is usually, but not invariably, a voracious appetite. The mouth is always parched, and a faint, sweetish odour may be evolved from the breath. The effect of the disease upon the general health is very marked, and the patient becomes more and more emaciated. He suffers from increasing muscular weakness, the temperature of his body is lowered, the skin is dry and harsh, the teeth are loosened or decay, while dyspeptic symptoms, constipation, and loss of sexual power are common accompaniments. There is in general great mental depression or irritability.

Diabetes as a rule advances comparatively slowly except in the case of young persons, in whom its progress is apt to be rapid. Various complications arise in the course of the disease, among which may be mentioned cataract, various cutaneous eruptions, kidney diseases, inflammatory chest affections, and especially pulmonary consumption, which is one of the most frequent modes of fatal termination in diabetes. Occasionally death occurs suddenly from exhaustion.

Diabetes is a very fatal form of disease, recovery being exceedingly rare. Nevertheless much may be done by appropriate treatment to mitigate the severity of the symptoms and to prolong life.

Cases may thus continue for years without material change to the worse, and in some rare instances it would seem that the disease is cured. The unfavourable cases are chiefly those occurring in young persons, also where serious chest or other complications arise, and especially where the disease itself is of severe character, the quantity of sugar passed being persistently large, and the patient losing flesh and strength rapidly.

With respect to the treatment of diabetes, the regulation of the diet has by all authorities been regarded as a matter of the first importance, inasmuch as it has been proved beyond question that certain kinds of food have a powerful influence in aggravating the disease, more particularly those consisting largely of saccharine and starchy matter; and it may be stated generally that the various methods of treatment proposed aim at the elimination as far as possible of these constituents from the diet. Hence it is recommended that such articles as bread, potatoes, and all farinaceous foods, turnips, carrots, parsnips, and most fruits should be avoided; while animal food and soups, green vegetables, milk, cream, cheese, eggs, butter, and tea and coffee without sugar, may be taken with advantage. As a substitute for ordinary bread, which most persons find it difficult to do without for any length of time, bran bread, gluten bread, almond biscuits, and even well-browned toast or rusks are recommended. Alcoholic stimulants are of little or no use, but if prescribed should be in those forms containing the least saccharine matter, such as claret, Burgundy, brandy, or bitter ale.

Thirst may be mitigated by iced water, or water slightly acidulated with phosphoric acid. The employment of a diet consisting entirely of skimmed milk has been recommended by Dr Donkin of London, who has obtained good results from this method of treatment. The milk is administered in quantities of from 8 to 12 pints in the twenty-four hours, all other articles of diet being excluded.

The plan of treatment once proposed, of administering sugar in large quantity in diabetes, proved to be highly injurious, and is now abandoned.

Numerous medicinal substances have been employed in diabetes, but few of them are worthy of mention as possessed of any efficacy. Opium is often found of great service, its administration being followed with marked amelioration in all the symptoms, and, according to some high authorities, with cure of the disease. It is borne in diabetes in larger doses than usual, and from 5 to 12 grains or more may be taken in the twenty-four hours. In like manner codeia (one of the constituents of opium), in doses of half a grain increased to two or three grains three times a day, has been used with good effect.

In most cases, however, it is the dieting of the patient to which the physician has to look in dealing successfully with this formidable disease; and sufferers ought always to be impressed with the necessity of strictly abstaining from those articles of food which by general consent are allowed to exercise a hurtful influence in aggravating the symptoms.

In *diabetes insipidus*, there is constant thirst and an excessive flow of urine, which, however, is not found to contain any abnormal constituent. Its effects upon the system are often similar to those of diabetes mellitus, except that they are much less marked, the disease being in general very slow in its progress. In some cases the health appears to suffer very slightly. It is rarely a direct cause of death, but from its debilitating effects may predispose to serious and fatal complications. Little is known as to its pathology, but it is generally supposed to own a similar origin to diabetes mellitus. It is best treated by tonics and generous diet. Opium and valerian have been found beneficial. (J. O. [illegible])

DIAGORAS, born at Melos, was a writer of dithyrambic poetry. Religious in his youth, he became an atheist because a great wrong done upon him (the details of which are unknown) was left unpunished by the gods. In consequence of his blasphemous speeches, and especially from his publication of the Mysteries, he was condemned to death at Athens, and a price set upon his head. During his flight he perished by shipwreck. Aristophanes alludes to his atheism in the *Clouds*, 830 *sqq*., and to his condemnation in the *Birds*, 1073. His date is not exactly known.

He could not have been, as is usually stated, a pupil of Democritus, as he was older than this philosopher, or certainly not younger. The circumstances of his death may have been confused with those of Protagoras. The writing in which he disclosed the Mysteries bore the name *φρύγιοι λόγοι*, or *ἀποπυργίζοντες*. These are all the facts which are known of him, and none of his actual opinions are preserved. See Zeller, *Geschichte der Griechischen Philosophie*.

DIAGRAMS. A diagram is a figure drawn in such a manner that the geometrical relations between the parts of the figure help us to understand relations between other objects. A few have been selected for description in this article on account of their greater geometrical significance.

Diagrams may be classed according to the manner in which they are intended to be used, and also according to the kind of analogy which we recognize between the diagram and the thing represented.

Diagrams of Illustration.

The diagrams in mathematical treatises are intended to help the reader to follow the mathematical reasoning. The construction of the figure is defined in words so that even if no figure were drawn the reader could draw one for himself. The diagram is a good one if those features which form the subject of the proposition are clearly represented. The accuracy of the drawing is therefore of smaller importance than its distinctness.

Metrical Diagrams.

Diagrams are also employed in an entirely different way—namely, for purposes of measurement. The plans and designs drawn by architects and engineers are used to determine the value of certain real magnitudes by measuring certain distances on the diagram. For such purposes it is essential that the drawing be as accurate as possible.

We therefore class diagrams as diagrams of illustration, which merely suggest certain relations to the mind of the spectator, and diagrams drawn to scale, from which measurements are intended to be made.

Methods in which diagrams are used for purposes of measurement are called Graphical methods.

Diagrams of illustration, if sufficiently accurate, may be used for purposes of measurement; and diagrams for measurement, if sufficiently clear, may be used for purposes of demonstration.

There are some diagrams or schemes, however, in which the form of the parts is of no importance, provided their connections are properly shown. Of this kind are the diagrams of electrical connections, and those belonging to that department of geometry which treats of the degrees of cyclosis, periphraxy, linkedness, and knottedness.

Diagrams purely Graphic and mixed Symbolic and Graphic.

Diagrams may also be classed either as purely graphical diagrams, in which no symbols are employed except letters or other marks to distinguish particular points of the diagrams, and mixed diagrams, in which certain magnitudes are represented, not by the magnitudes of parts of the diagram, but by symbols, such as numbers written on the diagram.

Thus in a map the height of places above the level of the sea is often indicated by marking the number of feet above the sea at the corresponding places on the map.

There is another method in which a line called a contour line is drawn through all the places in the map whose height above the sea is a certain number of feet, and the number of feet is written at some point or points of this line.

By the use of a series of contour lines, the height of a great number of places can be indicated on a map by means of a small number of written symbols. Still this method is not a purely graphical method, but a partly symbolical method of expressing the third dimension of objects on a diagram in two dimensions.

Diagrams in Pairs.

In order to express completely by a purely graphical method the relations of magnitudes involving more than two variables, we must use more than one diagram. Thus in the arts of construction we use plans and elevations and sections through different planes, to specify the form of objects having three dimensions.

In such systems of diagrams we have to indicate that a point in one diagram corresponds to a point in another diagram. This is generally done by marking the corresponding points in the different diagrams with the same letter. If the diagrams are drawn on the same piece of paper we may indicate corresponding points by drawing a line from one to the other, taking care that this line of correspondence is so drawn that it cannot be mistaken for a real line in either diagram.

In the stereoscope the two diagrams, by the combined use of which the form of bodies in three dimensions is recognized, are projections of the bodies taken from two points so near each other that, by viewing the two diagrams simultaneously, one with each eye, we identify the corresponding points intuitively.

The method in which we simultaneously contemplate two figures, and recognize a correspondence between certain points in the one figure and certain points in the other, is one of the most powerful and fertile methods hitherto known in science. Thus in pure geometry the theories of similar, reciprocal, and inverse figures have led to many extensions of the science. It is sometimes spoken of as the method or principle of Duality.

DIAGRAMS IN KINEMATICS.

The study of the motion of a material system is much assisted by the use of a series of diagrams representing the configuration, displacement, and acceleration of the parts of the system.

Diagram of Configuration.

In considering a material system it is often convenient to suppose that we have a record of its position at any given instant in the form of a diagram of configuration.

The position of any particle of the system is defined by drawing a straight line or vector from the origin, or point of reference, to the given particle. The position of the particle with respect to the origin is determined by the magnitude and direction of this vector.

If in the diagram we draw from the origin (which need not be the same point of space as the origin for the material system) a vector equal and parallel to the vector which determines the position of the particle, the end of this vector will indicate the position of the particle in the diagram of configuration.

If this is done for all the particles, we shall have a system of points in the diagram of configuration, each of which corresponds to a particle of the material system, and the relative positions of any pair of these points will be the same as the relative positions of the material particles which correspond to them.

We have hitherto spoken of two origins or points from which the vectors are supposed to be drawn—one for the material system, the other for the diagram. These points, however, and the vectors drawn from them, may now be omitted, so that we have on the one hand the material system and on the other a set of points, each point corresponding to a particle of the system, and the whole representing the configuration of the system at a given instant.

This is called a diagram of configuration.

Diagram of Displacement.

Let us next consider two diagrams of configuration of the same system, corresponding to two different instants.

We call the first the initial configuration and the second the final configuration, and the passage from the one configuration to the other we call the displacement of the system. We do not at present consider the length of time during which the displacement was effected, nor the intermediate stages through which it passed, but only the final result—a change of configuration. To study this change we construct a diagram of displacement.

Let A, B, C be the points in the initial diagram of configuration, and A′, B′, C′ be the corresponding points in the final diagram of configuration.

From *o*, the origin of the diagram of displacement, draw a vector *oa* equal and parallel to AA′, *ob* equal and parallel to BB′, *oc* to CC′, and so on.

The points, *a*, *b*, *c*, &c., will be such that the vector *ab* indicates the displacement of *b* relative to *a*, and so on. The diagram containing the points *a*, *b*, *c*, &c., is therefore called the diagram of displacement.

In constructing the diagram of displacement we have hitherto assumed that we know the absolute displacements of the points of the system. For we are required to draw a line equal and parallel to A_1A_2, which we cannot do unless we know the absolute final position of A, with respect to its initial position. In this diagram of displacement there is therefore, besides the points *a*, *b*, *c*, &c., an *origin*, *o*, which represents a point absolutely fixed in space. This is necessary because the two configurations do not exist at the same time; and therefore to express their relative position we require to know a point which remains the same at the beginning and end of the time.

But we may construct the diagram in another way which does not assume a knowledge of absolute displacement or of a point fixed in space.

Assuming any point and calling it *a*, draw *ak* parallel and equal to $B_1 A_1$ in the initial configuration, and from *k* draw *kb* parallel and equal to A_2B_2 in the final configuration. It is easy to see that the position of the point *b* relative to *a* will be the same by this construction as by the former construction, only we must observe that in this second construction we use only vectors such as A_1B_1, A_2B_2, which represent the relative position of points both of which exist simultaneously, instead of vectors such as A_1A_2, B_1B_2, which express the position of a point at one instant relative to its position at a former instant, and which therefore cannot be determined by observation, because the two ends of the vector do not exist simultaneously.

It appears therefore that the diagram of displacements, when drawn by the first construction includes an origin *o*, which indicates that we have assumed a knowledge of absolute displacements. But no such point occurs in the second construction, because we use such vectors only as we can actually observe. Hence the diagram of displacements *without an origin* represents neither more nor less than all we can ever know about the displacement of the material system.

Diagram of Velocity.

If the relative velocities of the points of the system are constant, then the diagram of displacement corresponding to an interval of a unit of time between the initial and the final configuration is called a diagram of relative velocity.

If the relative velocities are not constant, we suppose another system in which the velocities are equal to the velocities of the given system at the given instant and continue constant for a unit of time. The diagram of displacements for this imaginary system is the required diagram of relative velocities of the actual system at the given instant.

It is easy to see that the diagram gives the velocity of any one point relative to any other, but cannot give the absolute velocity of any of them.

Diagram of Acceleration.

By the same process by which we formed the diagram of displacements from the two diagrams of initial and final configuration, we may form a diagram of changes of relative velocity from the two diagrams of initial and final velocities. This diagram may be called that of total accelerations in a finite interval of time.

By the same process by which we deduced the diagram of velocities from that of displacements we may deduce the diagram of rates of acceleration from that of total acceleration.

We have mentioned this system of diagrams in elementary kinematics because they are found to be of use especially when we have to deal with material systems containing a great number of parts, as in the kinetic theory of gases. The diagram of configuration then appears as a region of space swarming with points representing molecules, and the only way in which we can investigate it is by considering the number of such points in unit of volume in different parts of that region, and calling this the *density* of the gas.

In like manner the diagram of velocities appears as a region containing points equal in number but distributed in a different manner, and the number of points in any given portion of the region expresses the number of molecules whose velocities lie within given limits. We may speak of this as the velocity-density.

Path and Hodograph.

When the number of bodies in the system is not so great, we may construct diagrams each of which represents some property of the whole course of the motion.

Thus if we are considering the motion of one particle relative to another, the point on the diagram of configuration which corresponds to the moving particle will trace out a continuous line called the path of the particle.

On the diagram of velocity the point corresponding to the moving particle will trace another continuous line called the hodograph of the particle.

The hodograph was invented and used with great success by Sir W. R. Hamilton as a method of studying the motions of bodies.

DIAGRAMS OF STRESS.

Graphical methods are peculiarly applicable to statical questions, because the state of the system is constant, so that we do not need to construct a series of diagrams corresponding to the successive states of the system.

The most useful of these applications relates to the equilibrium of plane framed structures. Two diagrams are used, one called the diagram of the frame and the other called the diagram of stress.

The structure itself consists of a number of separable pieces or links jointed together at their extremities. In practice these joints have friction, or may be made purposely stiff, so that the force acting at the extremity of a piece may not pass exactly through the axis of the joint; but as it is unsafe to make the stability of the structure depend in any degree upon the stiffness of joints, we assume in our calculations that all the joints are perfectly smooth, and therefore that the force acting on the end of any link passes through the axis of the joint.

The axes of the joints of the structure are represented by points in the diagram of the frame.

The link which connects two joints in the actual structure may be of any shape, but in the diagram of the frame it is represented by a straight line joining the points representing the two joints.

If no force acts on the link except the two forces acting through the centres of the joints, these two forces must be equal and opposite, and their direction must coincide with the straight line joining the centres of the joints.

If the force acting on either extremity of the link is directed towards the other extremity, the stress on the link is called pressure and the link is called a strut. If it is directed away from the other extremity, the stress on the link is called tension and the link is called a tie.

In this case, therefore, the only stress acting in a link is a pressure or a tension in the direction of the straight line which represents it in the diagram of the frame, and all that we have to do is to find the magnitude of this stress.

In the actual structure, gravity acts on every part of the link, but in the diagram we substitute for the actual weight of the different parts of the link, two weights which have the same resultant acting at the extremities of the link.

We may now treat the diagram of the frame as composed of links without weight, but loaded at each joint with a weight made up of portions of the weights of all the links which meet in that joint.

If any link has more than two joints we may substitute for it in the diagram an imaginary stiff frame, consisting of links, each of which has only two joints.

The diagram of the frame is now reduced to a system of points, certain pairs of which are joined by straight lines, and each point is in general acted on by a weight or other force acting between it and some point external to the system.

To complete the diagram we may represent these external forces as links, that is to say, straight lines joining the points of the frame to points external to the frame. Thus each weight may be represented by a link joining the point of application of the weight with the centre of the earth.

But we can always construct an imaginary frame having its joints in the lines of action of these external forces, and this frame, together with the real frame and the links representing external forces, which join points in the one frame to points in the other frame, make up together a complete self-strained system in equilibrium, consisting of points connected by links acting by pressure or tension. We may in this way reduce any real structure to the case of a system of points with attractive or repulsive forces acting between certain pairs of these points, and keeping them in equilibrium.

The direction of each of these forces is sufficiently indicated by that of the line joining the points, so that we have only to determine its magnitude.

We might do this by calculation, and then write down on each link the pressure or the tension which acts in it.

We should in this way obtain a mixed diagram in which the stresses are represented graphically as regards direction and position, but symbolically as regards magnitude.

But we know that a force may be represented in a purely graphical manner by a straight line in the direction of the force containing as many units of length as there are units of force in the force. The end of this line is marked with an arrow head to show in which direction the force acts.

According to this method each force is drawn in its proper position in the diagram of configuration of the frame. Such a diagram might be useful as a record of the result of calculation of the magnitude of the forces, but it would be of no use in enabling us to test the correctness of the calculation.

But we have a graphical method of testing the equilibrium of any set of forces acting at a point. We draw in series a set of lines parallel and proportional to these forces. If these lines form a closed polygon the forces are in equilibrium. We might in this way form a series of polygons of forces, one for each joint of the frame. But in so doing we give up the principle of drawing the line representing a force from the point of application of the force, for all the sides of the polygon cannot pass through the same point, as the forces do.

We also represent every stress twice over, for it appears as a side of both the polygons corresponding to the two joints between which it acts.

But if we can arrange the polygons in such a way that the sides of any two polygons which represent the same stress coincide with each other, we may form a diagram in which every stress is represented in direction and magnitude, though not in position, by a single line which is the common boundary of the two polygons which represent the joints at the extremities of the corresponding piece of the frame.

We have thus obtained a pure diagram of stress in which no attempt is made to represent the configuration of the material system, and in which every force is not only represented in direction and magnitude by a straight line, but the equilibrium of the forces at any joint is manifest by inspection, for we have only to examine whether the corresponding polygon is closed or not.

The relations between the diagram of the frame and the diagram of stress are as follows:—

To every link in the frame corresponds a straight line in the diagram of stress which represents in magnitude and direction the stress acting in that link.

To every joint of the frame corresponds a closed polygon in the diagram, and the forces acting at that joint are represented by the sides of the polygon taken in a certain cyclical order. The cyclical order of the sides of the two adjacent polygons is such that their common side is traced in opposite directions in going round the two polygons.

The direction in which any side of a polygon is traced is the direction of the force acting on that joint of the frame which corresponds to the polygon, and due to that link of the frame which corresponds to the side.

This determines whether the stress of the link is a pressure or a tension.

If we know whether the stress of any one link is a pressure or a tension, this determines the cyclical order of the sides of the two polygons corresponding to the ends of the links, and therefore the cyclical order of all the polygons, and the nature of the stress in every link of the frame.

Definition of Reciprocal Diagrams.

When to every point of concourse of the lines in the diagram of stress corresponds a closed polygon in the skeleton of the frame, the two diagrams are said to be reciprocal.

The first extensions of the method of diagrams of forces to other cases than that of the funicular polygon were given by Rankine in his *Applied Mechanics* (1857). The method was independently applied to a large number of cases by Mr W. P. Taylor, a practical draughtsman in the office of the well-known contractor Mr J. B. Cochrane, and by Professor Clerk Maxwell in his lectures in King's College, London. In the *Phil. Mag.* for 1864 the latter pointed out the reciprocal properties of the two diagrams, and in a paper on "Reciprocal Figures, Frames, and Diagrams of Forces," *Trans. R. S. Edinburgh*, vol. xxvi. (1870), he showed the relation of the method to Airy's function of stress and to other mathematical methods.

Professor Fleeming Jenkin has given a number of applications of the method to practice (*Trans. R. S. Edin.*, vol xxv.)

Cremona (*Le figure reciproche nella statica grafica*, Milan, 1872) has deduced the construction of reciprocal figures from the theory of the two components of a wrench as developed by Möbius.

Culmann, in his *Graphische Statik*, makes great use of diagrams of forces, some of which, however, are not reciprocal.

M. Maurice Levy in his *Statique Graphique* (Paris, 1874) has treated the whole subject in an elementary but copious manner.

Mr R. H. Bow, C.E., F.R.S.E., in his work on *The Economics of Construction in relation to Framed Structures*, 1873, has materially simplified the process of drawing a diagram of stress reciprocal to a given frame acted on by a system of equilibrating external forces.

Instead of lettering the joints of the frame, as is usually done, or the links of the frame, as was the writer's custom, he places a letter in each of the polygonal areas inclosed by the links of the frame, and also in each of the divisions of surrounding space as separated by the lines of action of the external forces.

When one link of the frame crosses another, the point of apparent intersection of the links is treated as if it were a real joint, and the stresses of each of the intersecting links are represented twice in the diagram of stress, as the opposite sides of the parallelogram which corresponds to the point of intersection.

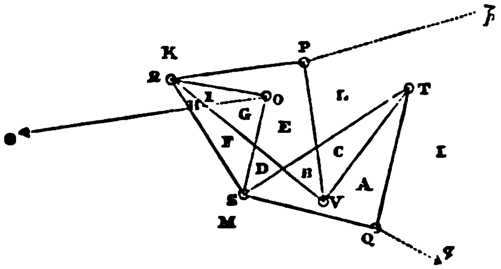

FIG. 1.—Diagram of Configuration.

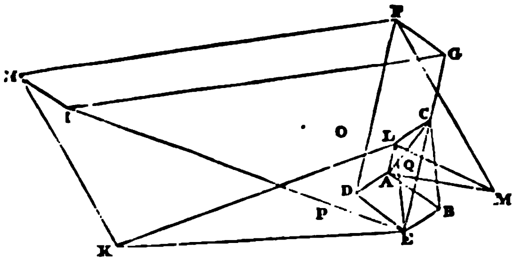

FIG. 2.—Diagram of Stress.

This method is followed in the lettering of the diagram of configuration (fig. 1), and the diagram of stress (fig. 2) of the linkwork which Professor Sylvester has called a quadruplane.

In fig. 1 the real joints are distinguished from the places where one link appears to cross another by the little circles O, P, Q, R, S, T, V.

The four points RSTV form a "contraparallelogram" in which RS = TV and RV = ST.

[illegible] ROS, RPV, TQS are [illegible] other [illegible] (TSV), not drawn [illegible] plane. The four points O, P, S, Q [illegible] angle POQ is constant [illegible] to [illegible] product of the distances OP and OQ is [illegible]

The linkwork may be fixed at O. If any figure is traced by P, Q will trace the inverse figure, but turned round O through the constant angle POQ.

In the diagram forces Pp, Qq are balanced by the force Oo at the fixed point. The forces Pp and Qq are necessarily inversely as OP and OQ, and make equal angles with those lines.

Every closed area formed by the links or the external forces in the diagram of configuration is marked by a letter which corresponds to a point of concourse of lines in the diagram of stress.

The stress in the link which is the common boundary of two areas is represented in the diagram of stress by the line joining the points corresponding to those areas.

When a link is divided into two or more parts by lines crossing it, the stress in each part is represented by a different line for each part, but as the stress is the same throughout the link these lines are all equal and parallel. Thus in the figure the stress in RV is represented by the four equal and parallel lines HI, FG, DE, and AB.

If two areas have no part of their boundary in common the letters corresponding to them in the diagram of stress are not joined by a straight line. If, however, a straight line were drawn between them, it would represent in direction and magnitude the resultant of all the stresses in the links which are cut by any line, straight or curved, joining the two areas.

For instance the areas F and C in fig. 1 have no common boundary, and the points F and C in fig. 2 are not joined by a straight line. But every path from the area F to the area C in fig. 1 passes through a series of other areas, and each passage from one area into a contiguous area corresponds to a line drawn in the diagram of stress. Hence the whole path from F to C in fig. 1 corresponds to a path formed of lines in fig. 2 and extending from F to C, and the resultant of all the stresses in the links cut by the path is represented by FC in fig. 2.

Automatic Description of Diagrams.

There are many other kinds of diagrams in which the two co-ordinates of a point in a plane are employed to indicate the simultaneous values of two related quantities.

If a sheet of paper is made to move, say horizontally, with a constant known velocity, while a tracing point is made to move in a vertical straight line, the height varying as the value of any given physical quantity, the point will trace out a curve on the paper from which the value of that quantity at any given time may be determined.

This principle is applied to the automatic registration of phenomena of all kinds, from those of meteorology and terrestrial magnetism to the velocity of cannon-shot, the vibrations of sounding bodies, the motions of animals, voluntary and involuntary, and the currents in electric telegraphs.

Indicator Diagram.

In Watt's indicator for steam engines the paper does not move with a constant velocity, but its displacement is proportional to that of the piston of the engine, while that of the tracing point is proportional to the pressure of the steam. Hence the coordinates of a point of the curve traced on the diagram represent the volume and the pressure of the steam in the cylinder. The indicator [illegible] supplies a record of the pressure of the [illegible] of the stroke of the engine, but indicates the work done by the steam in each stroke by the [illegible] by the curve traced on the diagram.

The indicator diagram was invented by James Watt as a means of estimating the work done by an engine. It was afterwards used by Clapeyron to illustrate the theory of heat, and this use of it was greatly developed by Rankine in his work on the steam engine.

The use of diagrams in thermodynamics has been very completely illustrated by Prof. J. Willard Gibbs (*Connecticut Acad. Sci.*, vol. iii.), but though his methods throw much light on the general theory of diagrams as a method of study, they belong rather to thermodynamics than to the present subject. (J. C. M.)

DIALLING

DIALLING, sometimes called gnomonics, is a branch of applied mathematics which treats of the construction of sun-dials, that is, of those instruments, either fixed or portable, which determine the divisions of the day by the motion of the shadow of some object on which the sun's rays fall.

It must have been one of the earliest applications of a knowledge of the apparent motion of the sun; though for a long time men would probably be satisfied with the division into morning and afternoon as marked by sun-rise, sun-set, and the greatest elevation.

History.—The earliest mention of a sun-dial is found in Isaiah xxxviii. 8: "Behold, I will bring again the shadow of the degrees which is gone down in the *sun-dial* of Ahaz ten degrees backward." The date of this would be about 700 years before the Christian era, but we know nothing of the character or construction of the instrument.

The earliest of all sun-dials of which we have any certain knowledge was the hemicycle, or hemisphere, of the Chaldean astronomer Berosus, who probably lived about 340 B.C. It consisted of a hollow hemisphere placed with its rim perfectly horizontal, and having a bead, or globule, fixed in any way at the centre. So long as the sun remained above the horizon the shadow of the bead would fall on the inside of the hemisphere, and the path of the shadow during the day would be approximately a circular arc. This arc, divided into twelve equal parts, determined twelve equal intervals of time for that day. Now, supposing this were done at the time of the solstices and equinoxes, and on as many intermediate days as might be considered sufficient, and then curve lines drawn through the corresponding points of division of the different arcs, the shadow of the bead falling on one of these curve lines would mark a division of time for that day, and thus we should have a sun-dial which would divide each period of daylight into twelve equal parts.

These equal parts were called *temporary hours*; and, since the duration of daylight varies from day to day, the temporary hours of one day would differ from those of another; but this inequality would probably be disregarded at that time, and especially in countries where the variation between the longest summer day and the shortest winter day is much less than in our climates.

The dial of Berosus remained in use for centuries. The Arabians, as appears from the work of Albategnius, still followed the same construction about the year 900 A.D. Four of these dials have in modern times been found in Italy. One, discovered at Tivoli in 1746, is supposed to have belonged to Cicero, who, in one of his letters, says that he had sent a dial of this kind to his villa near Tusculum. The second and third were found in 1751—one at Castel-Nuovo, and the other at Rignano; and a fourth was found in 1762 at Pompeii. G. H. Martini, the author of a dissertation in German on the dials of the ancients, says that this dial was made for the latitude of Memphis; it may therefore be the work of Egyptians, perhaps constructed in the school of Alexandria.

It is curious that no sun-dial has been found among the antiquities of Egypt, and their sculptures give no indication of any having existed. It has, however, been supposed that the numerous obelisks found everywhere were erected in honour of the sun and employed as gnomons.

Herodotus has recorded that the Greeks derived from the Babylonians the use of the gnomon, but the great progress made by the Greeks in geometry enabled them in later times to construct dials of great complexity, some of which remain to us, and are proofs, not only of extensive knowledge, but also of great ingenuity.

Ptolemy's *Syntaxis* treats of the construction of dials by means of his *analemma*, an instrument which solved a variety of astronomical problems. The constructions given by him were sufficient for regular dials, that is, horizontal dials, or vertical dials facing east, west, north, or south, and these are the only ones he treats of. It is certain, however, that the ancients were able to construct declining dials, as is shown by that most interesting monument of ancient gnomonics—the Tower of the Winds—which is still in existence at Athens. This is a regular octagon, on the faces of which the eight principal winds are represented, and over them eight different dials—four facing the cardinal points and the other four facing the intermediate directions. The date of the dials is long subsequent to that of the tower; for Vitruvius, who describes the tower in the sixth chapter of his first book, says nothing about the dials, and as he has described all the dials known in his time, we must believe that the dials of the tower did not then exist. The tower and its dials are described by Stuart in his *Antiquities of Athens*. The hours are still the temporary hours, or, as the Greeks called them, *hectemoria*.

As already stated, the learning and ingenuity of the Greeks enabled them to construct dials of various forms—among others, dials of suspension intended for travellers; but these are only spoken of and not explained; they may have been like our ring-dials.

The Romans were neither geometers nor astronomers, and the science of gnomonics did not flourish among them. The first sun-dial erected at Rome was in the year 290 B.C., and this Papirius Cursor had taken from the Samnites. A dial which Valerius Messala had brought from Catania, the latitude of which is five degrees less than that of Rome, was placed in the forum in the year 261 B.C. The first dial actually constructed at Rome was in the year 164 B.C., by order of Q. Marcius Philippus, but, as no other Roman has written on gnomonics, this was perhaps the work of a foreign artist. If, too, we remember that the dial found at Pompeii was made for the latitude of Memphis, and consequently less adapted to its position than that of Catania to Rome, we may infer that mathematical knowledge was not cultivated in Italy.

The Arabians were much more successful. They attached great importance to gnomonics, the principles of which they had learned from the Greeks, but they greatly simplified and diversified the Greek constructions. One of their writers, Abul-Hassan, who lived about the beginning of the 13th century, taught them how to trace dials on cylindrical, conical, and other surfaces. He even introduced *equal* or *equinoctial hours*, but the idea was not supported, and the temporary hours alone continued in use.

Where or when the great and important step already conceived by Abul-Hassan, and perhaps by others, of reckoning by *equal* hours was generally adopted cannot now be determined. The history of gnomonics from the 13th to the beginning of the 16th century is almost a blank, and during that time the change took place. We can see, however, that the change would necessarily follow the introduction of clocks and other mechanical methods of measuring time; for, however imperfect these were, the hours they marked would be of the same length in summer and in winter, and the discrepancy between these equal hours and the temporary hours of the sun-dial would soon be too important to be overlooked. Now, we know that a balance clock was put up in the palace of Charles V. of France about the year 1370, and we may reasonably suppose that the new sun-dials came into general use during the 14th and 15th centuries.

Among the earliest of the modern writers on gnomonics must be named Sebastian Munster, a cordelier who published his [illegible] at Basel in 1531. He gives a number of correct rules, but without demonstrations. Among his inventions was a moon-dial, but this does not admit of much accuracy.

During the 17th century dialling was discussed at great length by all writers on astronomy. Clavius devotes a quarto volume of 800 pages entirely to the subject. This was published in 1612, and may be considered to contain all that was known at that time.

In the 18th century clocks and watches began to supersede sun-dials, and these have gradually fallen into disuse except as an additional ornament to a garden, or in remote country districts where the old dial on the church tower still serves as an occasional check on the modern clock by its side. The art of constructing dials may now be looked upon as little more than a mathematical recreation.

[illegible] The diurnal and the annual motions [illegible] astronomical facts [illegible] the earth turns upon [illegible] 24 hours, and that [illegible] expressing these facts. [illegible] and it will suit our purpose [illegible] explanations easier, if we [illegible] furnish [illegible] the earth to be fixed. [illegible] revolve round the earth's axis [illegible] a day, the sun lagging [illegible] some 4 minutes [illegible] itself again in [illegible] revolution of the [illegible]

[illegible] revolve daily [illegible] the radius of the [illegible] distance of [illegible] point [illegible] that [illegible] in the case of [illegible] at 6 A.M. and [illegible] at noon would [illegible]

[illegible] the plane of the meridian, and [illegible] its elevation being equal [illegible]

[illegible] uniform, and [illegible]

[illegible]

watches being mechanical measures of time could not, except by extreme complication, be made to follow this irregularity, even if desirable, which is not the case.

The clock is constructed to mark uniform time in such wise that the length of the clock day shall be the average of all the solar days in the year. Four times a year the clock and the sun-dial agree exactly; but the sun-dial, now going a little slower, now a little faster, will be sometimes behind, sometimes before the clock—the greatest accumulated difference being about 16 minutes for a few days in November, but on the average much less. The four days on which the two agree are April 15, June 15, September 1, and December 24.

Clock-time is called *mean time*, that marked by the sun-dial is called *apparent time*, and the difference between them is the *equation of time*. It is given in most calendars and almanacs, frequently under the heading "clock slow," "clock fast." When the time by the sun-dial is known, the equation of time will at once enable us to obtain the corresponding clock time, or *vice versa*.

Atmospheric refraction introduces another error, by altering the apparent position of the sun; but the effect is too small to need consideration in the construction of an instrument which, with the best workmanship, does not after all admit of very great accuracy.

The general principles of dialling will now be readily understood. The problem before us is the following:—A rod, or *style*, as it is called, being firmly fixed in a direction parallel to the earth's axis, we have to find how and where points or lines of reference must be traced on some fixed surface behind the style, so that when the shadow of the style falls on a certain one of these lines we may know that at that moment it is solar noon,—that is, that the plane through the style and through the sun then coincides with the meridian; again, that when the shadow reaches the next line of reference, it is 1 o'clock by solar time, or, which comes to the same thing, that the above plane through the style and through the sun has just turned through the twenty-fourth part of a complete revolution; and so on for the subsequent hours,—the hours before noon being indicated in a similar manner. The style and the surface on which these lines are traced together constitute the dial.

The position of an intended sun-dial having been selected—whether on church tower, south front of farm-stead, or garden wall—the surface must be prepared, if necessary, to receive the hour-lines.

The chief, and in fact the only practical difficulty will be the accurate fixing of the style, for on its accuracy the value of the instrument depends.

It must lie in the meridian plane, and must make an angle with the horizon equal to the latitude of the place. The latter condition will offer no difficulty, but the exact determination of the meridian plane which passes through the point where the style is fixed to the surface is not so simple. We shall, further on, shew how this may be done; and, in the meantime, we shall assume that we have found the true position, and have firmly fixed the style to the dial and secured it there by cross wires, or by other means. The style itself will be usually a strong metal wire whose thickness may vary with circumstances; and when we speak of the shadow cast by the style it must always be understood that the middle line of the thin band of shade is meant.

The point where the style meets the dial is called the centre of the dial. It is the centre from which all the hour-lines radiate.

The construction of the XII o'clock line is the most important to determine accurately, since all the others are usually made to depend on this one. We cannot trace it correctly

until the style has been itself accurately fixed
place, as will be explained hereafter. When
the XII o'clock line will be found by the inter-
ıe dial surface with the vertical plane which
style ; and the most simple way of drawing
l will be by suspending a plummet from some
style whence it may hang freely, and waiting
dows of both style and plumb line coincide on
his single shadow will be the XII o'clock line.
ass of dials, namely, all the vertical ones, the
ine is simply the vertical line from the centre ;
efore, at once be traced on the dial face by
plumb line.

'clock line being traced, the easiest and most
thod of tracing the other hour lines would at
day when good watches are common, be by
ere the shadow of the style falls when 1, 2, 3,
ave elapsed since noon, and the next morning
means the forenoon hour lines could be traced ;
same manner the hours might be subdivided
nd quarters, or even into minutes.

rly, when watches were not, the tracing of the
c. o'clock lines was done by calculating the
each of these lines would make with the XII
. Now, except in the simple cases of a
ial or of a vertical dial facing a cardinal point,
equire long and intricate calculations, or elabor-
ical constructions, implying considerable mathe-
wledge, but also introducing increased chances
he chief source of error would lie in the uncer-
ıe data ; for the position of the dial-plane
to be found before the calculations began,—
would be necessary to know exactly by how
s it declined from the south towards the east
l by how many degrees it inclined from the
he ancients, with the means at their disposal,
these results only very roughly.

ived different names according to their posi-

l dials, when traced on a horizontal plane ;
ials, when on a vertical plane facing one of the
nts ;
leclining dials, on a vertical plane not facing a
nt ;
dials, when traced on planes neither vertical
tal (these were further distinguished as *reclin-*
aning backwards from an observer, *proclining*
g forwards) ;
al dials, when the plane is at right angles to
xis, &c. &c.

limit ourselves to an investigation of the
most usual of these cases, referring the reader,
details, to the later works given at the end of

struction.—A very correct view of the problem
truction may be obtained as follows :—

transparent cylinder (fig. 1) having an axis AB
e axis of the earth. On the surface of the cylinder
at generating lines be traced 15° apart, one of
II being in the meridian plane through AB, and
.I, II...II, &c., following in the order of the sun's

hadow of the line AB will obviously fall on the line
pparent noon, on the line I...I at one hour after noon,
wo hours after noon, and so on. If now the cylinder
ny plane MN representing the plane on which
be traced, the shadow of AB will be intercepted by
d fall on the lines AXII, AI, AII, &c.
ction of the dial consists in determining the angles
AII, &c. with AXII ; the line AXII itself, being
l plane through AB, may be supposed known.

purposes of actual calculation, perhaps a transparent sphere will, with advantage, replace the cylinder, and we shall here apply it to calculate the angles made by the hour line with the XII o'clock line in the two cases of a horizontal dial and of a vertical south dial.

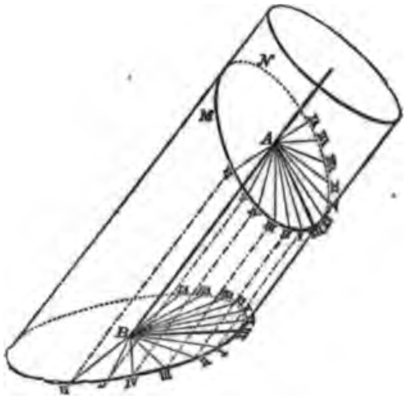

Fig. 1.

Horizontal Dial.—Let °Ep (fig. 2), the axis of the supposed transparent sphere, be directed towards the north and south poles of the heavens. Draw the two great circles HMA, QMa,

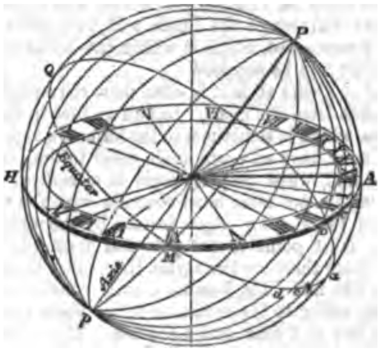

Fig. 2.

the former horizontal, the other perpendicular to the axis Pp and therefore coinciding with the plane of the equator. Let EZ be vertical, then the circle QZP will be the meridian, and by its intersection A with the horizontal will determine the XII o'clock line EA. Next divide the equatorial circle QMa into 24 equal parts *ab*, *bc*, *cd*, &c. . . . of 15° each, beginning from the meridian P*a*, and through the various points of division and the poles draw the great circles P*bp*, P*cp*, &c. . . . These will exactly correspond to the equidistant generating lines on the cylinder in the previous construction, and the shadow of the style will fall on these circles after successive intervals of 1, 2, 3, &c. hours from noon. If they meet the horizontal in the points B, C, D, &c., then EB, EC, ED, &c. . . . will be the I, II, III, &c., hour lines required ; and the problem of the horizontal dial consists in calculating the angles which these lines make with the XII o'clock line EA, whose position is known. The spherical triangles PAB, PAC, &c., enable us to do this readily. They are all right-angled at A, the side PA is the latitude of the place, and the angles APB, APC, &c., are respectively 15°, 30°, &c., then

$$\text{tan. } AB = \text{tan. } 15^\circ \text{ sin. } \textit{latitude},$$
$$\text{tan. } AC = \text{tan. } 30^\circ \text{ sin. } \textit{latitude},$$
&c., &c.

These determine the sides AB, AC, &c. that is, the angles AEB, AEC, &c., required.

For examples, let us find the angles made by the I o'clock line at the following places—Madras, London, Edinburgh, and Hammerfest (Norway).

Madras (13° 4′ N. lat.)
Log. tan. 15°..........9·42805
Log. sin. 13° 4′.......9·35427
Log. tan. 3° 28′.......8·78232

London (51° 30′ N. lat.)
Log. tan. 15°..........9·42805
Log. sin. 51° 30′......9·89354
Log. tan. 11° 51′......9·32159

Edinburgh (55° 57′ N. lat.)
Log. tan. 15°..........9·42805
Log. sin. 55° 57′......9·91832
Log. tan. 12° 31′......9·34637

Hammerfest (78° 40′ N. lat.)
Log. tan. 15°..........9·42805
Log. sin. 78° 40′......9·98211
Log. tan. 14° 25′......9·41016

Thus the I o'clock hour line EB must make an angle on a Madras dial of only 3° 28′ with the meridian EA, 11° 51′ on a London dial, 12° 31′ at Edinburgh, and 14° 25′ at Hammerfest. In the same way may be found the angles made by the other hour lines.

The calculations of these angles must extend throughout one quadrant from noon to VI o'clock, but need not be carried further, because all the other hour-lines can at once be deduced from these. —In the first place the dial is symmetrically divided by the meridian, and therefore two times equidistant from noon will have their hour lines equidistant from the meridian; thus the XI o'clock line and the I o'clock line must make the same angles with it, the XI o'clock the came as the II o'clock, and so on. And next, the 24 great circles, which were drawn to determine these lines, are in reality only 12; for clearly the great circle which gives I o'clock after midnight, and that which gives I o'clock after noon, are one and the same, and so also for the other hours. Therefore the hour lines between VI in the evening and VI the next morning are the prolongations of the remaining twelve.

Let us now remove the imaginary sphere with all its circles, and retain only the style EP and the plane HMA with the lines traced on it, and we shall have the horizontal dial.

On the longest day in London the sun rises a little after 4 o'clock, and sets a little before 8 o'clock; there is therefore no necessity for extending a London dial beyond those hours. At Edinburgh the limits will be a little longer, while at Hammerfest, which is within the Arctic circle, the whole circuit will be required.

Instead of a wire style it is often more convenient to use a metal plate from one quarter to half an inch in thickness. This plate, which is sometimes in the form of a right-angled triangle, must have an acute angle equal to the latitude of the place, and, when properly fixed in a vertical position on the dial, its two faces must coincide with the meridian plane, and the sloping edges formed by the thickness of the plate must point to the pole and form two parallel styles. Since there are two styles, there must be two dials, or rather two half dials, because a little consideration will show that, owing to the thickness of the plate, these styles will only one at a time cast a shadow. Thus the eastern edge will give the shadow for all hours before 6 o'clock in the morning. From 6 o'clock until noon the western edge will be used. At noon, it will change again to the eastern edge until 6 o'clock in the evening, and finally the western edge for the remaining hours of daylight.

The centres of the two dials will be at the points where the styles meet the dial face; but, in drawing the hour-lines, we must be careful to draw only those lines for which the corresponding style is able to give a shadow as explained above. The dial will thus have the appearance of a single dial plate, and there will be no confusion (see fig. 3).

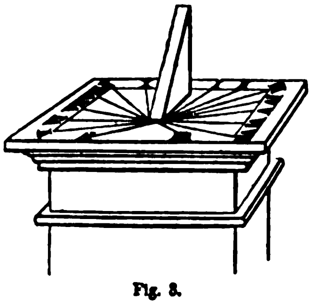

Fig. 8.

The line of demarcation between the shadow and the light will be better defined than when a wire style is used; but the indications by this double dial will always be one minute too fast in the morning and one minute too slow in the afternoon. This is owing to the magnitude of the sun, whose angular breadth is half a degre defined shadows are given, not by the centre we should require them, but by the forwar morning and by the backward one in the a the sun takes just about a minute to adva space equal to its half-breadth.

Dials of this description are frequently m country. Placed on an ornamental pedest high, they form a pleasing and useful additic to a garden terrace. The dial plate is of n the vertical piece upon it, and they may ready for placing on the pedestal,—the dia hour-lines traced on it, and the style-plate f in its proper position, if not even cast in t with the dial-plate.

When placing it on the pedestal care must the dial be perfectly horizontal and accur The levelling will be done with a spirit-level, tation will be best effected either in the fore afternoon, by turning the dial-plate till th by the shadow (making the *one* minute correc above) agrees with a good watch whose erro is known. It is, however, important to bea a dial, so built up beforehand, will have th base equal to the latitude of some selected London, and the hour-lines will be drawn calculated for the same latitude. Such a dia not be used near Edinburgh or Glasgow, alth without appreciable error, be adapted to a latitude did not differ more than 20 or 30 n of London, and it would be safe to emplo Kent, or Wiltshire.

If a series of such dials were constructe 30 miles in latitude, then an intending p select one adapted to a place whose latitude miles of his own, and the error of time woul a small fraction of a minute. The follow enable us to check the accuracy of the hour-l angle of the style,—all angles on the dial measured with an ordinary protractor. It 50° lat. to 59½° lat., and therefore include Great Britain and Ireland :—

Lat.	XI. A.M. I. P.M.	X. A.M. II. P.M.	IX. A.M. III. P.M.	VIII. A.M. IV. P.M.	V V
50° 0′	11° 36′	23° 51′	37° 27′	53° 0′	7
50 30	11 41	24 1	37 39	53 12	7
51 0	11 46	24 10	37 51	53 23	7
51 30	11 51	24 19	38 3	53 35	7
52 0	11 55	24 28	38 14	53 46	7
52 30	12 0	24 37	38 25	53 57	7
53 0	12 5	24 45	38 37	54 8	7
53 30	12 9	24 54	38 48	54 19	7
54 0	12 14	25 2	38 58	54 29	7
54 30	12 18	25 10	39 9	54 39	[illegible]
55 0	12 23	25 19	39 19	54 49	[illegible]
55 30	12 27	25 27	39 30	54 59	[illegible]
56 0	12 31	25 35	39 40	55 9	[illegible]
56 30	12 36	25 43	39 50	55 18	[illegible]
57 0	12 40	25 50	39 59	55 27	[illegible]
57 30	12 44	25 58	40 9	55 36	[illegible]
58 0	12 48	26 5	40 18	55 45	[illegible]
58 30	12 52	26 13	40 27	55 54	[illegible]
59 0	12 56	26 20	40 36	56 2	[illegible]
59 30	13 0	26 27	15 45	56 11	[illegible]

Vertical South Dial.—Let us take again our parent sphere QZPA (fig. 4), whose axis PEp earth's axis. Let Z be the zenith, and conseq circle QZP the meridian. Through E, the cent draw a vertical plane facing south. This will the great circle ZMA which, being vertical, the zenith, and, facing south, will be at rig meridian. Let QMa be the equatorial circle, obt a plane through E at right angles to the axis portion Ep of the axis will be the style, the ve the meridian plane will be the XII o'clock line, and the horizontal line EM[1] will be the VI o'clock line. Now, as in the previous problem, divide the equatorial circle into 24 equal arcs of 15° each, beginning at *a*, viz., *ab*, *bc*, &c.,—each quadrant aM, MQ, &c., containing six,—then through each point of division

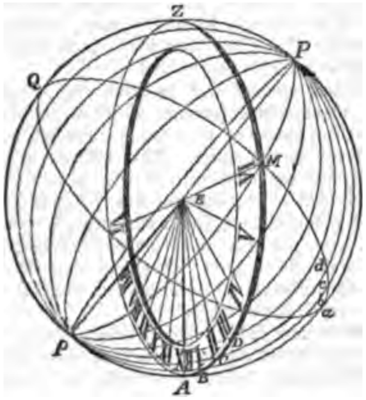

Fig. 4.

and through the axis Pp draw a plane cutting the sphere in 24 equidistant great circles. As the sun revolves round the axis the shadow of the axis will successively fall on these circles at intervals of one hour, and if these circles cross the vertical circle ZMA in the points A, B, C, &c., the shadow of the lower portion Ep of the axis will fall on the lines EA, EB, EC, &c., which will therefore be the required hour lines on the vertical dial, Ep being the style.

There is no necessity for going beyond the VI o'clock hour-line on each side of noon; for, in the winter months the sun sets earlier than 6 o'clock, and in the summer months it passes behind the plane of the dial before that time, and is no longer available.

It remains to show how the angles AEB, AEC, &c., may be calculated.

The spherical triangles pAB, pAC, &c., will give us a simple rule. These triangles are all right-angled at A, the side pA, equal to ZP, is the co-latitude of the place, that is, the difference between the latitude and 90°; and the successive angles ApB, ApC, &c. are 15°, 30°, &c., respectively. Then

tan. AB = tan. 15° sin. *co-latitude*;

or more simply,

tan. AB = tan. 15° cos. *latitude*,
tan. AC = tan. 30° cos. *latitude*,
&c., &c.

and the arcs AB, AC so found are the measure of the angles AEB, AEC, &c., required.

We shall, as examples, calculate the I o'clock hour angle AEB for each of the four places we had already taken in the horizontal dial.

Madras (13° 4′ N. lat.)	London (51° 30′ N. lat.)
Log. tan. 15°..........9·42805	Log. tan. 15°..........9·42805
Log. cos. 13° 4′.......9·98861	Log. cos. 51° 30′......9·79415
Log. tan. 14° 38′......9·41666	Log. tan. 9° 28′.......9·22220

Edinburgh (55° 57′ N. lat.)	Hammerfest (73° 40′ N. lat.)
Log. tan. 15°..........9·42805	Log. tan. 15°..........9·42805
Log. cos. 55° 57′......9·74812	Log. cos. 73° 40′......9·44905
Log. tan. 8° 32′.......9·17617	Log. tan. 4° 19′.......8·87710

In this case the angles diminish as the latitudes increase, the opposite result to that of the horizontal dial.

Inclining, Reclining, &c., Dials.—We shall not enter into the calculation of these cases. Our imaginary sphere being, as before supposed, constructed with its centre at the centre of the dial, and all the hour-circles traced upon it, the intersection of these hour-circles with the plane of the dial will determine the hour-lines just as in the previous cases; but the triangles will no longer be right-angled, and the simplicity of the calculation will be lost, the chances of error being greatly increased by the difficulty of drawing the dial-plane in its true position on the sphere, since that true position will have to be found from observations which can be only roughly performed.

In all these cases, and in cases where the dial surface is not a plane, and the hour-lines, consequently, are not straight lines, the only safe practical way is to mark rapidly on the dial a few points (one is sufficient when the dial face is plane) of the shadow at the moment when a good watch shows that the hour has arrived, and afterwards connect these points with the centre by a continuous line. Of course the style must have been accurately fixed in its true position before we begin.

Equatorial Dial.—The name equatorial dial is given to one whose plane is at right angles to the style, and therefore parallel to the equator. It is the simplest of all dials. A circle (fig. 5) divided into 24 equal arcs is placed at right angles to the style, and hour divisions are marked upon it. Then if care be taken that the style point accurately to the pole, and that the noon division coincide with the meridian plane, the shadow of the other style will fall on the other divisions, each at its proper time. The divisions must be marked on both sides of the dial, because the sun will shine on opposite sides in the summer and in the winter months, changing at each equinox.

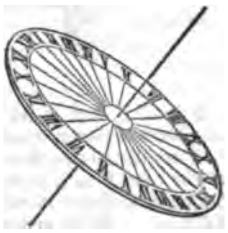

Fig. 5.

To find the Meridian Plane.—We have, so far, assumed the meridian plane to be accurately known; we shall proceed to describe some of the methods by which it may be found.

The mariner's compass may be employed as a first rough approximation. It is well known that the needle of the compass, when free to move horizontally, oscillates upon its pivot and settles in a direction termed the magnetic meridian. This does not coincide with the true north and south line, but the difference between them is generally known with tolerable accuracy, and is called the variation of the compass. The variation differs widely at different parts of the surface of the earth, being now about 20° W. in London, 7°. W. in New York, and 17° E. in San Francisco. Nor is the variation at any place stationary, though the change is slow. We said that *now* the variation in London is about 20° W.; in 1837 it was about 24° W.; and there is even a small daily oscillation which takes place about the mean position, but too small to need notice here.

With all these elements of uncertainty, it is obvious that the compass can only give a rough approximation to the position of the meridian, but it will serve to fix the style so that only a small further alteration will be necessary when a more perfect determination has been made.

A very simple practical method is the following:—

Place a table (fig. 6), or other plane surface, in such a position that it may receive the sun's rays both in the morning and in the afternoon. Then carefully level the surface by means of a spirit-level. This must be done very accurately, and the table in that position made perfectly secure, so that there be no danger of its shifting during the day.

Next, suspend a plummet SH from a point S, which must be rigidly fixed. The extremity H, where the plummet just meets the surface, should be somewhere near the middle of one end of the table. With H for centre, describe any number of concentric arcs of circles, AB, CD, EF, &c.

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[1] EM is obviously horizontal, since M is the intersection of two great circles ZM, QM, each at right angles to the vertical plane QZP.

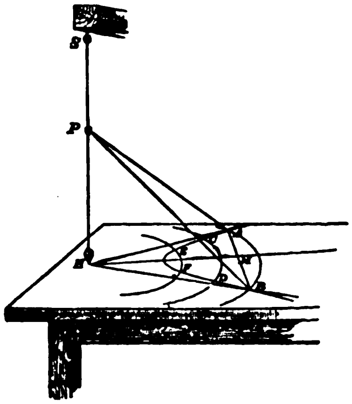

Fig. 6.

A bead P, kept in its place by friction, is threaded on the plummet line at some convenient height above H.

Every thing being thus prepared, let us follow the shadow of the bead P as it moves along the surface of the table during the day. It will be found to describe a curve ACE . . . . FDB, approaching the point H as the sun advances towards noon, and receding from it afterwards. (The curve is a conic section—an hyperbola in these regions.) At the moment when it crosses the arc AB, mark the point A; AP is then the direction of the sun, and, as AH is horizontal, the angle PAH is the altitude of the sun. In the afternoon mark the point B where it crosses the same arc; then the angle PBH is the altitude. But the right-angled triangles PHA, PHB are obviously equal; and the sun has therefore the same altitudes at those two instants, the one before, the other after noon. It follows that, *if the sun has not changed its declination* during the interval, the two positions will be symmetrically placed one on each side of the meridian. Therefore, drawing the chord AB, and bisecting it in M, HM will be the meridian line.

Each of the other concentric arcs, CD, EF, &c., will furnish its meridian line. Of course these should all coincide, but if not, the mean of the positions thus found must be taken.

The proviso mentioned above, that the sun has not changed its declination, is scarcely ever realized; but the change is slight, and may be neglected, except perhaps about the time of the equinoxes, at the end of March and at the end of September. Throughout the remainder of the year the change of declination is so slow that we may safely neglect it. The most favourable times are at the end of June and at the end of December, when the sun's declination is almost stationary. If the line HM be produced both ways to the edges of the table, then the two points on the ground vertically below those on the edges may be found by a plummet, and, if permanent marks be made there, the meridian plane, which is the vertical plane passing through these two points, will have its position perfectly secured.

To place the Style of a Dial in its True Position.—Before giving any other method of finding the meridian plane, we shall complete the construction of the dial, by showing how the style may now be accurately placed in its true position. The angle which the style makes with a hanging plumb-line, being the co-latitude of the place, is known, and the north and south direction is also roughly given by the mariner's compass. The style may therefore be already adjusted approximately—correctly, ind
to its inclination—but probably requiring a little hor
motion east or west. Suspend a fine plumb-line
some point of the style, then the style will be p
adjusted if, at the very instant of noon, its shado
exactly on the plumb-line,—or, which is the same t
both shadows coincide on the dial.

This instant of noon will be given very simply
meridian plane, whose position we have secured
two permanent marks on the ground. Stretch a cor
the one mark to the other. This will not gener
horizontal, but the cord will be wholly in the m
plane, and that is the only necessary condition.
suspend a plummet over the mark which is nearer
sun, and, when the shadow of the plumb-line falls
stretched cord, it is noon. A signal from the o
there to the observer at the dial enables the la
adjust the style as directed above.

Other Methods of finding the Meridian Plane.—W
dwelt at some length on these practical operations b
they are simple and tolerably accurate, and becaus
want neither watch, nor sextant, nor telescope—n
more, in fact, than the careful observation of
lines.

The polar star may also be employed for findi
meridian plane without other apparatus than plum
This star is now only about 1° 21′ from the pole; if
fore a plumb-line be suspended at a few feet fro
observer, and if he shift his position till the star is
hidden by the line, then the plane through his eye a
plumb-line will never be far from the meridian plane.
in the course of the 24 hours the planes would be
coincident. This would be when the star cross
meridian above the pole, and again when it cro
below. If we wished to employ the method of det
ing the meridian, the times of the stars crossing woul
to be calculated from the data in the *Nautical Al*
and a watch would be necessary to know when the i
arrived. The watch need not, however, be very ac
because the motion of the star is so slow that an e
ten minutes in the time would not give an error o
eighth of a degree in the azimuth.

The following accidental circumstance enables us
pense with both calculation and watch. The right
sion of the star η *Ursæ Majoris*, that star in the tail
Great Bear which is farthest from the "pointers," h
to differ by a little more than 12 hours from the
ascension of the polar star. The great circle whic
the two stars passes therefore close to the pole. Wh
polar star, at a distance of about 1¼° from the
crossing the meridian above the pole, the star η
Majoris, whose polar distance is about 40°, has
reached the meridian below the pole.

When η *Ursæ Majoris* reaches the meridian, whi
be within half an hour later, the polar star will ha
the meridian; but its slow motion will have carried
a very little distance away. Now at some instant b
these two times—much nearer the latter than the fo
the great circle joining the two stars will be
vertical; and at this instant, which the observer dete
by seeing that the plumb-line hides the two
simultaneously, neither of the stars is strictly
meridian; but the deviation from it is so small that
be neglected, and the plane through the eye a
plumb-line taken for meridian plane.

In all these cases it will be convenient, instead of
the plane by means of the eye and one fixed plum
have a second plummet at a short distance in front
eye; this second plummet, being suspended so as t
of lateral shifting, must be moved so as always

between the eye and the fixed plummet. The meridian plane will be secured by placing two permanent marks on the ground, one under each plummet.

This method, by means of the two stars, is only available for the upper transit of *Polaris;* for, at the lower transit, the other star *η Ursæ Majoris* would pass close to or beyond the zenith, and the observation could not be made. Also the stars will not be visible when the upper transit takes place in the day-time, so that one-half of the year is lost to this method.

Neither could it be employed in lower latitudes than 40° N., for there the star would be below the horizon at its lower transit;—we may even say not lower than 45° N., for the star must be at least 5° above the horizon before it becomes distinctly visible.

There are other pairs of stars which could be similarly employed, but none so convenient as these two, on account of *Polaris* with its very slow motion being one of the pair.

To place the Style in its True Position without previous determination of the Meridian Plane.—The various methods given above for finding the meridian plane have for ultimate object the determination of the plane, not on its own account, but as an element for fixing the instant of noon, whereby the style may be properly placed.

We shall dispense, therefore, with all this preliminary work if we determine noon by astronomical observation. For this we shall want a good watch, or pocket chronometer, and a sextant or other instrument for taking altitudes. The local time at any moment may be determined in a variety of ways by observation of the celestial bodies. The simplest and most practically useful methods will be found described and investigated in any good educational work on astronomy.

For our present purpose a single altitude of the sun taken in the forenoon will be most suitable. At some time in the morning, when the sun is high enough to be free from the mists and uncertain refractions of the horizon—but to insure accuracy, while the rate of increase of the altitude is still tolerably rapid, and, therefore, not later than 10 o'clock—take an altitude of the sun, an assistant, at the same moment, marking the time shown by the watch. The altitude so observed being properly corrected for refraction, parallax, &c., will, together with the latitude of the place, and the sun's declination, taken from the *Nautical Almanac*, enable us to calculate the time. This will be the solar or apparent time, that is, the very time we require; and we must carefully abstain from applying the equation of time. Comparing the time so found with the time shown by the watch, we see at once by how much the watch is fast or slow of solar time; we know, therefore, exactly what time the watch must mark when solar noon arrives, and waiting for that instant we can fix the style in its proper position as explained before.

We can dispense with the sextant and with all calculation and observation if, by means of the pocket chronometer, we bring the time from some observatory where the work is done; and, allowing for the change of longitude, and also for the equation of time, if the time we have brought is clock time, we shall have the exact instant of solar noon as in the previous case.

In remote country districts a dial will always be of use to check and even to correct the village clock; and the description and directions here given will, we think, enable any ingenious artisan to construct one.

In former times the fancy of dialists seems to have run riot in devising elaborate surfaces on which the dial was to be traced. Sometimes the shadow was received on a cone, sometimes on a cylinder, or on a sphere, or on a combination of these. A universal dial was constructed of a figure in the shape of a cross; another universal dial showed the hours by a globe and by several gnomons. These universal dials required adjusting before use, and for this a mariner's compass and a spirit-level were necessary. But it would be tedious and useless to enumerate the various forms designed, and, as a rule, the more complex the less accurate.

Another class of useless dials consisted of those with variable centres. They were drawn on fixed horizontal planes, and each day the style had to be shifted to a new position. Instead of hour-*lines* they had hour-*points;* and the style, instead of being parallel to the axis of the earth, might make any chosen angle with the horizon. There was no practical advantage in their use, but rather the reverse; and they can only be considered as furnishing material for new mathematical problems.

Portable Dials.—The dials so far described have been fixed dials, for even the fanciful ones to which reference was just now made were to be fixed before using. There were, however, other dials, made generally of a small size, so as to be carried in the pocket; and these, so long as the sun shone, roughly answered the purpose of a watch.

The description of the portable dial has generally been mixed up with that of the fixed dial, as if it had been merely a special case, and the same principle had been the basis of both; whereas there are essential points of difference between them, besides those which are at once apparent.

In the fixed dial the result depends on the *uniform* angular motion of the sun round the fixed style; and a small error in the assumed position of the sun, whether due to the imperfection of the instrument, or to some small neglected correction, has only a trifling effect on the time. This is owing to the angular displacement of the sun being so rapid—a quarter of a degree every minute—that for the ordinary affairs of life greater accuracy is not required, as a displacement of a quarter of a degree, or at any rate of one degree, can be readily seen by nearly every person. But with a portable dial this is no longer the case. The uniform angular motion is not now available, because we have no determined fixed plane to which we may refer it. In the new position, to which the observer has gone, the zenith is the only point of the heavens he can at once practically find; and the basis for the determination of the time is the constantly but *very irregularly* varying zenith distance of the sun.

At sea the observation of the altitude of a celestial body is the only method available for finding local time; but the perfection which has been attained in the construction of the sextant (chiefly by the introduction of telescopes) enables the sailor to reckon on an accuracy of seconds instead of minutes. Certain precautions have, however, to be taken. The observations must not be made within a couple of hours of noon, on account of the slow rate of change at that time, nor too near the horizon, on account of the uncertain refractions there; and the same restrictions must be observed in using a portable dial.

To compare roughly the value (as to accuracy) of the fixed and the portable dials, let us take a mean position in Great Britain, say 54° lat., and a mean declination when the sun is in the equator. It will rise at 6 o'clock, and at noon have an altitude of 36°,—that is, the portable dial will indicate an average change of one-tenth of a degree in each minute, or two and half times slower than the fixed dial. The vertical motion of the sun increases, however, nearer the horizon, but even there it will be only one-eighth of a degree each minute, or half the rate of the fixed dial, which goes on at nearly the same speed throughout the day.

Portable dials are also much more restricted in the range of latitude for which they are available, and they should not be used more than 4 or 5 miles north or south of the place for which they were constructed.

We shall briefly describe two portable dials which were in actual use.

Dial on a Cylinder.—A hollow cylinder of metal (fig. 7), 4 or 5 inches high, and about an inch in diameter, has a lid which admits of tolerably easy rotation. A hole in the lid receives the style, shaped somewhat like a bayonet; and the straight part of the style, which, on account of the two bends, is lower than the lid, projects horizontally out from the cylinder to a distance of 1 or 1½ inches. When not in use the style would be taken out and placed inside the cylinder.

A horizontal circle is traced on the cylinder opposite the projecting style, and this circle is divided into 36 approximately equidistant intervals.[1] These intervals represent spaces of time, and to each division is assigned a date, so that each month has three dates marked as follows:—January 10, 20, 31; February 10, 20, 28; March 10, 20, 31; April 10, 20, 30, and so on,—always the 10th, the 20th, and the last day of each month.

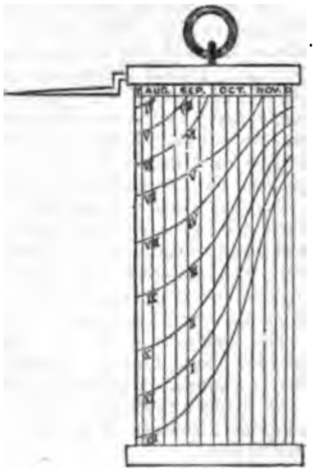

Fig. 7.

Through each point of division a vertical line parallel to the axis of the cylinder is drawn from top to bottom. Now it will be readily understood that if, upon one of these days, the lid be turned so as to bring the style exactly opposite the date, and if the dial be then placed on a horizontal table so as to receive sun-light, and turned round *bodily* until the shadow of the style falls exactly on the vertical line below it, the shadow will terminate at some definite point of this line, the position of which point will depend on the length of the style—that is, the distance of its end from the surface of the cylinder—and on the altitude of the sun at that instant. Suppose that the observations are continued all day, the cylinder being very gradually turned so that the style may always face the sun, and suppose that marks are made on the vertical line to show the extremity of the shadow at each exact hour from sunrise to sunset—these times being taken from a good fixed sun dial,—then it is obvious that the next year, on the *same date*, the sun's declination being about the same, and the observer in about the same latitude, the marks made the previous year will serve to tell the time all that day.

What we have said above was merely to make the principle of the instrument clear, for it is evident that this mode of marking, which would require a whole year's sunshine and hourly observation, cannot be the method employed.

The positions of the marks are, in fact, obtained by calculation. Corresponding to a given date, the declination
of the sun is taken from the almanac, a
with the latitude of the place and the len
will constitute the necessary data for comp
of the shadow, that is, the distance of the
style for each successive hour.

We have assumed above that the decli
is the same at the same date in different
not quite correct, but, if the dates be tak
year after leap year, the results will be su
mate. The actual calculations will offer

When all the hour marks have been p
their respective dates, then a continuous c
corresponding hour-points, will serve to fi
day intermediate to those set down, the
till the style occupy a proper position
divisions. The horizontality of the surf
instrument rests is a very necessary condi
summer, when, the shadow of the style
extreme end will shift rapidly for a smal
the vertical, and render the reading unce
can also be used by holding it up by a
top of the lid, and probably the vert
ensured in that way.

Portable Dial on a Card.—This neat a
dial is attributed by Ozanam to a Jesuit
Rigaud, and probably dates from the early
century. Ozanam says that it was some
capuchin, from some fancied resemblance
back.

Construction.—Draw a straight line ACB p
the card (fig. 8) and another DCE at right ang

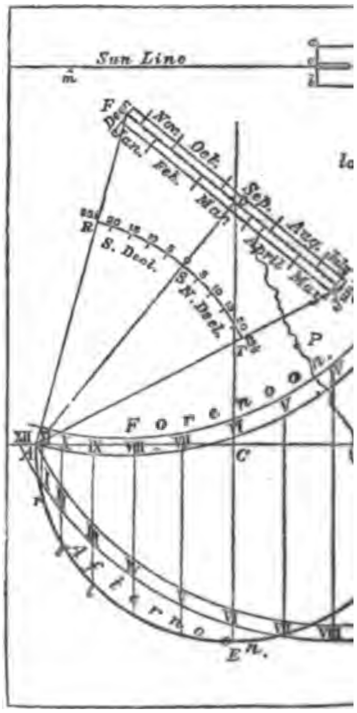

Fig. 8.

centre, and any convenient radius CA, describe
below the horizontal. Divide the whole arc AEB
at the points *r*, *s*, *t*, &c., and through these po
culars to the diameter ACB, these lines will be
the line through *r* will be the XI ..I line; the
X...II line, and so on; the hour line of noon

---

[1] Strict equality is not necessary, as the observations made are on the vertical line through each division-point, without reference to the others. It is not even requisite that the divisions should go completely and exactly round the cylinder, although they were always so drawn, and both these conditions were insisted upon in the directions for the construction.

itself; by subdivision of the small arcs Ar, rs, st, &c., we may draw the hour lines corresponding to halves and quarters, but this only where it can be done without confusion.

Draw ASD making with AC an angle equal to the latitude of the place, and let it meet EC in D, through which point draw FDG at right angles to AD.

With centre A, and any convenient radius AS, describe an arc of circle RST, and graduate this arc by marking degree divisions on it, extending from 0° at S to 23½° on each side at R and T. Next determine the points on the straight line FDG where radii drawn from A to the degree divisions on the arc would cross it, and carefully mark these crossings.

The divisions of RST are to correspond to the sun's declination, south declinations on RS and north declinations on ST. In the other hemisphere of the earth this would be reversed; the north declinations would be on the upper half.

Now, taking a second year after leap year (because the declinations of that year are about the mean of each set of four years), find the days of the month when the sun has these different declinations, and place these dates, or so many of them as can be shown without confusion, opposite the corresponding marks on FDG. Draw the *sun-line* at the top of the card parallel to the line AOB; and, near the extremity, to the right, draw any small figure intended to form, as it were, a door of which $a\,b$ shall be the hinge. Care must be taken that this hinge is exactly at right angles to the *sun-line*. Make a fine open slit $c\,d$ right through the card and extending from the hinge to a short distance on the door,—the centre line of this slit coinciding accurately with the *sun-line*. Now, cut the door completely through the card; except, of course, along the hinge, which, when the card is thick, should be partly cut through at the back, to facilitate the opening. Cut the card right through along the line FDG, and pass a thread carrying a little plummet W and a *very* small bead P; the bead having sufficient friction with the thread to retain any position when acted on only by its own weight, but sliding easily along the thread when moved by the hand. At the back of the card the thread terminates in a knot to hinder it from being drawn through; or better, because giving more friction and a better hold, it passes through the centre of a small disc of card—a fraction of an inch in diameter—and, by a knot, is made fast at the back of the disc.

To complete the construction,—with the centres F and G, and radii FA and GA, draw the two arcs AY and AZ which will limit the hour lines; for in an observation the bead will always be found between them. The forenoon and afternoon hours may then be marked as indicated in the figure. The dial does not of itself discriminate between forenoon and afternoon; but extraneous circumstances, as, for instance, whether the sun is rising or falling, will settle that point, except when close to noon, where it will always be uncertain.

To *rectify* the dial (using the old expression, which means to prepare the dial for an observation),—open the small door, by turning it about its hinge, till it stands well out in front. Next, set the thread in the line FG opposite the day of the month, and stretching it over the point A, slide the bead P along till it exactly coincide with A.

To find the hour of the day,—hold the dial in a vertical position in such a way that its plane may pass through the sun. The verticality is ensured by seeing that the bead rests against the card without pressing. Now gradually tilt the dial (without altering its vertical plane), until the central line of sunshine, passing through the open slit of the door, just falls along the sun-line. The hour line against which the bead P then rests indicates the time.

The *sun-line* drawn above has always, so far as we know, been used as a *shadow-line*. The upper edge of the rectangular door was the prolongation of the line, and, the door being opened, the dial was gradually tilted until the shadow cast by the upper edge exactly coincided with it. But this shadow tilts the card one-quarter of a degree more than the sun-line, because it is given by that portion of the sun which just appears above the edge, that is, by the upper limb of the sun, which is one-quarter of a degree higher than the centre. Now, even at some distance from noon, the sun will sometimes take a considerable time to rise one-quarter of a degree, and by so much time will the indication of the dial be in error.

The central line of light which comes through the open slit will be free from this error, because it is given by light from the centre of the sun.

The card-dial deserves to be looked upon as something more than a mere toy. Its ingenuity and scientific accuracy give it an educational value which is not to be measured by the roughness of the results obtained, and the following demonstration of its correctness will, it is hoped, usefully close what we have to say on this subject.

Demonstration.—Let H (fig. 9) be the point of suspension of the plummet at the time of observation, so that the angle DAH is the north declination of the sun,—P, the bead, resting against the hour-line VX. Join CX, then the angle ACX is the hour angle from noon given by the bead, and we have to prove that this hour-angle is the correct one corresponding to a north latitude DAO, a north declination AH and an altitude equal to the angle which the *sun-line*, or its parallel AO, makes with the horizontal. The angle PHQ will be equal to the altitude, if HQ be drawn parallel to DC, for the pair of lines HQ, HP will be respectively at right angles to the sun-line and the horizontal.

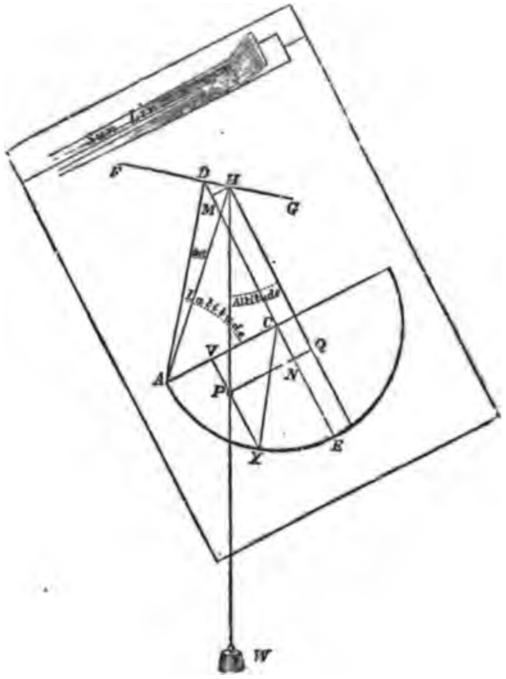

Fig. 9.

Draw PQ and HM parallel to AC, and let them meet DCE in M and N respectively.

Let HP and its equal HA be represented by a. Then the following values will be readily deduced from the figure:—

$$AD = a \cos.\ \mathit{decl.},\quad DH = a \sin.\ \mathit{decl.},\quad PQ = a \sin.\ \mathit{alt.}$$
$$CX = AC = AD \cos.\ \mathit{lat.} = a \cos.\ \mathit{decl.} \cos.\ \mathit{lat.}$$
$$PN = CV = CX \cos.\ ACX = a \cos.\ \mathit{decl.} \cos.\ \mathit{lat.} \cos.\ ACX.$$
$$NQ = MH = DH \sin.\ MDH = a \sin.\ \mathit{decl.} \sin.\ \mathit{lat.}$$
$$(\because \text{the angle } MDH = DAO = \text{latitude}).$$

And, since $PQ = NQ + PN$,

we have, by simple substitution,

$$a \sin.\ \mathit{alt.} = a \sin.\ \mathit{decl.} \sin.\ \mathit{lat.} + a \cos.\ \mathit{decl.} \cos.\ \mathit{lat.} \cos\ ACX;$$

or, dividing by a throughout.

$$\sin.\ \mathit{alt.} = \sin.\ \mathit{decl.} \sin.\ \mathit{lat.} + \cos.\ \mathit{decl.} \cos.\ \mathit{lat.} \cos.\ ACX \ldots (A)$$

which equation determines the hour angle ACX shewn by the bead.

To determine the hour-angle of the sun at the same moment, let

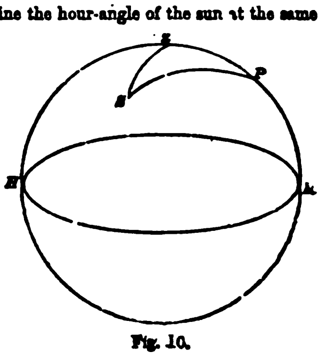

Fig. 10.

fig. 10 represent the celestial sphere, HR the horizon, P the pole, and Z the zenith, and S the sun.

From the spherical triangle PZS, we have

$$\cos. ZS = \cos. PS \cos. ZP + \sin. PS \sin. ZP \cos. ZPS$$

$$\begin{aligned}\text{but } ZS &= \text{zenith distance} = 90° - \text{altitude}\\ ZP &= 90° - PR \qquad\quad = 90° - \text{latitude}\\ PS &= \text{polar distance} \;\; = 90° - \text{declination.}\end{aligned}$$

therefore, by substitution

$$\sin. \mathit{alt.} = \sin. \mathit{decl.} \sin. \mathit{lat.} + \cos. \mathit{decl.} \cos. \mathit{lat.} \cos. ZPS \quad . \; . \; . \quad (B)$$

and ZPS is the hour-angle of the sun.

A comparison of the two formulæ (A) and (B) shows that the hour-angle given by the bead will be the same as that given by the sun, and proves the theoretical accuracy of the card-dial. Just at sun-rise or at sun-set, the amount of refraction slightly exceeds half a degree. If, then, a little cross *m* (see fig. 8) be made just below the sun-line, at a distance from it which would subtend half a degree at *c*, the time of sunset would be found corrected for refraction, if the central line of light were made to fall on *cm*.

The following list includes the principal writers on dialling whose works have come down to us, and to these we must refer for descriptions of the various constructions, some simple and direct, others fanciful and intricate, whi[illegible] have been at different times employed :—

Ptolemy, *Analemma*, restored by Commandine ; Vitruv[illegible] *Architecture* ; Sebastian Munster, *Horologiographia* ; Oront[illegible] Fineus, *De Horologiis Solaribus* ; Mutio Oddi da Urbino, *Horo*[illegible] *Solari* ; Dryander, *De Horologiorum Compositione* ; Conrad Ge[illegible] *Pandectæ* ; Andrew Schoner, *Gnomonicæ* ; F. Commandine, *Ho*[illegible] *giorum Descriptio* ; Joan. Bapt. Benedictus, *De Gnomonum* [illegible] Georgius Schomberg, *Exegesis Fundamentorum Gnomonicor*[illegible] Joan. Solomon de Caus, *Horologes Solaires* ; Joan. Bapt. Tr[illegible] *Praxis Horologiorum* ; Desargues, *Manière Universelle pour* [illegible] *l'Essieu, &c.* ; Ath. Kircher, *Ars magna Lucis et Umbræ* ; Ha[illegible] *Explicatio Horologii in Horto Regio Londini* ; Joan. Mark, *T*[illegible] *tus Horologiorum* ; Clavius, *Gnomonices de Horologiis*.

Also among more modern writers, Deschales, Ozanam, Sch[illegible] Wolfius, Picard, Lahire, Walper ; in German, Paterson, Mi[illegible] Müller ; and among English writers, Foster, Wells, Collins, [illegible] better, Jones, Leybourn, Emerson, and Ferguson. See also M[illegible] article in former editions of the present work. (H. G.)

DIAMANTE. The Italian fresco painter, commonly known as Fra Diamante, was born at Prato about 1400. He was a Carmelite friar, a member of the Florentine community of that order, and was the friend and assistant of the more celebrated Filippo Lippi. The Carmelite convent of Prato which he adorned with many works in fresco has been suppressed, and the buildings have been altered to a degree involving the destruction of the paintings. He was the principal assistant of Fra Filippo in the grand frescoes which may still be seen at the east end of the cathedral of Prato. In the midst of the work he was recalled to Florence by his conventual superior, and a minute of proceedings of the commune of Prato is still extant, in which it is determined to petition the metropolitan of Florence to obtain his return to Prato,—a proof that his share in the work was so important that his recall involved the suspension of it. Subsequently he assisted Fra Filippo in the execution of the frescoes still to be seen in the cathedral of Spoleto, which Fra Diamante completed in 1470 after his master's death in 1469. Fra Filippo left a son ten years old to the care of Diamante, who, having received 200 ducats from the commune of Spoleto, as the balance due for the work done in the cathedral, returned with the child to Florence, and, as Vasari says, bought land for himself with the money, giving but a small portion to the child. The accusation of wrong-doing, however, would depend upon the share of the work executed by Fra Diamante, and the terms of his agreement with Fra Filippo. Fra Diamante must have been nearly seventy when he completed the frescoes at Spoleto, but the exact year of his death is not known.

See *Relazione delle Pitture di Fra Filippo nel coro di Prato*, by the Canon Baldanzi, Prato ; also the last edition of Vasari, Florence, 1848.

DIAMANTINA, formerly Tejuco, a town of Brazil, in the province of Minas-Geraes, is situated at an altitude of 5700 feet above sea-level, in a valley watered by affluents of the Jequitinhonha. Its streets are broad, and the houses are mostly of wood. The public structures include several churches, a theatre, barracks, three hospitals, and a school. The surrounding district is sterile, but is rich in minerals. The discovery of diamonds there was made in 1729. Population about 7000, or, with that of the neighbouring villages, 15,000. See BRAZIL, vol. iv. p. 224.

DIAMANTINO, a town of Brazil, in the province of Matto-Grosso, is situated close to the Diamantino river, about six miles from its junction with the Paraguay, at the foot of a high range of country, in 14° 24′ 33″ S. lat. and 56° 8′ 30″ W. long. The neighbourhood, which is infertile, yields diamonds and gold. Population about 5000.

DIAMOND. This gem, the most highly value[illegible] and brilliant of precious stones, is also remarkable for its history and its peculiar physical and chemical prop[illegible]. Though not always accurately distinguished from other similar stones, it seems to have attracted notice at a very early period, especially in India, the chief source of supply in ancient times. The old Jewish doctors regarded the jahalom, the third in the second row of stones in the breast-plate of the high priest (Exod. xxxix. 11), as the diamond, and it is thus translated in the English and o[illegible]her versions. But as each stone bore the name of one of the tribes, and there is no reason to believe that any metho[illegible] of polishing such hard stones, still less of engraving let[illegible] on them, was then known, the identification cannot be accurate. Among the Greeks it is first mentioned ab[illegible] three centuries B.C. under the name of *adamas* ([illegible]), “the unsubduable,” referring to its hardness and pow[illegible] of resisting fire. The same name was previously given [illegible] a metal highly valued from its extreme hardness for arm[illegible] and weapons, and the twofold use of the term contin[illegible] long both in Greek and Latin. The name of the gem [illegible] in our own and most modern languages is derived from t[illegible] old name, occurring in the form *diamas* in Albertus Mag[illegible] and other authors of the 13th century. Curiously enou[illegible] the French *aimant*, applied to the magnet, comes from [illegible] same term in its other signification of an ore or metal.

The fullest account of the adamas as a stone is found [illegible] Pliny, who says it exceeds in value all human things, [illegible] its use was confined to kings, and to few even of th[illegible] He mentions six varieties, the most remarkable being t[illegible] Indian and Arabian, of such unspeakable hardness th[illegible] when struck with a hammer even the iron and anvil w[illegible] torn asunder—“ita respuentes ictum, ut ferrum utrinq[illegible] dissultet, incudesque etiam ipsi dissiliant.” It also resis[illegible] the fire, and could only be subdued and broken down whe[illegible] dipped in fresh warm goat's blood. Similar fables continued to prevail during the Middle Ages, and even yet have hardly vanished from popular belief. As an ornamental stone it was highly esteemed during the early times of the Roman empire, as some scandalous stories recorded by Juvenal testify, though only stones with naturally polished faces could be used. This fact is proved not only by the words of Seneca—“nec secari adamas aut cædi vel deteri potest”—and others, but from specimens of diamonds set in gold, with no artificial polishing, which have come down both from classic times and from the Middle Ages. This unworkable character long greatly limited both its use and its value ; and the more highly coloured rubies, and even emeralds and sapphires, were often preferred to it. It was only after Ludwig van Berquen (or Berghem, as he is often named) in 1476 discovered the mode of cutting and polishing it, that the diamond slowly regained the first place among gems. Even in the 16th century (1550), Benvenuto Cellini (*Trattato dell' orificerio*, cap. i.) assigns it only the third rank in value, estimating a perfect ruby of one carat weight as worth 800 scudi d'oro (each equal to about 4s.), a similar emerald at 400, an equal diamond at 100, and a sapphire at 10 scudi. In the same century the use of the diamond for cutting glass and engraving gems seems also to have become known.

The diamond always occurs in crystals of the tesseral or cubical system. Its most frequent forms are the octahedron, or double four-sided pyramid (fig. 1), the rhombic dodecahedron with twelve faces (fig. 2), and others with twenty-four (fig. 3), and forty-eight faces (fig. 4). The first form is most common in stones from India, the second in those from Brazil. Cubes also occur, but are rare, whilst the icositetrahedron has not been observed. Hitherto the diamond has been described as hemihedric, but Sadebeck from his own and G. Rose's researches shows it to be holohedric (in the Berlin *Monatsberichte*, Oct. 1876). The faces are often curved, strongly striated, or marked by stair-like inequalities, hiding the true form. Many of the crystals also are round almost like spheres (fig. 5), or the smaller ones like grains of sand. This does not arise, however, from attrition during transport by water, but is the original shape of the stones. Macles, or twin-crystals, specially of two octahedrons, are common, and the striæ due to this structure appear even on the polished facets. The diamond has a perfect cleavage parallel to the faces of the octahedron, and breaks readily both in this and other directions. Contrary to the old and still common opinion, it is rather brittle, and is easily injured by a slight blow or fall. Its hardness—10 in the mineralogical scale—far surpasses that of all other known stones, and was used even by the ancients to discriminate it from other gems. In specific gravity, 3·52 (or 3·515 to 3·525), it is considerably higher than rock crystal, but nearly the same as the topaz, which may thus be mistaken for it. According to Fizeau, it has its greatest density at – 42°·3 C., and below this begins to expand, a property seen in very few other solid bodies. Its expansion by heat is very small, the volume from the freezing to the boiling point of water only rising from 1·0 to 1·00000354. By friction it becomes positive electric. The so-called compact diamond or carbonado of the stone polishers, found as round grains or masses of one or two pounds weight in the washings near Bahia, of a brownish black colour and sp. g. = 3·012 to 3·416, is porous diamond mixed with a small amount of other matter.

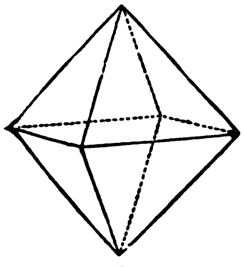
FIG. 1.—The Octahedron.

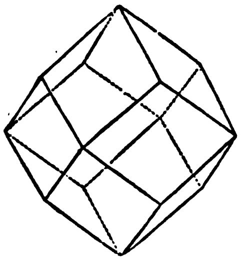
FIG. 2.—Rhombic Dodecahedron.

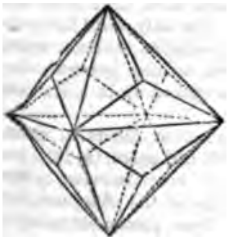
FIG. 3.—Triakisoctahedron.

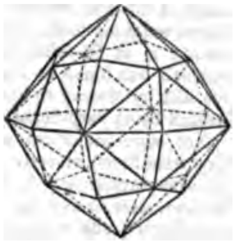
FIG. 4.—Hexakisoctahedron.

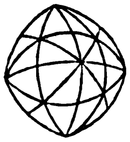
Fig. 5.

The optical properties of the diamond are also very remarkable. The purest stones, or those of the first water are highly transparent and colourless. But most generally it is less transparent, and shows various tints, specially white, grey, or brown; more rarely blue, red, yellow, green; and very seldom black. Such stones, when the colours are pure, are often highly valued. It is also distinguished by its brilliant adamantine lustre. Newton, two centuries ago, remarked its high refractive power, and from this conjectured that it was a substance of a peculiar nature. The index of refraction is 2·4135 for the red rays, 2·4195 for the yellow, and 2·4278 for the green. This high refractive power, and the strong reflection at both surfaces, render it seldom completely transparent, but give it the high lustre for which it is valued as an ornament. They also produce the numerous internal reflections seen in the interior of cut stones, all the rays of light falling on the posterior surfaces at angles above 25° being totally reflected. Like all crystals of the same system it possesses only simple refraction, but Dr (Sir David) Brewster found that many showed traces of double refraction by their action on polarized light. This he ascribed to a peculiar tension produced in the interior of the stone during its formation, and a somewhat similar explanation is still adopted.

In a history of gems published early in the 17th century, Boetius de Boot conjectured that the diamond was an inflammable body. Robert Boyle, who in 1664 described its property of shining in the dark, or phosphorescing after being exposed to the light of the sun, a few years later observed that a part of it was dissipated in acrid vapours when subjected to a high temperature. This combustibility of the diamond was confirmed in 1694 and 1695 by experiments with a powerful burning glass or lens made in the presence of Cosmo III., grand duke of Tuscany, by the Florentine Academicians. The experiment of the combustibility of the diamond when freely exposed in a strong heat has been often repeated, and its true character was proved by Lavoisier, who determined that the product was carbonic acid gas. Sir George Mackenzie converted iron into steel by powdered diamonds; whilst Mr Smithson Tennant showed that the carbonic acid produced corresponded to the oxygen consumed. No doubt, therefore, now remains that the diamond is only pure carbon in the crystallized condition, and like it insoluble in acids.

In regard to the action of heat on the diamond, various experiments have been made. Before the blowpipe it is infusible, and closely packed in powdered charcoal it can resist a very high temperature. But when oxygen is present it burns slowly at a temperature usually given at about that of melting silver. Gustaf Rose lately found that when air is excluded diamonds exposed to a temperature at which pig-iron melts, or to the strongest heat produced in the porcelain kiln, undergo no change; but at a higher temperature, like that at which bar-iron melts, they begin, whilst retaining their form, to be converted into graphite. He further observed that when diamonds and graphite were exposed together in the same muffle, foliated graphite was far more difficult to burn than the diamond, but compact graphite was consumed more readily. In the current of air the diamond gradually became smaller and smaller, but retaining its brilliancy till it finally vanished.

The faces also during burning became marked with peculiar triangular hollows, with their sides parallel to the edges of the octahedron. Seen in a strong light they appear as faces of an icositetrahedron, whilst other regular triangular impressions on the faces of natural crystals of diamond are produced by faces of the dodecahedron. (Rose, "Ueber das Verhalten des Diamants," &c., in Berlin *Monatsberichte*, June 1872).

India is the oldest, and was long the most celebrated, or rather the only, source of diamonds. They have been obtained from a wide district on the eastern side of the Deccan, extending from the Pennar river in 14° N. lat. to near the Sone in Bundelkund, in 25° N. lat. In the south the chief mines were at Cuddapah, Karnul, and Ellore, near the Kishna, in Madras presidency. In this district some of the largest Indian diamonds were obtained, Golconda, however, not being a mine, but a fortress where the diamonds were collected. There were other mines near Nagpore, and east at Sambhalpur, on the Mahanuddy, and north at Panna, in Bundelkund. At all of these the diamond was sought chiefly in recent deposits, beds of sand and clay, or in some places a ferruginous sandstone or conglomerate, but probably none of them the original matrix. Heyne states that the diamond has hitherto been found only in alluvial soil, or in the most recent rocks; and that the stones are not scattered through the whole of these beds, but confined to one rather harder than the rest. The upper stratum, of 18 inches, consists of sand, gravel, and loam; next there is a deposit of stiff black clay or mud, about 4 feet thick; and next the diamond bed, which is distinguished by a mixture of large rounded stones. It is from 2 to 2½ feet thick, closely cemented together with clay. Sometimes this stratum is covered with calcareous tufa. Here shallow pits are excavated, of a few feet in diameter, in such spots as the practice of the workman may induce him to select; he sinks to a depth of a few feet, and searches the bed which he considers most promising for his purposes; and if he meets with little encouragement, he shifts his situation and proceeds elsewhere. Thus a great deal of the country may be turned to waste and neglected. The working was chiefly in the hands of certain tribes or castes, but was conducted on no regular plan, and afforded a very miserable livelihood. There has been little change since, and though mines still exist at Panna, Karnul, and a few other places, but comparatively few diamonds are found, and probably scarcely pay the expense of collecting them. Diamonds have also been long collected in Borneo, at Pontiana, near the south-east extremity of the island. They occur in a red clay along with gold and platina, and the rajah of Mattan is said to possess one weighing 367 carats, of the purest water, but uncut.

During the end of last and the beginning of the present century the supply of diamonds chiefly came from Brazil. They were first recognized in 1727 in the province of Minas Geraes, where they had been long used by the negroes as counters in playing cards. The principal mines are still in that province near Diamantina (formerly Tejuco), and near Diamantino in Matto Grosso. Mines have also been recently worked in the province of Bahia. Other localities are enumerated in the article **BRAZIL**. The diamonds are chiefly obtained from the Cascalho, a loose, gravelly deposit mixed with red clay, and containing large lumps of quartz and grains of gold. This rock is probably derived from the itacolumite, a quartzose variety of mica slate, or metamorphosed sandstone, on which it often rests, and in which diamonds are also said to occur. When first brought to Europe the Brazil diamonds were regarded as inferior to those from India, but without reason. Though the mines are strictly watched as Crown property, the produce is not well ascertained. Martius estimated that in the forty-six years from 1772 to 1818 diamonds weighing about 3,000,000 carats, and worth £7,000,000, were exported. Mr Mawe stated the produce at 25,000 to 30,000 carats annually of rough diamonds, equal to 8000 or 9000 carats when reduced to brilliants. After his time it seems to have greatly decreased, the whole value from 1861 to 1867 being given at about £1,900,000; and the discovery of the Cape diamonds has further reduced the amount. The stones are mostly small, averaging little more than one carat, and very rarely exceeding twenty carats. The largest diamond from Brazil was long an uncut octahedron of 120 carats, but in 1854 a fine stone of 254½ carats was sent to London. It was an irregular dodecahedron, but of brilliant lustre, and with no flaws. Since cut it weighs about 124 carats, and is known as the "Star of the South."

Diamonds occur in other parts of America, having been found in the Sierra Madre, south-west of Acapulco, in Mexico; and a few also in Georgia and North Carolina. They have also been obtained in California, but all small (under 2 carats); and in the district of Arizona, where one is mentioned of 3 carats.

In 1829 diamonds were discovered on the European side of the Ural mountains in the gold washings near the [illegible] mines of Bissersk. Engelhardt conjectured that they were derived from a dolomite rock, but others state that it is mica slate like that of Brazil. Only about seventy were found in the first twenty years, and all of them small, the largest weighing under 8 carats. The only other European locality is at Dlaschkowitz, in Bohemia, where a single diamond was found in the sand containing pyropes,—the one said by Murray to have been picked up in a brook in Ireland being very doubtful.

Not more important are those from Australia, where they were found as early as 1852, and again in 1859, on the Macquarie river. In 1869 they were discovered in [illegible] the Mudgee, near one of the tributaries of the Macquarie, [illegible], by gold-diggers, and worked for a time pretty extensively. They lie there in old river drift covered by basalt said to be of Pliocene age. They occur in a similar position in [illegible] the Bingera diamond field. In both places they are sparingly distributed and small, the largest mentioned being [illegible] under 6 carats.

Far more important are the diamond fields of South Africa. In 1867 a Dutch farmer obtained from a [illegible] a bright stone which his children were using as a plaything. This stone was sent to the Cape, where its true nature [illegible] as a diamond was recognized, and subsequently forwarded to the Paris exhibition and sold for £500. This valuable discovery soon led to further researches, and diamonds were obtained from various places near the Orange and Vaal rivers in Griqua-Land West. They were first collected by washing recent alluvial or supposed lacustrine deposits, apparently the detritus of rocks in the vicinity, that are spread over the lower river valleys, but are now rather sought for in "pans," or "pipes," of a circular form running down into the inferior strata, or shale, and filled with a peculiar igneous rock, named diabase, or gabbro, often much changed near the surface. Throughout this rock, which has been penetrated to a depth of from 100 to 200 feet, diamonds are disseminated weighing from over 150 carats down to the 100th of a carat, or less. Many are entire, well-formed crystals, but a large proportion are broken and isolated fragments. Hence it has been inferred that the rock in which they now occur is not the matrix or mother rock in which they were originally formed, but that the "pipes" are rather channels by which volcanic matter has made its way to the surface, bringing the diamonds along with it from some inferior deposit. However this may be, ligging has become a regular branch of industry population; and it is probable, though no very estimate can be formed, that nearly fifteen ounds sterling worth of diamonds have been from this district since their discovery. The amond from the Cape we have seen mentioned is rt, of 288⅜ carats, found on the Vaal river in was an irregular octahedron of the purest water, ch in diameter, and is of a light yellow since

as been much speculation regarding the mode of these gems, but hitherto leading to no certain Iewton conjectured that the diamond was "an substance coagulated;" Jameson thought it a secretion from some ancient tree, like amber; ster also traced it to a vegetable source. Lavoisier, orveau, and others observed black specks when were burned, which were considered as uncrys- arbon. Petzhold, in 1842, also supported this ming that he had found vegetable cells in the iamonds. Goeppert, in his Haarlem Prize Essay, supported the same view, both from supposed ues and from other inclosures in diamonds, but that the evidence was not free from doubts. d others have explained its origin by a slow pro- composition in a fluid rich in carbon and hydro- the other hand, the occurrence of the diamond columite or mica slate, and more recently in or ous rocks, as at the Cape, has tended to favour that it owes its origin to heat or metamorphic is the case with graphite. But this, as graphite , does not preclude the idea that originally it may , like amber, some peculiar vegetable product, tly altered and crystallized. It may here also be l that all attempts to produce diamonds artificially erto failed.

nds are chiefly used and valued as ornamental nd for this purpose they are cut in various ording to the original shape of the crystals. It is that the Indians knew some method of doing this ly period, and it is said there were diamond- in Nuremberg even in 1373. Berghem of Bruges redit of having first used, in 1456, their own r this purpose. He found that by rubbing two on each other their surfaces were polished and ned, and acting on this hint, he employed diamond d a polishing wheel. His countrymen continued out the art with great success, but some two ago the English cutters were the more celebrated. then reverted to Holland, but is again returning , where many of the finest stones are cut. The as undergone little change, and is still chiefly y the hand, partly by rubbing one stone on partly by a wheel and diamond powder. Where flaws or large pieces of value to be removed, they onally cut by iron wires armed with the powder, y a blow of a hammer and chisel in the direction tural cleavage. The latter is, however, a danger- s, as the diamond is very brittle, and many valu- have been thus destroyed. When reduced to a m, the facets are polished on a lapidary's wheel. demands not only great skill but much time r. The period required to reduce a stone of 24 rats to a regular form extended formerly to at n or eight months of constant work, and in the e Pitt diamond two years were needed; but the ow greatly shortened by the use of machinery y steam. Jewellers have long cut diamonds forms—the brilliant, the rose, and tables. iant is most esteemed, as giving highest effect to the lustre, and implying less reduction of the stone. It is, as it were, a modification of the primary octahedron, the most common form of crystal, and is shown in its first form in figs. 6 and 7, and with the full number of facets in figs. 8 and 9. Figs. 4 and 6 show the upper surfaces, with the *table*, or principal face, in the middle, surrounded by the *bezil*, or upper faces, lying between its edge and the *girdle*, or common base of the two pyramids. The lower facet corresponding to the table is named the *collet*, and the whole portion below the girdle the *collet side*. The portion removed to form the table (generally $\frac{5}{18}$ths) and the collet ($\frac{1}{18}$th) is shown in fig. 10 Brilliants are usually set open, both the upper or table side and the lower collet-side being exposed. The *rose* cut (upper view, fig. 11; lateral view, fig. 12) is given to stones which have too little depth to be cut as brilliants; it has the whole upper curved surface covered with equilateral triangles. The *table* diamond, figs. 13 and 14, the least beautiful, is adopted for broad stones of trifling depth, showing a series of four-sided facets above and below the girdle. Recently brilliants are cut in the *star* form (taille à étoile), with the table above only one-fourth the diameter, and thus with less loss of weight. There

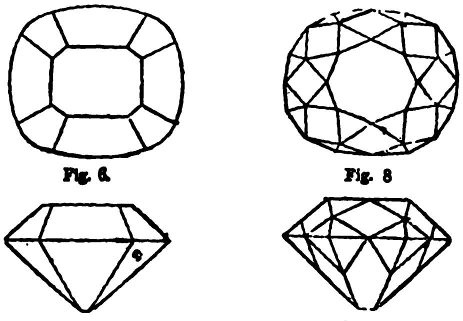
Fig. 6. Fig. 8
Fig. 7. Fig. 9.
FIGS. 6–9.—Showing cutting of brilliants.

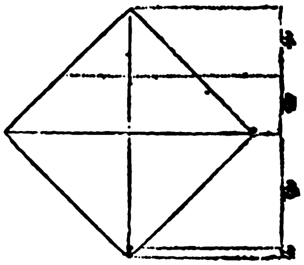
Fig. 10.

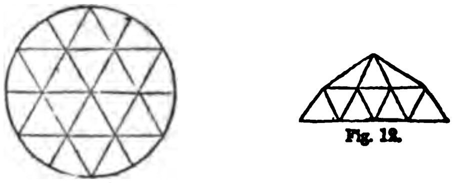
Fig. 11. Fig. 12.
FIGS. 11 and 12.—Rose cut.

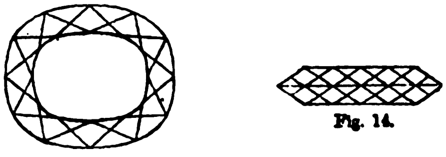
Fig. 13. Fig. 14.
FIGS. 13 and 14.—Table diamond.

are also "mixed" or less regular forms used to suit the shape of the stone; and even splinters of diamond of $\frac{1}{500}$ carat are facetted. In all the forms the girdle ought to be perfectly smooth, as a rough edge often appears through some of the facets as a flaw, and injures the brilliancy of the stone.

The value of diamonds is determined chiefly by their size, purity, colour, freedom from flaws or stains, and the skill with which they are manufactured. Their weight is reckoned by the carat, of four diamond grains, originally an Indian weight. In England the carat is estimated as = 3·174 grains troy; but it varies in different places, being, according to Schrauf, in Amsterdam = 205·70 milligrammes, in Florence = 197·20, in London = 205·409, in Madras = 207·353, in Paris = 205·50, and in Vienna = 206·13. The usual rule is that the value of the stone increases with the square of the weight in carats, and assuming £8 or £10 as the value of a cut brilliant of first quality in water and shape, weighing 1 carat, a similar stone of 2 carats would be worth four (2 × 2) times £8 or £10, *i.e.* £32 to £40; one of 3 carats nine (3 × 3) times, or £72 to £90; and so in proportion. Fine brilliants, however, of the sizes most in demand sell much higher, or from £12 to £20 or more the first carat; whilst roses and tables are of considerably smaller value, and rough or uncut diamonds, generally sold in lots, fetch only about £2 or even less, the value being further diminished in all cases where the stones are "off colour," that is milky or tinted, or imperfect in other respects. Still more important is the state of supply and demand, especially for the largest and most valuable stones, for which there are often very few purchasers, and their price is thus lower than the rule would imply. Even political events affect the price by bringing many into the market, as at the time of the first French Revolution. In 1873 Cape diamonds were stated to be worth—yellows under 5 carats, 40s. to 50s.; above that weight, £3 to £4 per carat; pure white stones under 5 carats, £3 to £4; and above 5 carats, £4 to £7, or more according to form or lustre. Fig. 15 shows the size of set stones round the girdle, the line indicating their depth, and the numerals the number of carats they may be expected to weigh.

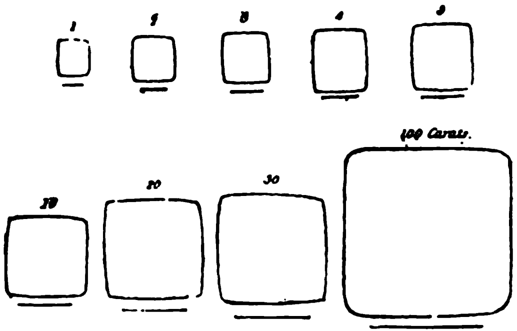

FIG. 15.—Relative sizes and weights of diamonds.

Some diamonds are remarkable for their size or history. The largest undoubted diamond is the Orloff in the sceptre of the emperor of Russia, weighing 194¾ carats, and cut in the rose form, with a flat face below, resembling the half of a pigeon's egg. According to one story, it formed the eye of an Indian idol, and was stolen by a French deserter; another is that it belonged to Nadir Shah of Persia, and on his murder came into the hands of an Armenian merchant, who brought it to Amsterdam. In 1772 it was sold to Count Orloff for the Empress Catherine for 450,000 silver roubles (£90,000), with an annuity of 4000 roubles and a title of Russian nobility. Second to it is the Regent or Pitt diamond (fig. 16), bought by Mr Pitt, the governor of Madras, in 1702, for about £20,000. He brought it to London, had it cut as a brilliant at, it is said, a cost of £3000, and sold it in 1717 to the regent duke of Orleans, for Louis XV., for 2½ million francs, or £130,000; but it is estimated to be worth fully twice that sum. At the time of the first French Revolution it was sent to Berlin, but reappeared in the hilt of the sword of state worn by Napoleon I. It is considered as the finest and most perfect brilliant in Europe. It weighs 136¾ carats, but originally weighed 410 carats, and the fragments split or sawn from it when cut were valued at some thousand pounds. The third in weight is the Florentine, or Grand Duke, as it is named (fig. 17). It is of a fine yellow colour, oblong, and cut in rose. It is said to have been lost by Charles the Bold at the battle of Granson, and found by a Swiss soldier, who sold it for a few pence as a piece of rock crystal. It afterwards belonged to the grand duke of Tuscany, from whom it passed to the emperor of Austria. Its weight is usually given at 139½ carats, but Schrauf finds its exact weight 133·16 Vienna carats, and its specific gravity at 19° C. 3·5213. The Koh-i-noor (fig. 18), the largest belonging to the British Crown, has also a singular history, corresponding to that of the country of its origin. The Indian legend tells that it was found in one of the Golconda mines near the Kishna river, and worn 5000 years ago by Karna, one of the heroes celebrated in the *Mahabharata*. It passed through many hands to Baber, the founder of the Mogul dynasty, in 1526, and was shown by his successor in 1665 to Tavernier, the French traveller. He describes it then as of the shape of a half egg, and weighing 280 carats, having been thus reduced by an unskilled stone-cutter from 793⅝ carats, which it once weighed. In 1739 it passed to Nadir Shah, the Persian invader of India, who gave it the name of Koh-i-noor, or Mountain of Light, and from his successors in 1813 to Runjeet Sing, the ruler of Lahore. In 1849, on the annexation of the Punjab to British India, the Koh-i-noor was also surrendered and presented to the Queen in June 1850. It was exhibited in the Great Exhibition of 1851, and then weighed 186$\frac{1}{16}$ carats, but has since been recut, with doubtful advantage, in the rose form, and is now 106$\frac{1}{16}$ carats. Its lower side is flat, and undoubtedly corresponds to a cleavage plane. Hence it has been conjectured that it and the Russian Orloff diamond are portions of the original stone belonging to the Great Mogul, whilst a stone of 132 carats, obtained by Abbas Mirza at the storming of Coocha, in Khorassan, in 1832, may be a third fragment. This portion was long used by a peasant as a flint for striking fire. The three united would have

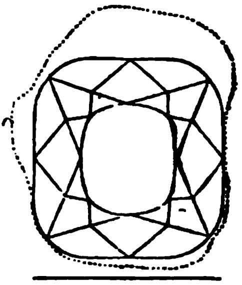

FIG. 16.—Pitt diamond.

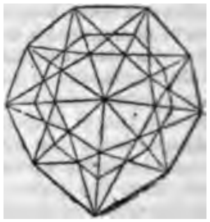

FIG. 17.—Florentine.

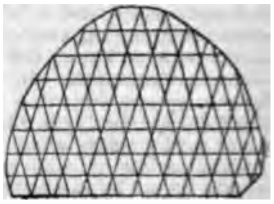

FIG. 18.—Koh-i-noor.

nearly the form and size given by Tavernier, and the Koh-i-noor would then surpass all known diamonds in its magnitude as in its eventful history.

It is not necessary to notice in detail other diamonds of smaller size, as the Sancy, of 53½ carats, once the property of Charles the Bold, like the Austrian, and afterwards of Louis XIV. of France, but sold in 1830 for £20,000 to the emperor of Russia. In the Russian treasury are also the Shah of 86 carats, and the Polar Star of 40. Other noted ones are the Nassac of 89¾ carats (now recut, and 78⅝), the Piggot of 82¼, and the Pasha of Egypt of 40 carats, which cost £28,000. Some are valued for other properties, as the Hope diamond, of a rare colour, a fine blue, and high brilliancy, estimated at £25,000, though only weighing 44¼ carats. Red diamonds seem very rare, but there is a brilliant of 10 carats among the crown jewels of Russia, which cost £15,000, and in Dresden some very fine yellow stones, the largest of 29½ carats.

Perhaps even more important is the use of the diamond for cutting glass, for polishing gems and other hard bodies, and recently by engineers for boring machines used in forming tunnels and artesian wells. The glaziers' diamond is about the size of a pin's head, and is set in copper or brass. The curvature of the fracture faces gives a sharp edge that cuts and not scratches merely. Each costs about 12s. to 18s., and, as it will weigh only about $\frac{1}{50}$th carat, the price is higher than that used as gems. For polishing purposes the so-called "bort," *i.e.* stones so imperfect in form and quality as to be useless for ornament, are broken down and crushed into diamond powder. The carbonado from Bahia is also employed both for polishing and for boring machines. In the latter the stones are fixed in a ring of steel, made to revolve with great rapidity, and kept cool by a current of water, which also removes the detritus. In consequence its price has risen lately from about 1s. to 18s. or 20s. a carat.

The literature of the diamond is very extensive, and scattered through many works. Its history in ancient times is given by Pinder, *De Adamante*, Berlin, 1829; its general character in treatises on mineralogy and on precious stones—of the latter those by Jeffries, London, 1757; Mawe, ib. 1831; Emanuel, ib. 1865; and Streeter, ib. 1877; with the *Edelsteinkunde* of Kluge, Leipsic, 1860, and of Schrauf, Vienna, 1869, may be mentioned. More special are Murray, *Memoir on the Diamond*, London, 1831; Petzholdt, *Beiträge zur Natur d. Diamanten*, Dresden, 1842; Goeppert, *Ueber Einschlüsse im D.*, Haarlem, 1864; and many papers in the journals and transactions of scientific societies. For its mode of occurrence may be consulted:—in India, Heyne's *Tracts*, London, 1814; Ritter's *Erdkunde*, *Asien*, vol. iv.; and many papers by Voysey, Adam, Franklin, Blandford, and others: in Brazil, Mawe's *Travels*, London, 1812; Eschwege, Claussen, Spix and Martius, Gardner, Tschudi, &c.; for the Ural, Rose's *Reise*, vol. i., but with much general information; for Australia, Liversidge, in *Jour. Geol. Society*; for the Cape, many papers in the *Journals* of Geol. Society and the Society of Arts, and in the *Geological Magazine*, by R. Jones, Tennant, Dunn, Maskelyne, Flight, and Stow; and by Cohen in Leonhard and Geinetz's *Jahrbuch*. (J. NI.)

DIANA, who was at a later period reverenced as the Greek Artemis by the side of Apollo, was originally an independent deity of Italy, as, indeed, is shown by the name, which is the feminine form of Janus. She is essentially the moon goddess, and presides over wood, plain, and water, as well as over the changes of human character, and the special functions of the female sex, also over chase and war. Diana was worshipped by the Sabines, but more especially by the Æqui, Hernici, and Latins, whose united sanctuary lay in the wooded hills of Algidus beyond Tusculum. Diana had also a sanctuary in Anagnia, the capital of the Hernici, and another in Corne, near Tusculum. But more celebrated than all these was the grove and sanctuary of Diana of Aricia, on the Lake of Nemi, which gave the name of Nemorensis to Diana. Here he was worshipped side by side with a male deity Virbius. After the destruction of Alba Longa this grove was for a long time the united sanctuary of the neighbouring Latin and Rutulian cities, until at last it was extinguished beneath the supremacy of Rome. The festival of the goddess was on the ides of August, the full moon of the hot season. She was worshipped with torches, her aid was sought by women seeking a happy deliverance in childbirth, and many votive offerings have rewarded modern excavations on the site. Another celebrated sanctuary of Diana was that on the slopes of Mount Tifata, near Capua, where she was worshipped under the name of Tifatina. This sanctuary was specially favoured by Sulla and at a later period by Vespasian. There were several ancient groves and sanctuaries of Diana in Rome, one in the Vicus Patricius between the Viminal and Esquiline, into which no man was admitted, another at the highest point of the Vicus Cyprius, another on the Cœliolus. But the most celebrated of all was the temple on the Aventine. This was originally a sanctuary of the Latin League, which accounts for the hill not being included in the original circuit of Rome, and for its being the refuge of the plebeians in political disturbances. The statue of the goddess was of the Ephesian type, the day of dedication was the ides of August, and the temple was especially frequented by slaves and their wives. Runaway slaves throughout Italy had a special dependence upon Diana. Such are the chief characteristics of the Roman Diana; but as early as 400 B.C. she began to be identified with the Greek Artemis, of which an account has already been given (see ARTEMIS). For fuller information see Preller, *Römische Mythologie*.

DIANO, or TEGGIANO, a town of Italy in the province of Principato Citeriore, 45 miles south-east of Salerno, on an isolated eminence, above the upper part of the valley of the Negro, or *Tanager*, to which it gives the name of Val di Diano. It represents the ancient Tegianum, a municipal town of Lucania, of which the ruins can still be traced at the foot of the hill; and it possesses a castle, several churches of some interest, and three conventual buildings. In 1497 it was strong enough to resist, under Antonio Sanseverino of Salerno, the siege undertaken by Frederick of Aragon. Population in 1871, 6224.

DIAPHORETICS (from διαφορέω, to carry through), such remedies as promote perspiration. In health there is constantly taking place an exhalation of watery vapour from the skin, by which not only are many of the effete products of nutrition eliminated, but the body is kept cool. Under exertion or in a heated atmosphere this natural function of the skin is increased, sweating more or less profuse follows, and, evaporation going on rapidly over the whole surface, little or no rise in the temperature of the body takes place. In many forms of disease, such as fevers and inflammatory affections, the action of the skin is arrested, and the surface of the body feels harsh and dry, while the temperature is greatly elevated. The occurrence of perspiration not unfrequently marks a crisis in such diseases, and is in general regarded as a favourable event. In some chronic diseases, such as diabetes and some cases of Bright's disease, the absence of perspiration is a marked feature; while, on the other hand, in many wasting diseases, such as phthisis, the action of the skin is increased, and copious exhausting sweating occurs. Many means can be used to induce perspiration, among the best known being baths, either in the form of hot vapour or hot water baths, or in that part of the process of the Turkish bath which consists in exposing the body to a dry and hot atmosphere. Such measures, particularly if followed by the drinking of hot liquids and the wrapping of the body in warm clothing, seldom fail to excite copious perspiration. Numerous medicinal substances have a similar effect, although the *modus operandi* appears to differ in the case of several of them. Thus antimony and ipecacuan appear to produce their diaphoretic action by their nauseating and depressing or relaxing effects; while others seem to act as direct stimulants to the function of the sudoriparous glands of the skin, such as the well-known diaphoretics—Mindererus spirit (acetate of ammonia), guaiacum, nitrous ether, and the recently introduced drug, jaborandi. Opium acts powerfully as a diaphoretic, especially when in combination with ipecacuan, as in Dover's powder, or with antimony; and alcohol has similar properties. Diaphoretics are of great service in many diseases. When employed at the commencement of a catarrh or common cold they frequently check it, and thus prevent the evils which are so apt to follow this affection. In acute dropsy due to kidney disease, such as that which sometimes results from scarlet fever, the hot air or hot water bath is a valuable remedy, and even in dropsical accumulations of long standing, when diaphoresis can be induced, marked improvement in the symptoms generally follows. In certain circumstances, however. diaphoretics, particularly in the form of baths, may be unsafe. especially where there is any affection of the heart or lungs attended with embarrassed respiration; and in general in diseases where diaphoretics seem to be indicated, the physician is required to take into account the patient's whole condition in his selection of any one remedy for this purpose.

DIARBEKIR (or *Kara Amid*, the Black Amid), a city of Asiatic Turkey, the administrative centre of the pashalic of the same name, is situated 2050 feet above the level of the sea, on a mass of basaltic rock which rises abruptly to a height of 100 feet from the western bank of the Tigris, about 100 miles north-east of Aleppo, in 37° 55′ 30″ N. lat. and 39° 53′ 39″ E. long. It is about three miles in circumference, has a nearly circular form, and is encompassed by ancient and dilapidated walls of a very remarkable character. They are built of basalt, have in most places a thickness of 14 feet, vary in height from 30 to 40 or 50 feet, and are strengthened by upwards of 70 towers, some square and some round, which communicate with each other by two passages formed in the heart of the masonry. There are four gates, which are closed at night:—the Dagh Kapi, or Mountain gate, on the N.; the Rum Kapi, or Anatolian gate, on the W.; the Mardin gate on the S.; and on the E. the Kyöprü gate, which takes its name from the stone bridge that spans the Tigris. Both the gates and the walls bear numerous ornamental designs and inscriptions in Arabic and Cufic characters relating to their erection or restoration. The citadel, or *Itch Kaleh*, which stands in the north-east corner between the Dagh Kapi and the Kyöprü Kapi, commands the town; and a fine view of the valley of the Tigris is obtained from one of its towers, supposed to be the belfry of an ancient Christian church. Within the enceinte is the official residence of the pasha, but he has another mansion at some distance from the town in the vicinity of the military barracks. The interior of the town contrasts unfavourably with the massive and spacious character of its defences; it has only one street about 20 feet in breadth. the rest being mere lanes from 4 to 5 feet across. The houses are built of basalt in the lower stories and of dark-coloured brick above; and this, combined with the flat terraces of the roofs, gives a sameness and gloominess of aspect. The public buildings comprise upwards of 50 mosques large and small, 9 Christian churches, a Jewish synagogue, upwards of 20 baths, about 15 khans or caravanserais, and a good military hospital; but only a few are worthy of individual notice, though some of the minarets are richly sculptured, and several of the mosques preserve interesting traces of ancient work. The Ulu-jami, or Great Mosque, which was formerly a Christian church. and perhaps originally the ancient palace of Tigranes, has an outer wall with two façad each formed by a row of Corinthian columns surmount by an equal number of a Byzantine type; the inter is divided into three portions, appropriated to as m Mahometan sects. The Hassan Pasha Khan, in the mediate vicinity of the mosque, is a fine building structed of layers of white and black stone; but exceeded in size by the Ali Pasha Khan, which indee the largest in Asiatic Turkey. The town is supplied water both by springs within the walls and by an aqued fed by a fountain at Ali-punar about two miles to west; but in the heats of summer, which are sometim exceedingly severe, these supplies become greatly exhaust and the water impure. In the last century Diarbek was one of the largest and most flourishing citi of Asia; and as a commercial centre it still ranks secon to Mosul, in the upper region of the Tigris and Euphrates The principal trade routes are by Argana and Kharput Samsun, by Sort, Bitlis, and Van, to Tabriz, by Mardin Mosul, by Urfa and Aintab to Aleppo, and by mea of kalleks, or inflated skins, down the river to Mosul a Baghdad. The bazaars are not much behind those Baghdad, and display a rich variety of both Asiatic a European wares. Owing partly to the introduction of t latter, the manufacturing industry of the town h greatly decreased, and most of the 1600 cotton looms which it could boast in 1816 have disappeared. Red a yellow morocco of the greatest repute throughout Asia Turkey is still produced, as well as copper vessels, pi heads, and goldsmith-work. The population, which w reckoned at 400,000 in 1750, was in the latter part of t century greatly reduced by war, and famine, and pestilence In 1837 it was estimated by Southgate at from 13,000 t 14,000 souls; in 1856 it was found to be 27,430; and i 1873 it was stated by Cernik at 40,000, and by another authority at 60,000. The principal nationalities in the polyglot community are the Kurds and Armenians, but there are also numerous Turkomans, Turks, and exiled Bulgarians. The Mahometans and Christians are now pretty equally balanced in numbers. Besides representatives of the Armenian, Syrian, and Greek churches, there are Roman Catholics enough to support a church and convent, and a mission is maintained by American Protestants.

Diarbekir is the city which, under the name of Amida, became a Roman colony in 230 A.D. and received a Christian bishop in 325. Fortified by Constantius II. it was, before long captured by Sapor the Persian king, after a siege of which a detailed account from his personal experience is given by Ammianus Marcellinus; and in the later wars between the Persians and the Romans it more than once changed hands. On its capture by the former in 502, it is said that 80,000 of its inhabitants perished. After having been from about the 11th century in the possession, by no means uninterrupted, of several Turkoman dynasties, it was finally captured by Selim, the first Sultan of the Osmanli Turks, in the year 1515, and since that date it has remained under the Ottoman rule.

See Sandreczy, *Reise nach Mosul und durch Kurdistan und Urumia*, 1857; R. J. Garden's "Description of Diarbekir," in *Journal of Roy. Geogr. Soc.*, 1867; and Cernik, *Technische Studien Expedition durch die Gebiete des Euphrat und Tigris*, 1875.

DIARRHŒA (from διά, through, ῥέω, to flow), looseness of the bowels. The causes of this complaint are very numerous. As a primary affection it has been treated of under CHOLERA (*q. v.*) It is frequently a symptom or complication of other diseases, such as consumption or typhoid fever, and as such it will be mentioned in describing the various ailments in which it occurs.

DIAS, ANTONIO GONÇALVES (1823–1864), a Brazilian poet and historian, was born at the little town of Caxias, in Maranhão, with the charms of which he has made his readers familiar. From the university of Coimbra, in Portugal, he returned to his native country well-equipped with legal lore, and obtained an official appointment at Maranhão; but the literary tendency which was strong

to try his fortune as an author at Rio
he wrote for the newspaper press,
as a dramatist, and at last in 1846
ation by a volume of poems—*Primieros*
ealed to the national feelings of his
ere remarkable for their autobiographic
eir beauty of expression and rhythm
at the head of the lyric poets of his
he followed up his success by *Secundos*
de F ei Antão, in which, as the title
number of the pieces in the mouth of
can friar; and in the following year,
duties of his new post as professor of
the imperial college of Pedro II., he
of Berredo, and added a sketch of the
dian tribes. A third volume of poems,
the title of *Ultimos Cantos* in 1850,
poet's farewell to Rio de Janeiro and
use, for he spent the next eight years
vernment patronage in obtaining a
ce with the scientific institutions of
ed on his return to Brazil a member of
e exploration of the province of Ceara,
by the state of his health to try the
sit to Europe, and died in September
ressel that was bearing him once again

While in Germany he published at
collection of his lyrical poems, which
ough several editions; the four first
em called *Os Tymbiros* (1857); and a
a Tupy (1858). To the publications
o Geographical and Historical Institute
mber of papers, among which the one
ania has received special notice. A
the works of Dias has made its appear-
aneiro. See Francisco Sutero in the
e, and Wolf, *Brésil Littéraire.*

MEO, a Portuguese navigator, the dis-
of Good Hope, flourished towards the
entury, the date of his birth being
s to have interested himself at an early
al research, and to have been intimate
. In August 1486 he was appointed
o the command of a small expedition
the work of exploration on the coast
uching at various points on the western
nt, and taking possession of them for
sailed onward into the unknown sea
ape without being aware of it. He
mouth of the Great Fish River. He
had rounded the continent, and in his
ghted the promontory to which he gave
mentoso, or *Cabo de todos los tormientos*
orms). This was afterwards changed
appier title it still bears. Dias arrived
ber 1487. He afterwards commanded
xpedition of Vasco da Gama, who sent
gal after they had reached the Cape
held a similar position in the expedi-
hich discovered Brazil. On the return
e commanded foundered in a storm on

. For the knowledge we possess of
nisms, so minute as to be undiscernible
on, we are indebted to the assistance of
t was not till towards the close of the
e first known forms of this group were
Müller. And so slow was the progress
field of scientific research that in the
century, when Agardh published his *Systema Algarum* in 1824, only 49 species included under 8 genera had been described. Since that time, however, the microscope has been greatly improved; and eminent naturalists in all parts of the civilized world have been induced to engage in the study of these forms. The result is that the number of known genera and species has been greatly increased; the species found in Great Britain and Ireland may be estimated at little less than 1000; and Rabenhorst, in the index to his *Flora Europæa*, enumerates about 4000 forms which have been discovered throughout the continent of Europe. At a time when little was understood of the structure of these organisms they were generally known among botanists by the appellation of Bacillariaceæ; but almost all recent authors are agreed in adopting the later and more appropriate designation of Diatomaceæ.

Various opinions have been entertained as to the position to be assigned to these forms. The earlier observers referred them to the vegetable kingdom. Subsequent authors, including Ehrenberg, regarded them as animals; but in consequence of their analogy to other organisms acknowledged to be vegetable, as regards their general structure, and more especially their modes of reproduction, they are now almost universally included in the vegetable kingdom, and classified with the Monocellular Algæ.

The Diatomaceæ exhibit great variety in form. While some species are circular, as *Coscinodiscus perforatus* (fig. 1), others are of an oval outline, as *Surirella ovalis* (fig. 2).

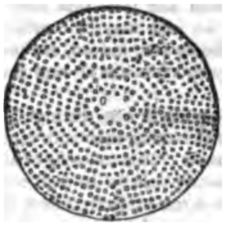
FIG. 1.—Coscinodiscus perforatus. ×400.

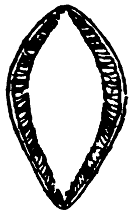
FIG. 2.—Surirella ovalis. ×400.

Some are linear, as *Synedra radians* (fig. 3); others more or less crescentic, as *Epithemia hyndmanii* (fig. 4); others, again, are cuneate, as *Podosphenia lyngbyii* (fig. 5); some few have a sigmoid outline, as *Pleurosigma balticum* (fig. 6); but the prevailing forms are naviculoid, as *Navicula cuspidata* (fig. 7). They vary greatly also in their modes of growth,—some being free, others attached to foreign bodies by gelatinous stipes, the stipes being in some species very short, while in others they are of considerable length. In some genera the forms are simple, while in others the frustules are connected together in ribbon-like filaments, or form, as in other cases, zig-zag chains. In some genera the frustules are naked, while in many others they are inclosed in a more or less definite gelatinous investment, or frond,

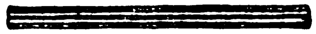
FIG. 3.—Synedra radians. ×200.

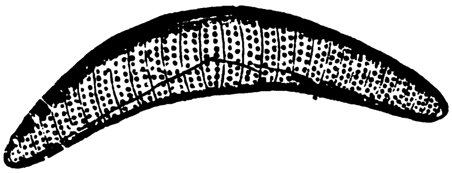
FIG. 4.—Epithemia hyndmanii. ×400.

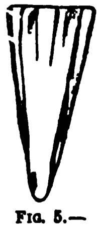
FIG. 5.—Podosphenia lyngbyii. ×400.

as this covering is usually designated. The conditions necessary to their growth are moisture and light. Wherever these circumstances coexist, diatomaceous forms will almost invariably be found. They occur mixed with other organisms on the surface of moist rocks; in streamlets and pools, they form a brownish stratum on the surface of the mud, or cover the stems and leaves of water plants or floating twigs with a furry investment. Marine forms are usually attached to various sea-weeds, and many are found in the stomachs of molluscs, holothurians, ascidians, and other denizens of the ocean. The fresh-water forms are specifically distinct from those incidental to salt or brackish water,—fresh-water species, however, are sometimes carried some distance into the sea by the force of the current, and in tidal rivers marine forms are carried up by the force of the tide. Some notion may be formed of the extreme minuteness of these forms from the fact that one the length of which is $\frac{80}{10000}$ths of an inch may be considered as beyond the medium size. Some few, indeed, are much larger, but by far the greater proportion are of very much smaller dimensions.

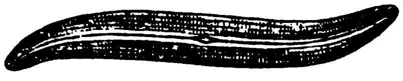

FIG. 6.—Pleurosigma balticum. × 200.

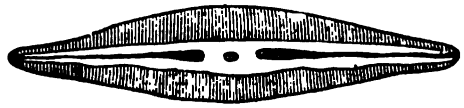

FIG. 7.—Navicula cuspidata. × 400.

Structure.—These minute vegetables are distinguished from kindred forms by the fact of having their soft vegetative part covered by a siliceous case. This covering of silex consists of two similar valves nearly parallel to each other, each valve being furnished with a rim projecting from it at a right angle. One of these valves with its rim is slightly smaller than the other, the smaller fitting into the larger pretty much as a pill box fits into its cover. This peculiarity of structure affords ample scope for the growth of the cell-contents usually known as the endochrome. As the endochrome increases in volume the siliceous valves are pushed out, and their corresponding siliceous rims become broader.

As regards the vegetative contents of this cell, in so brief a description the following parts only need to be referred to. There is first what Pfitzer, a distinguished German writer on this subject, designates the plasm-sac, consisting of a fine colourless plasm forming a closed sac of the same shape as that of the cell. The refractive power of this plasm differing but slightly from that of water, the presence of this structure is not always obvious; but on the application of hydrochloric acid its outline may be discerned as it slowly separates from the cell wall,—at first preserving the shape of the cell, but ultimately contracting into a small round mass. Within the plasm-sac is the structure which the writer just named designates the endochrome-plates. They consist of a thick substance, and are of the same colour throughout, varying from bright yellow to a dark yellowish brown. The number and position of the endochrome plates vary in the different genera—some having two, others only one. Within the folds of these plates is sometimes noticeable a collection of plasm which Ehrenberg describes as resembling the embryo in an egg, and which Pfitzer calls the middle plasm-mass. Within this plasm-mass oil globules and vacuoles are diffused, and in the centre of it a small vesicle may often be observed.

Motion.—One of the first phenomena which comes under the notice of the observer is the extraordinary power of motion with which the frustules are endowed. Some species move slowly backwards and forwards in pretty much the same line, but in the case of *Bacillaria paradoxa* the motion is very rapid, the frustules darting through the water in a zig-zag course. To account for this motion various theories have been suggested, none of which appear to be altogether satisfactory. So while the extraordinary motion of the Diatomaceæ excites admiration, it must be acknowledged that the mechanical agency which produces the motion remains unexplained.

Classification.—In this group, as well as in almost all others, various systems of classification have from time to time been adopted; but that which seems to commend itself most strongly, as well by reason of its simplicity as its facility of application, is the system which has been matured by Heiberg, the distinguished Danish writer on the subject, and which he has founded on the symmetrical or unsymmetrical form of the frustule in its several aspects. A diatomaceous frustule may be regarded on what is called the front view, in which the connecting rim or hoop is seen, or on the side view, by which the valve is presented to the eye of the observer. If the outline be symmetrical both on the transverse and longitudinal axis, in both these aspects the frustule is said to be symmetrical; but if the outline be different on one side from that of the other, or if perfect symmetry does not exist as respects the longitudinal or transverse axis, the frustule is said to be unsymmetrical on the aspect or axis in which want of symmetry is found to exist.

Reproduction.—In the Diatomaceæ, as well as in the Desmidieæ, the ordinary mode of increase is by self-division of the cell (see ALGÆ, vol. i. p. 508). The cell-contents within the inclosure of the siliceous case separate into two distinct masses. As these two masses of endochrome become more and more developed, the valves of the mother cell are pushed more and more widely apart. A new siliceous valve is secreted by each of the two masses on the side opposite to the original valve. When this process has been completed the hoop of the mother frustule gives way, and two distinct frustules are formed, the siliceous valves in each of these new frustules being one of the valves of the mother cell, and a newly formed valve similar and more or less parallel to it.

During the life of the plant this process of self-division is continued with an almost incredible rapidity. On this subject the observation of the late Professor Smith is worthy of special notice:—"I have been unable to ascertain the time occupied in a single act of self-division, but supposing it to be completed in twenty-four hours we should have, as the progeny a of single frustule, the amazing number of 1,000,000,000 in a single month, a circumstance which will in some degree explain the sudden, or at least rapid, appearance of these organisms in localities where they were a short time previously either unrecognized or sparingly diffused" (*British Diatomaceæ*, vol. i. p. 25).

Some authors of reputation have been under the impression that the Diatomaceæ, like other kindred forms, are sometimes reproduced by zoospores, and some few facts from time to time have been recorded by various observers which seem to bear out this view of the case. But in this group, as well as in the Desmidieæ already referred to, there obtains another mode of reproduction which is generally known as conjugation. It would be unnecessary here to describe in detail the various observed modes of this process. Suffice it to say that usually two parent frustules unite, invest themselves in a gelatinous sac in which their cell contents are discharged and formed into two bodies termed sporangia, which soon are developed into two frustules in all respects resembling the parents but usually double their size. In some phases of this process the gelatinous sac bears a considerable resemblance to that lowest form of animal life known by the name of Amœba, so much so that an inexperienced observer might suppose that the object before him was an Amœba gorged with diatomaceous frustules.

Mode of Preparation.—The Diatomaceæ are usually gathered in small bottles, and special care should be taken to collect them as free as possible from extraneous matter. A small portion having been examined under the microscope, should the gathering be thought worthy of preservation, some of the material is boiled in acid for the purpose of cleaning it. The acids usually employed are hydrochloric, nitric, or sulphuric, according as circumstances require. When the operator considers that by this process all foreign matter has been eliminated, the residuum is put into a precipitating jar of a conical shape, broader at the bottom than at the top, and covered to the brim with filtered or distilled water. When the diatoms have settled in the bottom of the jar, the supernatant fluid is carefully removed by a syringe or some similar instrument, so that the sediment be not disturbed. The jar is again filled with water, and the process repeated till the acid has been completely removed. It is desirable afterwards to boil the sediment for a short time with supercarbonate of soda, the alkali being removed in the same manner as the acid. A small portion may then be placed with a pipette upon a slip of glass, and, when the moisture has been thoroughly evaporated, the film that remains should be covered with dilute Canada balsam, and, a thin glass cover having been gently laid over the balsam, the preparation should be laid aside for a short time to harden, and then is ready for observation.

General Remarks.—Like all other organisms, the Diatomaceæ doubtless have a definite function assigned to them in the grand system of creation, but a special interest attaches to them. Allusion has been made to the fact that the soft cell of these organisms is encased in a siliceous epiderm. When the plant has fulfilled its natural course the siliceous covering sinks to the bottom of the water in which it had lived, and there forms part of the sediment. When in the process of ages, as it has often happened, the accumulated sediment has been hardened into solid rock, the siliceous exuviæ of the diatoms remain unaltered, and, if the rock be disintegrated by natural or artificial means, may be removed from what has been called "their stony shroud," and subjected to examination under the microscope. The forms found may from their character help in some degree to illustrate the conditions under which the stratum of rock had been originally deposited.

Vast deposits of Diatomaceæ have been discovered in various parts of the world,—some the deposit of fresh, others of salt water. Of these deposits the most remarkable for extent, as well as for the number and beauty of the species contained in it, is that of Richmond, in Virginia, one of the United States of America. It is said to extend for many miles, and to be in some places at last 40 feet deep. The material has long been used as a polishing powder, and recently has been largely employed in the manufacture of the powerful explosive agent known as dynamite. It is a remarkable fact that existing species of Diatomaceæ have been traced so far down as the lower strata of the Tertiary formation; and, though the generations of a diatom in the space of a few months far exceed in number the generation of man during the period usually assigned to the existence of the race, the fossil genera and species are in all respects to the most minute details identical with the numerous living representatives of their class.

(E. O'M.)

DIAZ DE LA PEÑA, NARCISSE VIRGILE (1809–1876), a French artist, distinguished chiefly as a landscape painter, was born at Bordeaux in August 1809. His first works were exhibited at the Salon in 1831, and attracted little notice, being poor in colour, the quality for which he afterwards became conspicuous. The same criticism applies to the pictures he exhibited annually until 1840, when his style underwent a decided change. His Nymphes de Calypso (1840), Le Rêve (1841), Vue de Bas-Bréau, L'Orientale, Le Maléfice, and Les Bohémiens se rendant à une Fête (1844), showed in an increasing degree the richness of colour and the mastery of the more subtle effects of light and shade which ultimately obtained for Diaz a place in the first rank of landscape painters. His powers were seen at their best in his Baigneuse and L'Amour désarmé (1851), and in the pictures he sent to the Paris Exhibition of 1855, Les Présents d'Amour, La Rivale, La Fin d'un Beau Jour, Nymphe Endormie, Les Dernières Larmes, &c. As the titles of several of these works indicate, Diaz endeavoured to add to the interest of his landscapes by introducing into them the personages of the classical mythology. Late in his career he devoted himself to *genre* subjects with but indifferent success. Diaz received a medal of the third class in 1844, of the second class in 1846, and of the first class in 1848; and in 1851 he was made a chevalier of the Legion of Honour. He died in November 1876.

DIBDIN, CHARLES (1745–1814), a well-known writer of songs and musical composer, was born at Southampton on the 15th March 1745, and was the youngest of a family of eighteen. His parents designing him for the church, he was sent to Winchester; but his love of music early diverted his thoughts from the clerical profession. After receiving some instruction from Kent, the organist of Winchester Cathedral, he went to London at the age of fifteen. In the following year his first work, an operetta entitled *The Shepherd's Artifice*, with words and music by himself, was produced at Covent Garden Theatre. This proved successful; and was followed by other works, his reputation being firmly established by the music to the play of *The Padlock*, which was produced at Drury Lane under Garrick's management in 1768, the composer himself taking the part of Mungo. He continued for some years to be connected with Drury Lane, both as composer and as actor, and produced during this period two of his best known works; *The Waterman* (1774) and *The Quaker* (1775). A quarrel with Garrick led to the termination of his engagement, and in 1782 he became joint manager of the Royal Circus, afterwards known as the Surrey Theatre. In three years he lost this position owing to a quarrel with his partner. In 1788 he sailed for the East Indies on the invitation of a sailor brother (the "Tom Bowling" of his famous song); but, the vessel having put in to Torbay in stress of weather, he changed his mind and returned to London. A series of mono-dramatic entertainments which he gave at his theatre, *Sans Souci*, in Leicester Square, brought his songs, music, and recitations more prominently into notice, and permanently established his fame as a lyric poet. It was at these entertainments that he first introduced many of those sea songs which so powerfully influenced the national spirit. The words breathed the simple loyalty and dauntless courage that are the cardinal virtues of the British sailor, and the music was appropriate and naturally melodious. Their effect in stimulating and ennobling the spirit of the navy during the war with France was so marked as to call for special acknowledgment. On retiring from public life, in 1805, Dibdin was rewarded by Government with a pension of £200 a year, of which he was only for a time deprived under the administration of Lord Grenville. Dibdin died of paralysis in 1814. Besides his *Musical Tour through England* (1788), his *Professional Life*, an autobiography published in 1803, a *History of the Stage* (1795), and several smaller works, he wrote upwards of 1400 songs and about 30 dramatic pieces. He also wrote one or two novels which are now forgotten. An edition of his songs by G. Hogarth (1843) contains a memoir of his life. The edition prepared by his son Thomas is referred to below.

DIBDIN, THOMAS (1771–1841), English dramatist and song writer, was one of the sons of the subject of last notice, and was born on the 21st of March 1771. He was apprenticed to a London upholsterer, but after four years' service he broke his engagement and joined a company of country players. From 1789 to 1795 he performed in every department of the drama, composing during the same period more than 1000 songs, and making his first attempt as a dramatic writer. He returned to London in 1795, having married two years before; and in the winter of 1798–1799 his *Jew and the Doctor* was produced at Covent Garden. From this time he contributed a very large number of comedies, operas, farces, &c., to the public entertainment. Some of these brought immense popularity to the writer and immense profits to the theatres. It is stated that the pantomime of *Mother Goose* produced more than £20,000 at Covent Garden Theatre, and the *High-mettled Racer* £18,000 at Astley's. Notwithstanding this run of popularity, and the author's connection with theatrical notabilities, his last years were passed in comparative indigence. In 1827 he published two volumes of *Reminiscences*; and at the time of his death he was preparing an edition of his father's sea songs, for which a small sum was allowed him weekly by the lords of the Admiralty. He died in London, September 16, 1841.

DIBDIN, REV. THOMAS FROGNALL (1776–1847), an enthusiastic bibliographer, born at Calcutta in 1776, was the son of Thomas Dibdin, the sailor brother of Charles Dibdin, whom the latter has immortalized in his song "Poor Tom Bowling." His father and mother both died on the voyage home to England in 1780, and he was brought up by a maternal uncle. He was educated at St John's College, Oxford, but left the university without taking his degree. Intended for the bar, he was entered at Lincoln's Inn, and studied for a time in the chambers of Basil Montague. After an unsuccessful attempt to obtain practice as a provincial counsel at Worcester, he resolved to abandon law for the church, and he was ordained a clergyman at the close of 1804. His ecclesiastical preferment was slow. For a number of years he had to content himself with the appointment of preacher at various chapels in the West End of London, and it was not until 1823 that he received the living of Exning in Sussex. Soon afterwards he was appointed by Lord Liverpool to the rectory of St Mary's, Bryanstone Square, which he held until his death on the 18th November 1847. The first of the numerous bibliographical works on which Dibdin's fame entirely rests was his *Introduction to the Knowledge of the Rare and Valuable Editions of the Latin and Greek Classics* (1803), which, though superficial, incomplete, and untrustworthy in many of its details, supplied a blank in English literature. A fourth and greatly enlarged edition appeared in 1827. The first edition rendered a valuable service to its author in bringing him under the notice of Earl Spencer, to whom he owed not only his first living but much important aid in his bibliographical pursuits. The rich library at Althorp was thrown open to him; he spent much of his time in it, and in 1814 published his *Bibliotheca Spenceriana*, giving an account of the many rare works it contained. As the library was not open to the general public, the information given in the *Bibliotheca* was found very useful, but the work was marred by the inaccuracy in matters of detail which more or less characterized all its author's productions. This fault [illegible] naturally least obtrusive in a series of playful, discur[illegible] works in the form of dialogues on his favourite subject, which great exactness was not necessary. The first these, *Bibliomania* (1809), was republished with la[illegible] additions in 1811, and was very popular, passing throu[illegible] numerous editions. To the same class belonged *Bibliographical Decameron*, a larger work, which appe[illegible] in 1817, and has a higher value than its predece[illegible] though it did not attain the same circulation. In 181[illegible] commenced the publication of a new and much exte[illegible] edition of Ames's *Typographical Antiquities*. The [illegible] volume was so great a success that Dibdin realized £[illegible] by it. This, however, was not maintained, and the fo[illegible] volume, which did not appear until 1819, fell almost [illegible] born from the press. The work was scarcely half-finis[illegible] when its publication was thus checked. The chief ca[illegible] of its failure was that Dibdin had not critical saga[illegible] enough to make a thorough change in the arrangement [illegible] predecessor had followed, and to enable him to distingu[illegible] what was valuable from what was worthless in the v[illegible] stores of information he had himself collected. In 18 Dibdin was commissioned by his patron, Earl Spencer, purchase books for him on the Continent, and he afterwar[illegible] published an account of his journey in his *Bibliographic*[illegible] *Antiquarian, and Picturesque Tour in France and Germa*[illegible] (3 vols. 1821), which was got up in a most sumptuo[illegible] style, the engravings alone, it is said, costing £5000. 1824 he published an ambitious venture in his *Libr*[illegible] *Companion, or the Young Man's Guide and Old Ma*[illegible] *Comfort in the Choice of a Library*, which was intended [illegible] point out the best works in all departments of literat[illegible] His culture was not broad enough to render him compet[illegible] for the task, and the *Library Companion*, being sever[illegible] criticized in the *Quarterly* and *Westminster Revie*[illegible] seriously injured his reputation. He had been for s[illegible] time involved in pecuniary difficulties, from which he t[illegible] to free himself with only partial success by extending t range of his literary activity. He wrote for periodic[illegible] published many of his sermons, and for some years [illegible] himself chiefly to religious literature. He returned [illegible] bibliography in his *Bibliophobia, or Remarks on the Pr*[illegible] *Depression in the State of Literature and the Book T*[illegible] (1831), and the same subject furnishes the main intere[illegible] his *Reminiscences of a Literary Life* (1836), and his *B*[illegible]*bli*-*graphical, Antiquarian, and Picturesque Tour in* [illegible] *Northern Counties of England and Scotland* (1[illegible]38) Didbin was the originator and vice-president, Lord Sp[illegible] being the president, of the Roxburghe Club, found[illegible]d in 1812,—the first of the numerous book clubs which have done such service to literature in the present century.

DICÆARCHUS, a celebrated Peripatetic philosopher, historian, and geographer, was a native of Mess[illegible], in Sicily. He was the contemporary of Theophrastus and Aristotle, and flourished towards the close of the 4th century B.C. The exact dates of his birth and death are unknown; the time of the latter event is approximately fixed by good authorities as the year 285 B.C. Nothing is known with certainty concerning the life of Dicæarchus except that he was a disciple of Aristotle and a friend of Theophrastus, to whom he dedicated the majority of his works. Of his writings, which comprised treatises on a great variety of subjects, none have descended to our day. Nothing but their titles and a few fragments survive. The most important of them was his *Life in Greece*, in which the moral, political, and social condition of the people was very fully discussed. Among the philosophical works of Dicæarchus may be mentioned the *Lesbiaci*, in three books, in which the author endeavours to prove that the soul is mortal. This work is written in the form of a dialogue, and derived its name from the fact that the scene of the dialogue was laid at Lesbos. To it the author afterwards appended a supplement, likewise in three books, which he called *Corinthiaci*. The only complete edition of the fragments of Dicæarchus is that published at Darmstadt in 1841 by Max Fuhr. An excellent dissertation on them will be found in Osann, *Beiträge zur Griech. und Rom. Literatur*.

DICK, Thomas (1775–1857), a popular writer on astronomy and other scientific subjects, was born in 1775. He was educated for the ministry in connection with the Secession (now United Presbyterian) Church of Scotland, and was ordained at Stirling in 1803. About two years afterwards his connection with the church was severed, and he became a teacher, first at Methven, a village in Perthshire, and afterwards at Perth. In 1824 he published in two volumes the *Christian Philosopher*, a work whose "aim was," in his own words, "to illustrate the harmony which subsists between the system of nature and the system of revelation, and to show that the manifestations of God in the material universe ought to be blended with our view of the facts and doctrines recorded in the volume of inspiration." The success of this work enabled him to resign his labours as teacher, and in 1827 he removed to Broughty Ferry, a suburb of Dundee, where he devoted his whole time to literary and scientific pursuits. Besides the *Christian Philosopher*, he is author of the *Philosophy of a Future State* (1828), the *Improvement of Society by the Diffusion of Knowledge* (1833), *Celestial Scenery* (1837), *The Sidereal Heavens* (1840), and several smaller treatises. These works were all intended to supplement and extend the aims of the *Christian Philosopher*, and may be regarded as endeavours by means of scientific discoveries to illustrate particular aspects of religious truth, and to suggest solutions of difficult religious problems. They are written in a popular and fascinating style, and manifest great aptitude for simplifying scientific subjects, and rendering them interesting to non-scientific readers. Some years before his death, which took place 27th July 1857, a pension was conferred on him by Government.

DICKENS, Charles (1812–1870), the great English novelist, was what would generally be described as a self-educated man, and yet, if by a man's education we understand preparation for the work he has to do in life, he was indebted to circumstances for an education on which it would have been difficult to improve. His father was a clerk in the Navy Pay Office, stationed at Portsmouth when Charles was born, but soon afterwards at Chatham, and soon after that in London,—a conscientious man, industrious and punctual in his occupation, but too easy tempered and unpractical to expend his income so as to keep pace with the wants of a rapidly increasing family. The boy's mother seems to have been a person of more energy, as well as of considerable accomplishments; she taught him the rudiments of Latin, and tried to establish a boarding school in Gower Street. The one parent was the original of Micawber, the other the original of Mrs Nickleby. With all their united efforts they could not keep out of distress; the boarding school scheme came too late; and when Dickens was nine years old the family was living in abject poverty in Bayham Street, Camden Town, then one of the poorest London suburbs, and their difficulties were increasing upon them. Charles was sent out to earn six shillings a week in a blacking warehouse, tying blue covers on pots of paste-blacking. For two years the child led a very hard, uncared-for life at this uncongenial work. He bitterly felt that it was uncongenial, for he was a very precocious boy, had read many books, and had formed an ambition to be "a learned and distinguished man." It must have been very galling to him, with his prematurely developed sensibilities and aspirations, to be thrown among such companions as Bob Fagin and Poll Green. And perhaps he was right in afterlife to wonder at the thoughtlessness of his parents in subjecting him to such a humiliation. His sufferings were so acute, and made such an impression on him, that years afterwards he could not think of them without crying; and there were certain quarters of the town through which he used to pass to his daily work, and where he used to loiter with less than enough to eat, that he habitually shunned for their painful memories. "It is wonderful to me," he wrote when in the height of his fame, "how I could have been so easily cast away at such an age. It is wonderful to me that, even after my descent into the poor little drudge I had been since we came to London, no one had compassion enough on me—a child of singular abilities, quick, eager, delicate, and soon hurt, bodily or mentally—to suggest that something might have been spared, as certainly it might have been, to place me at any common school. Our friends, I take it, were tired out. No one made any sign. My father and mother were quite satisfied. They could hardly have been more so if I had been twenty years of age, distinguished at a grammar school, and going to Cambridge."

And indeed, if his parents could have foreseen the future, they would have had cause to be much more satisfied. For when the fragile little boy was sent into his cousin's blacking warehouse, he entered a better school, as it happened, than his father could have chosen for him. It was an infinitely more painful school than Harrow or Eton, but for one whose destined work was to describe the poorer houses and streets of London, and the many varieties of life, odd and sad, laughter-moving and pitiful, that swarmed in them, it was a more instructive school, it was the true road to knowledge. The chances were that a delicate boy like him succumbed to his wretchedness, and that a clever boy like him became a rogue and vagabond; but he survived these dangers and became a great novelist. Instead of sinking into the depths of the thronging atoms, he rose above them, or kept apart from them, observed them, and became their describer.

It is impossible to say how this watchful habit began, and when it connected itself with his love of literary distinction. We have Dickens's own testimony that he was a singularly observant child, and that at a very early period he had an ambition to become "a learned and distinguished man," but it would be going too far to suppose that from his childhood he held himself apart and kept a keen eye on the doings of others with a view to making capital out of his observations. At first in all likelihood the distinction which he coveted was a kind of distinction that seemed to him possible only through the medium of grammar-schools and universities. To the last no doubt he regretted this want of academical study, and believed that it had placed him at a disadvantage. Still accident is so very much better a schoolmaster than design, that from the first it gave him also the literary training needful to make him a painter of manners. His father, the navy pay clerk, had a small collection of books, with which the "very small and not over-particularly taken care of boy" had made himself familiar while he was living at Chatham, before his experiences in Camden Town and the blacking warehouse. Among these books were *Roderick Random*, *Peregrine Pickle*, *Humphrey Clinker*, *Tom Jones*, *the Vicar of Wakefield*, *Don Quixote*, *Gil Blas*, *Robinson Crusoe*, the *Arabian Nights*, Mrs Inchbald's *Farces*, and the *Tales of the Genii*. This literature did not glide over the boy's mind like water over marble; it found congenial soil, and fell into it as seed. He lived the life of his favourite characters. "I have been Tom Jones," he says, putting his own case into the mouth of David Copperfield "(a child's Tom Jones, a harmless creature), for a week together. I have sustained my own idea of Roderick Random for a month at a stretch, I verily believe. I had a greedy relish for a few volumes of voyages and travels—I forget what now—that were on these shelves; and for days and days I can remember to have gone about my region of our house, armed with the centre-piece out of an old set of boot-trees, the perfect realization of Captain Somebody of the Royal British navy, in danger of being beset by savages, and resolved to sell his life at a great price." And then follows something still more suggestive, as showing his tendency to connect these ideal creations with the world of sense around him. "Every barn in the neighbourhood, every stone in the church, and every foot of the churchyard had some association of its own in my mind, connected with these books, and stood for some locality made famous in them. I have seen Tom Piper go climbing up the church steeple; I have watched Strap, with the knapsack on his back, stopping to rest himself upon the wicket gate; and I *know* that Commodore Trunnion held that club with Mr Pickle in the parlour of our little village alehouse." Even thus early, too, he tried to imitate what he read, wrote a tragedy founded on one of the *Tales of the Genii*, and acquired great fame in his own circle as a teller of stories.

A boy with this preliminary training was excellently prepared for a course of strange and painful experiences. The bitter contrast between the ideal world in which he had lived, and the miserable poverty in which he spent the first three years of his life in London, making himself useful at home, running errands, carrying things to the pawnbrokers, visiting his father in the Marshalsea, into which the poor man and his family soon drifted, tying up pots of blacking at the warehouse, prowling about cook-shops, *à-la-mode* beef-shops, and coffee-shops, a shabbily clad and insufficiently fed little boy, seeking to invest his livelihood of a shilling a day to the best advantage, helped to fix these experiences and the many odd scenes and characters with which they brought him in contact more indelibly on his memory. According to his own account, intensely as he felt the misery and shame of this kind of life, he was not without a perception of its humorous side. He used to say that, incredible as it might appear, he looked upon things then very much as he did afterwards. He even began to make attempts to sketch what he saw. Colman's *Broad Grins* was lent him by some kind people—another wise provision on the part of the great schoolmaster Accident; and with this before him as a stimulus, he actually sketched the barber who came to shave his bachelor uncle, the old charwoman who helped his mother, and laid the foundation of subsequent sketches,—Mrs Pipchin, the little Marchioness, Bob Sawyer's lodgings, and many other characters and scenes to which we have not the same direct traces. He was pursuing his education, in fact, as thoroughly as if he had been a pupil in a painter's studio. He was serving his apprenticeship. He could not have been better employed if he had been the holder of an endowment for research.

Dickens himself by no means looked upon it in that light. It was with difficulty, twenty-five years afterwards, that he could bring himself to speak of this period of his life. In his eyes it was a miserable servitude, from which he was happily relieved by a quarrel between his father and one of the partners in the warehouse when he was rather more than twelve years old, and sent to a school in Mornington Place, where he consorted with more respectable boys, and had some chance of book learning. If his father's fortunes had been equal to it, he might now have passed through a regular grammar-school and university training, and thereby perhaps been incapacitated for the work to which he was called. But fortunately he was soon again thro[illegible] chiefly on his o[illegible] resources. At the age of fifteen he was engaged as office-boy by an attorney in Gray's Inn at a salary of 1[illegible] 6d., and afterwards 15s. a week. Here again he ha[illegible] good field for observation, and did not fail to use it, [illegible] his employer afterwards recognized in *Pickwick* and *Nick*[illegible] several incidents that took place in his office, and profe[illegible] also to identify some of the characters. With Mr Bl[illegible] more he remained for eighteen months. During that [illegible] his father became a newspaper parliamentary reporter, [illegible]nd the office-boy, who had lost none of his thirst for disti[illegible]tion, and spent all his spare time reading hard in [illegible]he British Museum, resolved to qualify himself for a simi[illegible]ar occupation. He mastered the difficulties of short-ha[illegible]d, and in November 1828 obtained employment as a repor[illegible]er in Doctors' Commons. He spent two years reporting [illegible] cases, practising in Doctors' Commons and the other [illegible] courts. It would be difficult to conceive a more perf[illegible]ct way of completing the education of the future noveli[illegible], giving him an insight into the strange by-paths of t[illegible] higher stratum of society of which he had before had lit[illegible]le experience. At the age of nineteen he entered the parl[illegible]iamentary gallery to enlarge his knowledge still further. [illegible]He was a reporter of political speeches in and out of Par[illegible]iament for five years from 1831 to 1836. First he report[illegible]d for the *True Sun*, then for the *Mirror of Parliam*[illegible], finally for the *Morning Chronicle*. In his excursions i[illegible]to the country, and back with his "copy," he saw the las[illegible] of the old coaching days and of the old inns that were a p[illegible] of them; but it will be long, as Mr Forster rema[illegible], "before the readers of his living page see the last of [illegible] life of either."

His first published piece of original writing appeared in the *Old Monthly Magazine* for January 1834. The title was "A Dinner at Poplar" ("Mr Minns"), one of the pieces afterwards published as *Sketches by Boz*, the *nom de plume* which he adopted from the nickname of one of his brothers. He wrote nine of these sketches for the *Monthly Magazine*, and then he was engaged to write some for an evening offshoot to the *Morning Chronicle*. The first series of *Sketches by Boz* was collected and published in two volumes in the February of 1836, with illustrations by George Cruickshank. The first edition was exhausted in a few months; a second was called for in August. The *Sketches* had at once attracted attention. No wonder, for in them we find already in full swing the unflagging delight in pursuing the humorous side of a character, and the inexhaustible fertility in inventing ludicrous incidents, which had only to be displayed on a large scale to place him at once on a pinnacle of fame. There are many of them, such as the Parish, the Boarding House, Mr Minns and his Cousin, and the misplaced attachment of Mr John Do[illegible], which show Dickens's humour at its very richest. He [illegible] formed, too, by this time his characteristic likes [illegible] dislikes, and plays them off upon his butts and favo[illegible] with the utmost frankness. The delight in homely [illegible]bility and cheerfulness, in the innocent efforts of [illegible] people to make merry, the kindly satire of their little v[illegible]ties and ambitions, the hearty ridicule of dry fogies w[illegible] shut themselves up in selfish cares and reserves, and sour mischief-makers who take pleasure in conspi[illegible] against the enjoyment of their neighbours,—these tend[illegible]cies, which remained with Dickens to the last, are stro[illegible] marked in the *Sketches*, though lighter-hearted in th[illegible] expression than in his later works. The mark and ind[illegible]pensable condition of all great work is there, that which [illegible] Carlyle calls veracity—the description of what the wri[illegible] has himself seen, heard, and felt, the fearless utterance of his own sentiments in his own way.

The first number of *The Posthumous Papers of* [illegible]

Pickwick Club was issued in April 1836. The story of its rigin was first authentically told in the preface to the edi-on of 1847. Some of the details were afterwards slightly odified. The first thought of the work did not originate with Dickens, although the whole character of it was determined by him. The publishers, Messrs Chapman & Hall, and Mr Seymour the artist, had agreed to issue a monthly serial to be illustrated by Mr Seymour, and they went to Dickens, whose *Sketches* had attracted their attention, to propose that he should write the letterpress of this "monthly something." Their idea was that the author should describe the adventures of a "Nimrod Club," the members of which should go out shooting, fishing, and so forth, and getting themselves into difficulties through their want of dexterity. Dickens undertook the monthly something, but obtained the required diverting incidents by a different machinery, namely, the Pickwick Club. The first four numbers went off slowly; the demand first became "brisk" after the fifth number, in which Sam Weller made his appearance. But by the discerning few the value of the work was recognized; and one of them, Mr Bentley the publisher, only a few weeks before fame came to the author with its capricious and overwhelming suddenness, engaged him to undertake the editing of a monthly magazine to be started the following January, and to write a serial story for it, and further made an agreement with him for the writing of two other tales at a specified early date. Of the vexation arising out of this agreement, when the huge success of the *Pickwick Papers* showed its terms to be inadequate, and Dickens was disposed to resent it as a selling of himself into slavery, and of the manner in which the bargain was re-adjusted, an account is given by Mr Forster from the author's point of view. Nine monthly numbers of the *Pickwick Papers* were published in 1836; eleven more in 1837; by November of the latter year the sale had reached 40,000 copies, Pickwick had become a popular hero and godfather to innumerable articles of merchandise, and Sam Weller's sayings were catchwords in the street and the household wherever the English language was spoken.

In the first excitement of success, the young author's ppetite for work was unbounded. In 1837 he wrote his nthly instalments of the *Pickwick Papers* and *Oliver ist* side by side, not even by a week in advance of the nter with either. They kept him fully occupied, and l in abeyance for that year a taste which from his th to the end of his career was strong in him, and had nconsiderable influence upon his style as a painter of ners. In his childhood at Chatham he got his first ience of fame as the author of a tragedy; at the l in Mornington Place he and his companions mounted theatres and acted small plays; when in the attorney's in Lincoln's Inn Fields he frequented minor theatres, ture of which he has caricatured in the *Sketches*, and requently engaged in parts; one of his first published s, "Mrs Joseph Porter Over the Way," is a descrip- rivate theatricals in a stage-struck family. In 1836, is serial engagements multiplied, he wrote a farce e *Strange Gentleman*, and a short comedy with songs e *Village Coquettes*. It is strange that with this or the stage, which he always retained, he should written more plays. He probably felt that in of composition he had but the use of his left did not care to risk his reputation where he had r those powers of description and narrative over ad proved his mastery. But though he did not , and finally sought no outlet for his theatrical cept in amateur acting and in reading from his the habit of realizing incidents as they would he stage is unmistakably apparent in his work. ly seems to be working up scenes to the pitch of stage effect, elaborating the actions of his characters as if he were inventing "business" for a player, suggesting, in fact, an exuberance of business far beyond the capabilities of any human performer.

We doubt whether the fact that Dickens did not write plays is explained by saying that his genius was descriptive and narrative, but not dramatic. There is plenty of the raw material of dramatic action in his dialogues. He probably could have written a good acting play if he had tried. His characters are essentially theatrical, though their story is told according to the laws of the novel, and not according to the laws of the drama The explanation of his not having tried to write plays we take to be simply that he discovered full employment for his powers in another direction before he had applied himself to the art of constructing plays. Dickens was eminently a practical man, and, when publishers were fighting for his novels, he directed his whole energy to meeting the demand without seeking to experiment on other modes of composition. As some compensation to Mr Bentley for releasing him from the strict terms of the agreement we have mentioned, he edited a life of Grimaldi, which was published in 1838; but after that he put his whole strength into the art of writing sketches and serial tales. As soon as *Pickwick* was off his hands, and before *Oliver Twist* was yet completed, he made an agreement with Chapman & Hall "to write a new work, the title whereof should be determined by him, of a similar character and of the same extent as the *Posthumous Papers of the Pickwick Club*;" and between April 1838 and October 1839 he produced the *Life and Adventures of Nicholas Nickleby*.

Before the end of the serial publication of *Nickleby*, he had conceived a new project, partly with a view to relief from the strain of writing a continuous story in instalments with the printer at his heels, and partly with a view to getting more profit for himself out of his labours. This was a weekly publication, to be edited by himself, and to contain sketches, essays, tales, adventures, and letters from imaginary correspondents. He was to receive a certain sum every week for what was written, and was besides to share half the profits with the publishers. When the scheme was agreed to by the publishers, he proceeded to release himself from other engagements by resigning the editorship of *Bentley's Miscellany*, and getting clear of his obligation to write *Barnaby Rudge* for Mr Bentley in consideration of his buying the copyright and stock of *Oliver Twist* for £2250. He thus started clear with *Master Humphrey's Clock*, the title upon which he fixed for his new publication. The first number of *Master Humphrey* was issued on April 4, 1840. The sale of the first number was 70,000 copies, but the orders fell off when it was found that there was to be no continuous story. A story in weekly instalments it was thereupon necessary for him to write. A tale which he had begun in his magazine, and put into the mouth of Old Humphrey, was seen to be capable of expansion, and he expanded it into the *Old Curiosity Shop*, finding himself thus driven to his old employment of keeping ahead of the printers with a serial story, the only difference being that the instalments were weekly, and that he had the stimulus of larger profits from his success.

It is necessary in any account of Dickens, if we care to understand his method as a novelist, to give prominence to the conditions under which he worked. All that has been said about the want of plot in his novels finds its true explanation in those conditions. We need not search for deeper causes. His stories being published in instalments, it was indispensable to success that each separate part should have an independent interest; and as each instalment was published before the next was written, it was necessary that he should have a plot leaving him with the utmost possible freedom of action. Of course, when we say that this explains his method, we do not mean that it accounts for his success; we do not mean to detract from the marvellous genius that enabled him to write with success under such conditions. We are only concerned to show how the kind of plot that he adopted, and the numerous branches, offshoots, and meanderings which he permitted himself were imposed upon him by circumstances of publication and composition,—were, in fact, necessary to success under those circumstances. A great deal too much has been made of the want of plot in Dickens's novels, as if it were a weakness, as if he had been incapable of constructing a plot,—the truth being that his method was deliberately adopted as that best suited to the position in which he found himself. It is evident that he was very much exercised over this question of plot, as indeed he was on all points touching his art. The *Pickwick Papers* may be put on one side in studying his method; he tumbled as it were into writing them; "no ingenuity of plot," as he himself explained, "was attempted;" they were simply "designed for the introduction of diverting characters and incidents." In his subsequent novels, if the *Pickwick Papers* can be called a novel, he could lay his plans beforehand, and consider how far it was possible to reconcile the introduction of interesting characters and incidents with greater regularity of structure, and he never seems to have solved the problem to his own satisfaction. In *Oliver Twist* he adopted the method of Defoe, and wrote what may be called a biographical novel, the hero of which is involved in a series of complications, arising one after another without being foreseen and calculated for from the beginning. In this way he avoided committing himself too far in advance to engagements which might afterwards prove embarrassing; the toils are laid for Oliver and cleared away more than once in the course of the story. In *Nicholas Nickleby* he reserved similar freedom of action by making Ralph conspire to ruin his brother's children without committing himself at the outset to any particular scheme as the villain's one resource; he thus also makes provision for a series of plots, one after another, and secures a certain unity for the whole by making them all proceed from one malevolent agency, whose motive was formed before the story began. In *Nicholas Nickleby*, however, he departs from certain restraints under which he had laid himself in the construction of *Oliver Twist*; he asserts greater freedom from the bit and bridle of plot in his introduction of diverting incidents which have no proper connection with the main story. Miss La Creevy and the Kenwigses are brought in on the slightest of pretexts, slighter even than that which serves for the introduction of the Mantalinis and the Crummles family. But no one can quarrel with a breadth of canvas which the author is able to fill with such figures; the critic can only say that he would have made a mistake if he had limited himself from the scope thereby given for his powers. As in *Nickleby* the moving principle of the story is the malevolent humour of Ralph, so in the *Old Curiosity Shop* the moving principle is the malevolent humour of Daniel Quilp. It is characteristic of Dickens that the uncalculating impulses should have so much influence in the direction of his stories. Fagin has some amount of selfish object in his designs against Oliver Twist; but Ralph and Quilp have nothing to gain by their conspiracies except the gratification of pure malice. The counter-agencies to these simple incarnations of the devil are equally disinterested. Oliver's good angel Nancy, Kate Nickleby's Newman Noggs, Little Nell's Kit, and Kit's Dick Swiveller are swayed by impulses of pure generosity. Observe, too, the analogous positions of Mr Brownlow the protector of Oliver, the Cheeryble brothers the protectors of Nicholas, and Mr Garland the protector of Kit. It is a game between the elemen passions, in which the good triumphs.

Master Humphrey's Clock was allowed to run out November 1841, with the conclusion of the tale of *Barna Rudge*. which followed the *Old Curiosity Shop*. The c struction of *Barnaby Rudge* is less simple than that of a of its predecessors; Dickens here attempted a more clos knit form of plot. There are no incidental diversions this novel, all the characters have some finger in the m story, and every scene tends towards the development some relation which afterwards has a potent influence the course of the main events. It is true the Lord Geo Gordon riots fill so much space as to eclipse for a time private interests of the novel: but the lives of all personages whose fortunes we are following are interwo with the public history with the most elaborate care consummate skill, and when our fears for the commonw in the general storm are allayed, the keenest interest is for the fates of the individuals that have been involv the commotion.

Barnaby Rudge cost the author much labour, and a finishing it, and with it *Master Humphrey's Clock*, he the need of some change of strain. He had begun chafe under the weekly form of publication, and fret a what he might have done with Barnaby if he could have produced it in monthly instalments. This determi him to make an agreement with his publishers for the is of his next story in the old monthly form. When he jected the *Clock*, one of his schemes was that he sho visit Ireland or America, and write from there a series descriptive papers for it. The *Clock* was discontinued, the desire to seek fresh fields remained. He according set out for America in January 1842, returning in Ju after a reception which might well have turned his head write the *American Notes*. He had been run after stared at by crowds, and cheered with greater enthusi than if he had been a crowned potentate; and the peo of the United States complained that in these *Notes* well as in his fierce endeavours to enlighten them on subject of copyright, he had made but a poor return their welcome. He was superfluously aggressive, the no doubt; but they freely forgave him when he retur some years afterwards.

From whatever cause, the sale of the first numbe *Martin Chuzzlewit* (January 1843), in which he retu to the broad and free method of *Nickleby*, only seeki new motive for his plot in the design of a severe but b volent old uncle for his nephew's reformation, and schemes of a pious hypocrite, fell considerably below w he had been led to expect by the sale of his former mo lies. Only 20,000 were sold; his publishers, with wh he had made a very advantageous bargain, irritated him grumbling; and though the novel obtained still high praise than any of its predecessors, he was disappointed a discontented, and began to revolve other plans for maki a living by his pen. He conceived the idea of writing Christmas tale, the *Christmas Carol*; but he made mu less profit by the enterprise than he made by similar tale afterwards, when he charged less for them and appealed t a wider audience. Although he sacrificed nothing of hi individuality in the substance of the tale, and it wa no failure in point of reputation, the pecuniary side of th work was for the moment uppermost in his mind, for, larg as his income had been, he had exceeded it, and the mos popular author of his time was suffering horrors, as h himself said, of "intolerable anxiety and disappointment." This disappointment determined him to live abroad for time, partly to reduce his expenses, and partly to store hi mind with fresh material. He settled at Genoa, and the finished *Chuzzlewit*, and wrote the *Chimes*, his Christma

1844, making a brief visit to England to read it to
of friends and arrange for its publication. He
the principal towns of Italy in the first months of
eturning to England by way of Switzerland in June.
irst work on returning to London was to project a
ekly, to be called the *Cricket*, "price three half-
if possible—partly original, partly select, notices of
notices of theatres, notices of all good things, notices
ed ones: *carol* philosophy, cheerful views, sharp
ization of humbug, jolly good temper, papers always
n, pat to the time of year; and a vein of glowing,
generous, mirthful, beaming reference in everything
e and friends." The scheme for the time fell
About the same time he "opened communica-
ith a leading member of the Government to ascer-
at chances there might be for his appointment,
e qualification, to the paid magistracy of London;
reply did not give him encouragement to entertain
ion farther." Soon after he was asked to undertake
orship of a new daily paper, the *Daily News*, and
ed. But a fortnight's experience (from January 21
uary 9, 1846) satisfied him that he was out of his
He then resolved to go abroad again, and write
novel in shilling monthly numbers. The fruit of
olution was *Dombey and Son*, the first number of
was issued in October 1846, and the last in April
On resigning the editorship of the *Daily News*, he
wholly part connection with it; he continued in it
nuary to March 1846 a series of descriptive letters,
e afterwards published under the title of *Pictures
taly*. The sale of *Dombey*, which reached 32,000,
ed him in the pursuit of his special calling. He
d it up in 1849 and 1850 with *David Copperfield*.
e is not much room for variety of incident in the life
velist securely established in popular favour, work-
d, and happy in the exercise of his art. When we
entioned that *Bleak House* appeared in monthly
s, from March 1852 to September 1853, *Little*
from December 1855 to June 1857, *Our Mutual*
from May 1864 to November 1865, we have given
of incidents in the later half of the literary life of
s. He was much too restless a man, however, to
lown into a steady routine of work. He was not
to appear before the public only in monthly num-
He stuck steadily enough to work in which he had
his mastery, but yet he had always a craving for
periences, and was always planning new enterprises.
David Copperfield was still upon his hands he
d to his old notion of a weekly periodical. At first
ght of calling it *The Shadow*, making it contain, as
, the observations of "a kind of semi-omniscient,
esent, intangible creature," "which should go into
lace, by sunlight, moonlight, starlight, firelight,
ight, and be in all houses, and all nooks and
, and be supposed to be cognizant of everything,
everywhere, without the least difficulty; which
e in the theatre, the palace, the House of Commons,
sons, the unions, the churches, on the railroad, on
, abroad, and at home." But on consideration he
ned this idea, and chose the title *Household Words*.
t number appeared in March 30, 1850. In *House-
ords*, besides contributing short stories to the annual
as number, Dickens wrote *Hard Times* between
and August 12, 1854. In 1859, in consequence of
el between the editor and the publishers, *Household*
was discontinued, and *All the Year Round*,
lly the same periodical under a new title, took its
In *All the Year Round*, besides Christmas con-
ns, Dickens wrote *A Tale of Two Cities* between
30 and November 26, 1859; the *Uncommercial Traveller*, between January 28 and October 13, 1860; and *Great Expectations* between December 1, 1860, and August 3, 1861. It is often made a question whether there was any falling off of power in the later works of Dickens. *David Copperfield* would generally be named as the novel in which his power was at its zenith. The question is not one that can be answered by an unqualified yes or no. There is certainly no falling off in descriptive power. The idiom of his dialogue is finer: the wit is perhaps keener and more swift. His characters are more sharply defined; the force with which they are drawn is more delicate. In no point of the novelist's art, whether in the general construction or in the execution of details, is there any sign of failing power; on the contrary the power seems to have become firmer and more sure from practice. Does the fault then lie with the reader? Is it that we have grown tired of his manner? This is probably part of the reason, but yet it is not to be denied that we miss something in the later works. We laugh less over the pages. There are longer "intervallums" of seriousness. Humorous characters are still there in abundance; Joe Gargery, Old Boffin, Silas Wegg, Rumty Wilfer, Septimus Crisparkle, Durdles, Mr Sapsea, are as irresistible as any of their predecessors. But on the whole there is less exuberance of animal spirits. The fun is not so unflagging. It is even less hearty, for there is mixed with our laughter something of contempt or pity for the object of it. Not that it is all laughter and undesigning diversion in any of the earlier works. Dickens belonged to a serious and moralizing generation; he came in with the Reform Bill, and partook largely of the moral spirit of its framers. Even in the joyous *Pickwick Papers* there is a serious blow at prison abuses. *Oliver Twist* is almost as didactic as one of Harriet Martineau's tales. Before writing *Nicholas Nickleby* he went down to Yorkshire like a Government commissioner to inquire into the abuses of the Yorkshire schools. Through all the fresh and boisterous fun of his earlier works, there was an almost declared doctrine that it is our duty to laugh, a sort of protest in favour of laughter, and a denunciation of the dismal as a crime. The same genial doctrine runs also through his later works, but it is urged with a trace of bitterness, and with a greater sensitiveness to the evil principles that oppose it. Dickens was not written out, but he was growing old, and the animal spirits which fed the flame of his marvellous humour began to show symptoms of exhaustion. The quality of his humour was unimpaired, but the quantity had suffered diminution.

Dickens established his first weekly periodical from a desire to draw closer the relations between himself and his readers. He drew those relations still closer in 1858, by beginning a series of public readings of his own works. He had long hungered for this way of giving body and substance to his feeling of success. He had always been eager for the immediate and palpable triumphs of the stage. The idea of taking a hall or theatre and reading from his own books was first mentioned by him in 1844, after he had read the *Chimes* to a small company in Mr Forster's rooms, and he often returned to it, but was obliged to hold it in abeyance for fourteen years, his friends urging that it would be beneath his dignity. In 1858 his resolution was taken in spite of all discouragements, partly, he said, to escape from uneasiness at home, though it may well be believed that his own temper—restless, irritable, and exacting in the midst of his work—was largely to blame for the discomfort from which he suffered. He gave four series of readings, in 1858–59, 1861–63, 1866–67, and 1868–70, appearing in nearly every town of any size in the United Kingdom; and in 1867–68 renewing in this way his acquaintance with the Americans. The success of these readings was enormous from every point of view. Mr Forster mentions that he remitted from America £10,000 odd as the result of 34 readings.

That Dickens should so long have abstained from appearing as a public reader of his own works, and standing face to face with his audience to enjoy the delight of their effect, notwithstanding his strong desire to do so, is a significant fact. It gives a sort of measure of two things,—the force of his craving for sympathy and applause, and the extent of his patience under conventional prejudices. It was from deference to these prejudices that he abstained; and it required an almost fierce effort on his part to dismiss those prejudices as "humbug," and "the proprieties of old women." His attitude towards society, in the narrow sense of the word, was always peculiar. To understand it, we must bear in mind the circumstances of his youth. He seems never to have quite lost a lurking fear that those circumstances exposed him to contempt. He was much too proud and great-hearted a man to give in to such a fear; but it clung to him, and was always demanding a certain struggle to keep it down. Slight as the struggle was, the traces of it are perceptible in his work. We have an evidence of it in the common saying that he never succeeded in painting "a gentleman." That is not to be got over by calling for a definition of the word; it is a popular expression of a fact, the fact that nearly all the personages in his novels occupying a position in life to which that word would have been applied in his own time are painted in unfavourable colours. Perhaps the course of his stories did not call upon him to paint more favourable specimens of that class; still the fact remains that in Dickens's attitude towards society there was something of the defensive, even of the aggressive. He faced towards society with a certain air of defiance, with the consciousness of a vast popular multitude behind him, to which he could appeal if they refused him what was his due. He never claimed more than his due, and it was never refused to him. It is perhaps for this reason that the traces of his spirit of revolt against society are so slight as to be more matter of inference than of observation. It is more correct to say that he never tried to paint "a gentleman," than that he did not succeed. The question can hardly be raised without giving it undue importance, an importance which Dickens himself would have been the first to make light of; for, though he had his full share of the little vanities inseparable from humanity, he was a great man in temper as well as in genius, and littlenesses were of the accidents and not of the essence of his nature.

Dickens's want of perfect sympathy with the cultured society of his time incapacitated him for that kind of novel which answers to comedy in dramatic composition, although it left him free for work of a greater and more enduring kind. What may be called the comedy novel, the novel of Thackeray in Dickens's generation, is much less sure of enduring fame, because the sentiments on which it rests, being the product of a particular knot of circumstances, are more fugitive, and pass sooner into the province of the historian. The novels of Dickens will live longer because they take hold of the permanent and universal sentiments of the race,—sentiments which pervade all classes, and which no culture can ever eradicate. His fun may be too boisterous for the refined tastes of his own time, or, for the matter of that, of posterity; his pathos may appear maudlin; but they carried everything before them when they first burst upon our literature, because, however much exaggerated, they were exaggerations of what our race feels in its inner heart; and unless culture in the future works a miracle, and carries its changes beneath the surface, we may be certain that Dickens will keep his hold.

If Dickens had been asked why his novels were likely to live, he would probably have answered that it was because he put more work into them than any of his contemporaries. He was fond of insisting that genius meant attention. The definition may be accepted with a qualification. No man can become a genius by resolving to attend; but if he attends very much in some one direction by natural impulse, then he may be said to have a genius, whatever may be his field of work. No genius is of much avail for great literary productions without attention. Dickens could never have gathered together his amazing variety of characters and abundance of incidents without attention. M. Taine, in his criticism of Dickens, dwells much upon the boundless wealth of his imagination; Dickens himself would have expressed the same fact by speaking of the persistence and closeness of his attention. It comes to the same thing in the end, whichever way we express it; but there is no doubt that Dickens's own expression is more descriptive of his actual method of work. M. Taine rather gives us the notion that Dickens sat down and trusted to the inexhaustible fertility of his imagination; whereas, ready and active as his imagination ever was, he accumulated materials for it with the industry of a pre-Raphaelite painter. The charm, the inimitable secret, lay, of course, in the transmuting process through which dry facts passed in his imagination; but he laboured earnestly, exercised the most painstaking attention, not merely in bringing his facts together, but in setting them, with all their superadded value, for his special purposes. Dickens would have been a humorist though he had never written a line; he could never have helped attending to the humorous side of whatever met his eye; but without the attention on which he prided himself as the secret of his power, he could never have established himself securely as one of the greatest humorists in literature.

Our Mutual Friend was published in 1864 and 1865. After an interval of five years, during which he contributed to three Christmas numbers of *All the Year Round*, and wrote *A Holiday Romance* and *George Silverman's Explanation* for an American publisher, the first number of *The Mystery of Edwin Drood* was issued in April 1870. He did not live to complete the novel. For some years severe pains in the left hand and foot had given warning that he was overtaxing his system, but the warning was not fully understood till too late. He was suddenly overcome by a stupor, caused by effusion on the brain, on the evening of the 8th of June, and ceased to breathe on the following day. In his will he had desired that he should be buried in "an inexpensive, unostentatious, and strictly private manner, without any public announcement of the time or place of his burial." These conditions were observed; but his executors did not consider them inconsistent with his receiving the honour of interment in Westminster Abbey, where he was buried on the 14th of June 1870.

His death took place at Gadshill Place, a house near the main road between Rochester and Gravesend, which he had bought in 1856, and which had been his home since 1859. Here he worked, and walked, and saw his friends, and was loved and almost worshipped by his poorer neighbours for miles around. His previous residences in London had been Furnival's Inn, where fame found him a young man writing sketches for the *Chronicle*; 48 Doughty Street, after his marriage and first flood of success; Devonshire Terrace, from 1839 to 1851; Tavistock House, from 1851 to 1859. These residences were varied by his numerous excursions to provincial towns, to the Continent, to America. But "perhaps there was never a man who changed places so much and habits so little. He was always methodical and regular, and passed his life from day to day, divided for the most part between working and walking, the same wherever he was." It is a notable feature in his regularity that it was never a complacent routine; it was persisted in in spite of restless longings which he never conquered to the last.

The authorized life of Dickens is that by John Forster, 3 vols. 8vo, 1871-2-4. There are two books on his public readings—*Charles Dickens as a Reader*, by Mr C. Kent, and *Pen Photographs of his Readings in America*, by Miss Kate Field. Mr G. A. Sala has published a valuable essay on his "Genius and Character." (W. M.)

DICOTYLEDONS. See BOTANY, vol. iv. p. 92, &c., and VEGETABLE KINGDOM.

DICTATOR, the highest extraordinary magistrate of the ancient Roman republic. The original name of this office was *magister populi*, by which appellation he was called in the sacred books down to the latest times of the commonwealth.

When the republican form of government was established at Rome, and the supreme executive vested in the two consuls, emergencies sometimes occurred in which it seemed that the safety of the state might advantageously be intrusted for the time to some one man, whose past life had gained for him the esteem and respect of the whole body of the citizens. The idea of this office was borrowed by the Romans from the constitution of some of the Latin towns which they had subdued. It lay with the senate to decide when the services of a dictator were necessary. The power of nominating a man to the office was by that body made over to one of the consuls. It is not exactly determined to which of these officers the nomination of a dictator properly appertained.

The insignia of the dictator's office were—first, the lictors, twenty-four in number, who bore the fasces and secures; second, the curule chair; and third, the toga praetexta.

The first dictator was appointed at Rome 501 B.C., nine years after the expulsion of the Tarquins. Who the first dictator was is differently stated by different historians, but it is most probable that it was T. Lartius.

Dictators were generally appointed to conduct a foreign war, but it often happened that in matters of less importance they were appointed with nominal authority. The dictator was generally selected in the absence of the consuls to perform some small ceremonies, which in strict propriety would only be gone through by one of the consuls. Thus he was sometimes chosen to hold the comitia, to appoint holidays, to affix the *clavus annalis* in the temple of Jupiter, and to preside at trials. As soon as the dictator was appointed, he was required to select a master of the horse (*magister equitum*), whose term of office was the same as his own.

The power of the dictator was absolute; and so long as he remained in office no appeal was open against his mandates to any other authority in the state. He was nearly altogether independent of the senate. He could inflict much severer punishments than the consuls without being liable, as these officers were, to have his sentence reversed by the assembly of the people. His power was as irresponsible as it was absolute. In token of the absolute power of the dictators over the lives of their fellow-citizens, their lictors bore the axe in the midst of the fasces even in their walks through the city—a mark of distinction which the consuls had formerly enjoyed, but which had been abolished in their case by the Valerian law.

Though the power of the dictator was thus great, it was nevertheless limited by certain indirect restrictions. The most important of these was, that he had no control whatever over the public money, and had to content himself with such sums as were allowed him by the senate. He was not allowed to leave Italy; and could not appear on horseback in the city without the express permission of the people. The surest safeguard, however, against any treacherous designs on the part of the dictator was the shortness of the period during which he remained in office. This was never permitted to exceed six months.

When a dictator was appointed, all the ordinary magistrates ceased to be directly responsible to the governing authorities of the state, and took their orders directly from him. The only magistrates exempt from this necessity were the tribunes of the commons. The inferior officers, however, did not, as has been supposed, retire from office altogether. They merely obeyed the dictator so long as he continued in power, and on his resignation entered once more upon the untrammelled exercise of their authority.

It remains to be added that dictators were only appointed at Rome so long as Italy remained unsubdued. The last dictator appointed at Rome held office in 202 B.C.; from that time the constitutional dictatorship disappears from Roman history.

See Mommsen's *Römische Staatsrecht*, ii. 1.

DICTIONARY

ALTHOUGH dictionaries are so numerous, so well known, and so much used, they vary so greatly in the nature and treatment of their subjects that any definition must be very much modified in order to include some works so entitled and usually so called. In its proper and most usual meaning, a dictionary is a book containing a collection of the words of a language, dialect, or subject, arranged alphabetically or in some other definite order, and with explanations in the same or some other language. What is essential is, that the words given should be all or most of those belonging to the subject of the dictionary, or at least be very many in number, and that they should be arranged in definite order, and accompanied with interpretations. Many other characters may rightly and advantageously belong to a dictionary, but these are the essentials. When the words are few in number, being only a small part of those belonging to the subject, or when they are given without explanation, or some only are explained, or the explanations are partial, the work is called a vocabulary. An alphabetical arrangement of the words of some book or author with references to the places where they occur is called an index. When under each word the phrases containing it are added to the references, the work is called a concordance. Sometimes, however, these names are given to true dictionaries; thus the great Italian dictionary of the Academy of La Crusca, in six volumes folio, is called *Vocabolario*, and Ernesti's dictionary to Cicero is called *Index*. When the words are arranged according to a definite system of classification under heads and subdivisions, according to their nature or their meaning, the book is usually called a classed vocabulary; but when sufficient explanations are given, it is often accepted as a dictionary, like the *Onomasticon* of Julius Pollux, or the native dictionaries of Sanskrit, Manchu, and many other languages. Dictionaries were originally books of reference explaining the words of a language or of some part of it. As the names of things, as well as those of persons and places, are words, and often require explanation even more than other classes of words, they were necessarily included in dictionaries, and often to a very great extent. In time, books were devoted to them alone, and were limited to special subjects, and these have so multiplied, that dictionaries of things now rival in number and variety those of words or of languages, while they often far surpass them in bulk. There are dictionaries of biography and history, real and fictitious, general and special, relating to men of all countries, characters, and professions; dictionaries of bibliography, relating to all books, or to those of some particular kind or country; dictionaries of geography, of the whole world, of particular countries, or of small districts, of towns and of villages, of castles, monasteries, and other buildings. There are dictionaries of philosophy; of mathematics; of natural history, zoology, botany; of birds, trees, plants, and flowers; of chemistry, geology, and mineralogy; of architecture, painting, and music; of medicine, surgery, anatomy, pathology, and physiology; of diplomacy; of law, canon, civil, statutory, and criminal; of political and social sciences; of agriculture, rural economy, and gardening; of commerce, navigation, horsemanship, and the military art; of mechanics, machines, and the manual arts. There are dictionaries of antiquities, of chronology, of dates, of genealogy, of heraldry, of diplomatics, of abbreviations, of useful receipts, of monograms, of adulterations, and of very many other subjects. And lastly, there are dictionaries of the arts and sciences, and their comprehensive offspring, *encyclopædias*, which include in themselves every branch of knowledge. The tendency of dictionaries of language is to increase the vocabulary, to multiply articles; the tendencies of dictionaries of things, and especially of encyclopædias, is to diminish the number of articles, fusing subjects together as far as possible, and to develop the explanation, making it longer and more copious and circumstantial. This does away with the necessity of turning to many articles scattered through all parts of the work for a complete view of a subject. On the other hand, as requiring an index, it is less convenient for frequent reference on minor points.

Dictionarium is a word of low or modern Latinity;[1] *dictio*, from which it was formed, was used in mediæval Latin to mean a word. Lexicon is a corresponding word of Greek origin, meaning a book of or for words—a dictionary. A glossary is properly a collection of unusual or foreign words requiring explanation. It is the name frequently given to English dictionaries of dialects, which the Germans usually call idioticon, and the Italians vocabolario. Wörterbuch, a book of words, was first used among the Germans according to Grimm, by Kramer (1719), imitated from the Dutch woordenboek. From the Germans the Swedes and Danes adopted ordbok, ordbog. The Icelandic ordabók, like the German, contains the genitive plural. The Slavonic nations use slovar, slovnik, and the Southern Slavs ryetshnik, from slovo, ryetsh, a word, formed, like dictionary and lexicon, without composition. Many other names have been given to dictionaries, as thesaurus, Sprachschatz, cornucopia, gazophylacium, comprehensorium, catholicon, to indicate their completeness; manipulus predicantium, promptorium puerorum, liber memorialis, hortus vocabulorum, ionia (a violet bed), alveary (a beehive), kamoos (the sea), haft kulzum (the seven seas), tsze tien (a standard of character), onomasticon, nomenclator, bibliotheca, elucidario, Mundart, Sammlung, clavis, scala, pharetra,[2] La Crusca from the great Italian dictionary, and Calepin (in Spanish and Italian) from the Latin dictionary o Calepinus.

A dictionary of language should contain all the word which may be reasonably looked for in it, so arranged a to be readily and surely found, and so explained as t make their meaning, and if possible their use, clear t those who have a competent knowledge of the languag or languages in which the explanations are given. Som dictionaries may suppose a very considerable degree o knowledge in those who use them, but though one coul not be written which would make every word clear to young child, they should in general be as easy and simpl as possible. A full and complete dictionary of a grea literary language can be compiled only by great labour patience, knowledge, and skill, employed for many year in collecting, correcting, adjusting, and completing th labours of many previous generations of workers. Such dictionary should include all the words of the language As a great library cannot select books and publications, but must collect and preserve all without regard to their apparent value or worthlessness, for it is impossible to foretell what may be valued in future times, or what may be required by its readers for completing their researches, so a complete and standard dictionary should make no choice. Words obsolete and newly coined, barbarous, vulgar, and affected, temporary, provincial, and local, belonging to peculiar classes, professions, pursuits, and trades, should all find their place,—the only question being as to the evidence for their existence,—not indeed, all received with equal honour and regard, but with their characteristics and defects duly noted and pointed out. A complete dictionary should be the complete record and picture, or, as Archbishop Trench says, the inventory of language. It must contain all words ever in any way belonging to it, in writing or in speech, or it will not be a complete record, and will not satisfy those who consult it. Lexicographers have too often tried to exercise a choice, and not content with being recorders, have made themselves judges of words, and refiners and improvers of language, and have attempted not only to reform the language, but to check it in that growth and development which is inherent in all living tongues, and to make their dictionaries standards and rules of language, rather than inventories and records. Unfortunately, this error is echoed by popular opinion; and a standard dictionary is too often supposed to be an arbitrator of words, rather than a standard of excellence among dictionaries. The intention of the author should be, as Bescherelle says, not to reform the language, but to present it with all its caprices, anomalies, irregularities, beauties, defects,—in a word, as the nation has made it. The precise value or worthlessness of a word can only be marked when it is admitted. If not found in the dictionary, it may be supposed to have been unknown to the author, as there is nothing to show that it has been condemned and rejected. The French Academy at first rejected all technical terms, but was compelled by popular clamour and the success of Furetière's dictionary, in which very many were given, to admit them in increasing numbers in its second and all subsequent editions. It is the more necessary that they should not be excluded, as the meanings are difficult to learn, and are most often looked for; and a dictionary intended for general use, should, as Dr Johnson says, include the words belonging to every profession. Obsolete words are admitted by Johnson, Littré, and other first-rate lexicographers, only when they have remained in use after a certain period. Richardson gives only those useful for etymology, which is Littré's rule for patois. Grimm admits all words at any time belonging to High German or its dialects. The great German dictionaries generally admit dialects, and in this respect are more complete than the French and English. The Chinese give in their standard dictionaries every character known to exist, though many are erroneous, corrupt, vulgar, or local, or are merely improvements proposed by some eminent person. Of the ancient characters, sometimes the pronunciation, and occasionally the meaning, are unknown, while both one and the other are in some cases completely lost. Johnson omits all words relating to proper names, but they, as well as proper names, often as really belong to a language as any other words. The Philological Society propose that their new dictionary of English, begun in 1856, shall contain "every word occurring in the literature of the language," and "admit as authorities all English books," unwisely excepting "such as are devoted to purely scientific subjects, as treatises on electricity, mathematics," &c., beginning "with that definite appearance of an English type of language distinct from the preceding semi-Saxon," about the year 1250. Their vocabulary of words beginning with the letter B, printed in 1863, contains 17,729. The practice of universal admission of words is becoming more generally adopted in standard dictionaries of all languages.

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[1] Joannes de Garlandia, who probably was born about 1275, and died soon after 1250, gives the following explanation in his *Dictionarius*, which is a classed vocabulary:—"Dictionarius dicitur libellus iste a dictionibus magis necessariis, quas tenetur quilibet scolaris, non tantum in tabulis de lignis facto, sed in cordis armariolo firmiter retinere." This has been supposed to be the first use of the word.

[2] An excellent dictionary of quotations, perhaps the first of the kind; a large folio volume printed in Strasburg about 1475, is entitled "Pharetra auctoritates et dicta doctorum, philosophorum, et poetarum continens."

Words can be most surely and quickly found when arranged alphabetically in a single series. Other arrangements, though sometimes more useful, are not so generally convenient. When it is thought desirable to separate any class of words, they should still be also inserted in their proper places in the general alphabet. In a large dictionary a small separate additional alphabet is almost lost, and is usually overlooked by searchers. According to Grimm, the alphabetical arrangement not only facilitates reference, but makes the author's work quicker and surer; "for he who would insert rich contributions must have the places for them before his eyes, and not have to search about undecidedly to find whether the word is already there or not." The order of the alphabet should be that commonly used in the language. Any other makes reference more slow and uncertain. Grimm says that the order of the Sanskrit alphabet, adopted by Diefenbach and others, brings confusion rather than light to European languages. The etymological arrangement under roots has been generally condemned by experience. It places all words of the same origin together, so that they can be at once seen, which is often very useful and important, and is a great help in learning a language, as it assists the memory. But a word not belonging to the small number of roots cannot be found unless its root is known; otherwise it must be looked for in the index, or if there is none, sought for by guess-work in many places. And as etymologies will vary according to fancy or knowledge, no word, as Grimm says, will be sure of its place, and no arrangement is more destructive of the object and use of a dictionary. All its advantages may be secured by giving under each root a list of derivatives. Another system, more rarely adopted, though perhaps more useful, is that of arranging all words under their leading ideas, so that all those relating to a subject are seen together, and the proper word to express an idea may be found almost as easily as the idea expressed by a word may be found in an ordinary dictionary. It is, in fact, a classed vocabulary of all the words of the language, with the sections arranged alphabetically, and resembles in its purpose the classified index of a bibliographical dictionary, while it is quite as useful and necessary. Boissière has chosen about 2000 common words, under each of which he gives all the French words evidently attached to it by community of ideas, or by relations of habitual use, cause, means, effect, or any analogy whatever. This part, he says, shows how to call things by their right names, and, as he remarks, great care is taken to teach children grammar, but none to teach them words. In the upper part of each page he gives all the words in alphabetical order, with a reference to the group in which each will be found. Roget, in his *Thesaurus*, gives under each head (1000 in number) not only the words belonging to the idea, but their opposites, and adds at the end of the book an index of all the words. This system, on account of its very great use and value, might well be made a subsidiary part of a standard dictionary, the groups being placed in the general alphabet, and a reference to each group being added to each word. The arrangement by terminations is of use grammatically and stenographically, and for making out words of which the beginning is illegible or wanting. A dictionary of rhymes is similar, but not exactly the same, and is of little use except for making verses, and, when the rhymes are perfect, for showing the pronunciation. In the Semitic languages words are commonly placed under their roots, and in MS. lexicons the roots are often arranged alphabetically, according to the last radical. When Lane was making his great Arabic lexicon, he generally had before him eight or ten native lexicons, containing three different arrangements of roots. In Chinese dictionaries the characters are usually arranged under the 214 radicals, which now serve as an alphabet. In former times the number varied, and was much greater. The characters under each radical are further subdivided according to the number of strokes used in making each character, in addition to its radical, or the abbreviation of its radical which each character contains. But no arrangement is attempted of the characters having the same number of strokes. Other systems are sometimes used, arranged by tones and endings, and by the characters (about 1040) called phonetics.

In the separate articles of a dictionary the arrangement must vary very much with the language, as well as with the word itself. When necessary, the orthography, pronunciation, and grammatical inflexions of the word should be given, and any variations of these at different times and places carefully pointed out, as well as the character of the word, such as obsolete, provincial, &c.; and forms beginning with a different spelling should be placed in separate articles, with references to the main article. The etymology should be given, referring derivatives to their respective roots; and under each root giving, if not the derivation as far back as it can be traced, at least what Littré calls the secondary etymology—that is, deriving it from a word not belonging to the language, as when a French word is traced to a Latin or German word without proceeding farther; and cognate words should generally be enumerated, often with their principal meanings. This gives a primary meaning, but care must be taken that the derivation is a real one, not a mere fancy or guess. The times when the word was introduced or became obsolete should be noted, and the meaning it bore at first, as well as those which prevailed at various periods. The meanings may be arranged in a series, not merely as they may be imagined to have been logically developed from each other, but as their connection may be traced, and can be shown to have existed in actual use; and where this connection cannot be traced, the defect should be pointed out. Sometimes, too, the meanings are, as Johnson says, collateral. In some kinds of dictionaries the explanations may be merely sufficient to identify the word, as in Bilderdijk's *Voordenboek voor de Nederduitsche Spelling*, or, as in most small dictionaries, they may merely give the sense. They may also be full and complete explanations of all the meanings, and again, as is necessary in a complete dictionary, may include usage. The explanations of the meanings should be precise and not vague, real definitions and not a mere reference of one word to another of the same meaning, as when the French Academy explains *fier* by *hautain*, *altier*, and *hautain* by *fier*, *orgueilleux*. But when one language is explained by another, nothing conveys the meaning so well as a perfectly equivalent word. The interpretation of a language by itself is, as Dr Johnson says, very difficult, for there is no other word to express the idea, and simple ideas cannot be described. Therefore, in Grimm's dictionary Latin and other languages are used when necessary. Synonyms and homonyms should be given, as well as words of opposite meaning, and their similarities and differences explained. Remarks should be made on difficulties, faults to be avoided, peculiar constructions, figurative, idiomatic, and proverbial expressions, and the origin of these given when possible. All this should be done in the fewest and plainest words. Eloquence is out of place in a dictionary; but the author must not fear fulness when it is necessary, and must not allow brevity to make him obscure. A complete dictionary of a copious language must necessarily be a very large book, but much space may be saved by the use of well-selected terms and abbreviations, and by typographical arrangements.

Examples form a very important part of a dictionary, but one which is generally omitted, often neglected, and seldom so carefully attended to as it deserves. When no quotations are given, the whole language depends on the authority of the author of the dictionary. The French Academy have always claimed the right of making their own examples. Voltaire says they seem to have made a law not to quote, but, he adds, a dictionary without quotations is a skeleton. Examples may be arranged either under the meanings they illustrate, which is the usual and most useful plan, or, in languages possessing an extensive literature of long duration, chronologically in one series, as the Philological Society formerly proposed. Littré has adopted a medium, and gives examples from authors of the 17th, 18th, and 19th centuries under the meanings to which they belong, and those from previous authors in a chronological series. Each quotation should give a complete sense, and not be a mere fragment of a sentence. It should, if possible, be instructive and interesting in itself, but should not on this account be made too long. Those containing etymologies, definitions, or explanations of a word, as well as those in which it is joined to words of the same or opposite meaning, and those which mark its introduction or disuse, and those in which it is used as a foreign word not yet naturalized, should be especially sought for. Each should have as exact a reference as possible. The common practice of giving only the author's name makes it sometimes impossible to verify a quotation without searching through his entire works, which may fill many volumes. In the case of some rare words, when the quotation would add nothing to the information otherwise given, the mere reference may suffice. The value of a dictionary and the richness of its vocabulary depend very much on the carefulness and extent of the search for examples, which can only be complete when it has extended to the whole literature of the language. If concordances and full indexes were more universal, the search for examples would be much facilitated. The foundation of the Philological Society's intended dictionary was to have been the reading of all English books not purely scientific for examples by volunteers. In October 1864, 1149 had been read, and 360 were in hand.

Though complete dictionaries of a language are very few, and none as yet exists in English, large dictionaries ar many. The tendency of great dictionaries is to unite i themselves all the peculiar features of special dictionaries A large dictionary is most useful when a word is to b thoroughly studied, or when there is difficulty in making out the meaning of a word or phrase. Special dictionaries are more useful for special purposes; for instance synonyms are best studied in a dictionary of synonyms And small dictionaries are more convenient for frequen use as in translating from an unfamiliar language, for word may be found more quickly, and they present the word and their meanings in a concentrated and compact form instead of being scattered over a large space, and separate by other matter. Dictionaries of several languages, calle polyglots, are of different kinds. Some are polyglot the vocabulary, but not in the explanation, like Johnson dictionary of Persian and Arabic explained in English some in the interpretation, but not in the vocabulary o explanation, like *Calepini Octoglotton*, a Latin dictionary of Latin, with the meanings in seven languages. Many great dictionaries are now polyglot in this sense. Some are polyglot in the vocabulary and interpretation, but are explained in one language, like Jal's *Glossaire Nautique*, a glossary of sea terms in many languages, giving the equivalents of each word in the other languages, but the explanation in French. Pauthier's *Annamese Dictionary* is polyglot in a peculiar way. It gives the Chinese characters with their pronunciation in Chinese and Annamese. Special dictionaries are various, and many kinds will be found in the following list. There are dictionaries of etymology, foreign words, dialects, secret languages, slang, neology, barbarous words, faults of expression, choice words, prosody, pronunciation, spelling, orators, poets, law, music, proper names, particular authors, nouns, verbs, participles, particles, double forms, difficulties, and many others. Fick's dictionary (Göttingen, 1868, 8vo; 1874-76, 8vo, 4 vols.) is a remarkable attempt to ascertain the common language of the Indo-European nations before each of their great separations. In the second edition of his *Etymologische Forschungen* (Lemgo and Detmoldt, 1859-73, 8vo, 7217 pages) Pott gives a comparative lexicon of Indo-European roots, 2226 in number, occupying 5140 pages.

Comparatively few languages possess dictionaries, and they are few in number compared to other books, probably much under 2 per cent.; and 5000, not counting different editions, might be considered a very large collection. More than half belong to European languages, of which five surpass the rest in the number and variety of their dictionaries, namely, Greek, Latin, French, English, and German. In Asia, those excelling in this respect are Hebrew, Arabic, Persian, Sanskrit, Hindustani, Malay, Chinese, and Japanese; in Africa, Egyptian, Ethiopic, and Kaffre; in America, Otomi, Aztec, Guarani, Tupi, and Quichua.

The following list of dictionaries is arranged geographically by families of languages, or by regions. In each group the order, when not alphabetical, is usually from north to south, extinct languages generally coming first, and dialects being placed under their language. Dictionaries forming parts of other works, such as travels, histories, transactions, periodicals, reading-books, &c., are generally excluded. When a selection has to be made, the earliest, largest, latest, and best dictionaries are preferred. This system seemed on the whole best calculated to keep together dictionaries naturally associated. The languages to be considered are too many for an alphabetical arrangement, which ignores all relations both natural and geographical, and too few to require a strict classification by affinities, by which the European languages, which for many reasons should be kept together, would be dispersed.

Under either system, Arabic, Persian, and Turkish, whose dictionaries are so closely connected, would be widely separated. A wholly geographical arrangement would be inconvenient, especially in Europe. Any system, however, which attempts to arrange in a consecutive series the great network of languages by which the whole world is enclosed, must be open to some objections; and the arrangement adopted in this list has produced some anomalies and dispersions which might cause inconvenience if not pointed out. The old Italic languages are placed under Latin, all dialects of France under French (but Provençal as a distinct language), and Wallachian among Romanic languages. Low German and its dialects are not separated from High German. Basque is placed after Celtic; Albanian, Gipsy, and Turkish at the end of Europe, the last being thus separated from its dialects and congeners in Northern and Central Asia, among which are placed the Kazan dialect of Tartar, Samoyed, and Ostiak. Accadian is placed after Assyrian among the Semitic languages, and Maltese as a dialect of Arabic; while the Ethiopic is among African languages, as it seemed undesirable to separate it from the other Abyssinian languages, or these from their neighbours to the north and south. Circassian and Ossetic are joined to the first group of Aryan languages lying to the north-west of Persia, and containing Armenian, Georgian, and Kurd. The following is the order of the groups, some of the more important languages, that is, of those best provided with dictionaries, standing alone:—

Europe: Greek, Latin, French, Romance, Scandinavian, Teutonic (including English and German), Celtic, Lithuanic, Slavonic, Ugrian, Turkish.

Asia: Semitic, Armenian, Persian, Sanskrit, Indian, Indo-Chinese, Indian Archipelago, Philippines, Chinese, Japanese, Northern and Central Asia.

Africa: Egypt and Abyssinia, Eastern Africa, Southern, Western, Central, Berber.

Australia and Polynesia.

America: North, Central (with Mexico), South.

EUROPE.

Greek.—Athenæus quotes 35 writers of works, known or supposed to be dictionaries, for, as they are all lost, it is often difficult to decide on their nature. Of these, Anticlides, who lived after the reign of Alexander the Great, wrote Ἐξηγητικός, which seems to have been a sort of dictionary, perhaps explaining the words and phrases occurring in ancient stories. Zenodotus, the first superintendent of the great library of Alexandria, who lived in the reigns of Ptolemy I. and Ptolemy II., wrote Γλῶσσαι, and also λέξεις ἐθνικαί, a dictionary of barbarous or foreign phrases. Aristophanes of Byzantium, son of Apelles the painter, who lived in the reigns of Ptolemy II. and Ptolemy III., and had the supreme management of the Alexandrian library, wrote a number of works, as Ἀττικαὶ λέξεις, Λακωνικαὶ Γλῶσσαι, which, from the titles, should be dictionaries, but a fragment of his Λέξεις, printed by Boissonade, in his edition of Herodian (London, 1869, 8vo, pp. 181–9), is not alphabetical. Artemidorus, a pupil of Aristophanes, wrote a dictionary of technical terms used in cookery. Nicander Colophonius, hereditary priest of Apollo Clarius, born at Claros, near Colophon, in Ionia, probably in reputation for 50 years, from 181 to 135, wrote Γλῶσσαι in at least three books. Parthenius, a pupil of the Alexandrian grammarian Dionysius (who lived in the 1st century before Christ), wrote on choice words used by historians. Didymus, called χαλκέντερος, who, according to Athenæus, wrote 3500 books, and, according to Seneca, 4000, wrote lexicons of the tragic poets (of which book 28 is quoted), of the comic poets, of ambiguous words, and of corrupt expressions. Glossaries of Attic words were written by Crates, Philemon, Philetas, and Theodorus; of Cretan, by Hermon or Hermonax; of Phrygian, by Neoptolemus; of Rhodian, by Moschus; of Italian, by Diodorus of Tarsus; of foreign words, by Silenus; of synonyms, by Simaristus; of cookery, by Heracleon; and of drinking vessels, by Apollodorus of Cyrene. According to Suidas, the most ancient Greek lexicographer was Apollonius the sophist, son of Archibius. According to the common opinion, he lived in the time of Augustus at Alexandria. He composed a lexicon of words used by Homer, Λέξεις Ὁμηρικαί, a very valuable and useful work, though much interpolated, edited by Villoison. from an MS. of the 10th century, Paris, 1773, 4to, 2 vols.; and by Tollius, Leyden. 1788, 8vo; ed. Bekker, Berlin, 1833, 8vo. Erotian or Herodian, physician to Nero, wrote a lexicon on Hippocrates, arranged in alphabetical order, probably by some copyist, whom Klein calls for "homo sciolus." It was first published in Greek in H. Stephani *Dictionarium Medicum*, Paris, 1564, 8vo; ed. Klein, Lipsiæ, 1865, 8vo, with additional fragments. Timæus the sophist, who, according to Ruhnken, lived in the 3d century, wrote a very short lexicon to Plato, which, though much interpolated, is of great value, 1st ed. Ruhnken, Leyden, 1754; ed. locupletior, Lugd. Bat. 1789, 8vo. Ælius Mœris, called the Atticist, lived about A.D. 190, and wrote an Attic and Greek lexicon, 1st ed. Hudson, Oxf. 1712, 8vo. Julius Pollux (Ἰούλιος Πολυδεύκης) of Naucratis, in Egypt, died, aged 58, in the reign of Commodus (180–192), who made him professor of rhetoric at Athens. He wrote, besides other lost works, an Onomasticon in ten books, being a classed vocabulary, intended to supply all the words required by each subject with the usage of the best authors. It is of the greatest value for the knowledge both of language and antiquities. First printed by Aldus, Venice, 1500, fol.; often afterwards; ed. Lederlinus and Hemsterhuis, Amst. 1706, fol. 2 vols.; ed. Dindorf, Leip. 1824, 8vo, 5 vols. Harpocration of Alexandria, who lived in the 4th century, wrote a lexicon on the ten Attic orators, first printed by Aldus, Ven. 1503, fol.; ed. Dindorf, Oxford, 1853, 8vo, 2 vols. from 14 MSS. Orion, a grammarian of Thebes, in Egypt, who lived between 390 and 460, wrote an etymological dictionary, printed by Sturz, Leipzig, 1820, 4to. Helladius, a priest of Jupiter at Alexandria, when the heathen temples there were destroyed by Theophilus in 389 or 391 escaped to Constantinople, where he was living in 408. He wrote an alphabetical lexicon, now lost, chiefly of prose, called by Photius the largest (πολυστιχώτατον) which he knew. Ammonius, professor of grammar at Alexandria, and priest of the Egyptian ape, fled to Constantinople with Helladius, and wrote a dictionary of words similar in sound but different in meaning, which has been often printed in Greek lexicons, as Aldus, 1497, Stephanus, and separately by Valckenaer, Lugd. Bat. 1739, 4to, 2 vols., and by others. Zenodotus wrote on the cries of animals, printed in Valckenaer's *Ammonius*; with this may be compared the work of Vincentio Caralucci, *Lexicon vocum quæ a brutis animalibus emittuntur*, Perusia, 1779, 12mo. Hesychius of Alexandria, probably a heathen, who lived before 389, wrote a lexicon, important for the knowledge of the language and literature, containing many dialectic and local expressions and quotations from other authors, 1st ed. Aldus, Ven. 1514, fol.; the best is Alberti and Ruhnken, Lugd. Bat. 1746–66, fol. 2 vols.; collated with the MS. in St Mark's Library, Venice, the only MS., existing, by Niels Iversen Schow, Leipzig, 1792, 8vo; ed. Schmidt, Jena, 1867, 8vo. The foundation of this lexicon is supposed to have been that of Pamphilus, an Alexandrian grammarian, quoted by Athenæus, which, according to Suidas, was in 95 books from Ε to Ω; Α to Δ had been compiled by Zopirion. Photius, consecrated patriarch of Constantinople, 25th Dec. 857, living in 886, left a lexicon, partly extant, and printed with Zonaras, Lips. 1808, 4to, 3 vols., being vol. iii.; ed. Naber, Leidæ, 1864–5, 8vo, 2 vols. The most celebrated of the Greek glossaries is that of Suidas, of whom nothing is known. He probably lived in the 10th century. His lexicon is an alphabetical dictionary of words, including the names of persons and places,—a compilation of extracts from Greek writers, grammarians, scholiasts, and lexicographers, very carelessly and unequally executed. It was first printed by Demetrius Chalcondylas, Milan, 1499, fol.; the best edition, Bernhardy, Halle, 1853, 4to, 2 vols. John Zonaras, a celebrated Byzantine historian and theologian, who lived in the 12th century, compiled a lexicon, first printed by Tittmann, Lips. 1808, 4to, 2 vols. An anonymous Greek glossary, entitled Ἐτυμολογικὸν μέγα, Etymologicum magnum, has been frequently printed. The first edition is by Musurus, Venitia, 1499, fol.; the best by Gaisford, Oxonii, 1848, fol. It contains many grammatical remarks by famous authorities, many passages of authors, and mythological and historical notices. The MSS. vary so much that they look like the works of different authors. Eudocia Augusta of Makrembolis, wife of the emperors Constantine XI. and Romanus IV. (1059 to 1071), compiled a dictionary of history and mythology, called Ἰωνιά (bed of violets), first printed by D'Ansse de Villoison, *Anecdota Græca*, Venetiis, 1781, 4to, vol. i. pp. 1–482. It was supposed to have been of much value before it was published. Thomas, Magister Officiorum under Andronicus Palæologus, afterward called as a monk Theodulus, wrote Ἐκλογαὶ ὀνομάτων Ἀττικῶν, printed by Calliergus, Romæ, 1817, 8vo. Papias, *Vocabularium*, Mediolani, 1476, fol.: Craston, an Italian Carmelite monk of Piacenza, compiled a Greek and Latin lexicon, edited by Bonus Accursius, printed at Milan, 1478, fol.; Aldus, Venetiis, 1497, fol.: Guarino born about 1450 at Favora, near Camarino, who called himself both Phavorinus and Camers, published his *Thesaurus* in 1504. These three lexicons were frequently reprinted. Estienne, *Thesaurus*, Genevæ, 1572 fol. 4 vols; ed. Valpy, Lond. 1816–26, 8 vols. fol.; Paris, 1831–65

9 vols. fol. 9902 pages: Κιβωτὸς, the ark, was intended to give the whole language, ancient and modern, but vol. I., Constantinople, 1819, fol. 763 pages Α to Δ, only appeared, as the publication was put an end to by the events of 1821. ENGLISH.—Jones, London, 1823, 8vo: Dunbar, Edin. 3d ed. 1850, 4to: Liddell and Scott, 6th ed. Oxford, 1867, 4to. FRENCH.—Alexandre, 12th ed. Paris, 1863, 8vo; 1869-71, 2 vols.: Chassang, *ib.* 1872, 8vo. ITALIAN.—Canini, Torino, 1865, 8vo, 972 pages: Müller, *ib.* 1871, 8vo. SPANISH.—*Diccionario manual, por los padres Esculapios*, Madrid, 1859, 8vo. GERMAN.—Passow, 5th ed. Leipzig, 1841-57, 4to: Jacobitz and Seiler, 4th ed. *ib.* 1856, 8vo: Benseler, *ib.* 1859, 8vo: Pape, Braunschweig, 1870-74, 8vo, 4 vols. DIALECTS.—*Attic:* Moeris, ed. Pierson, Lugd. Bat. 1759, 8vo. *Attic Orators:* Reiskius, Oxon. 1828, 8vo, 2 vols. *Doric:* Portus, Franckof. 1605, 8vo. *Ionic:* Id. *ib.* 1603, 8vo; 1817; 1825. PROSODY.—Morell, Etonæ, 1762, 4to; ed. Maltby, Lond. 1830, 4to: Brasse, Lond. 1850, 8vo. RHETORIC.—Ernesti, Lips. 1795, 8vo. MUSIC.—Drieberg, Berlin, 1855. ETYMOLOGY.—Curtius, Leipzig, 1858-62: Lancelot, Paris, 1863, 8vo. SYNONYMS.—Peucer, Dresden, 1766, 8vo: Pillon, Paris, 1847, 8vo. PROPER NAMES.—Pape, ed. Sengebusch, 1866, 8vo, 969 pages. VERBS.—Veitch, 2d ed. Oxf. 1866. TERMINATIONS.—Hoogeveen, Cantab. 1810, 4to: Pape, Berlin, 1836, 8vo. PARTICULAR AUTHORS.—*Æschylus:* Wellauer, 2 vols. Lips. 1830-31, 8vo. *Aristophanes:* Caravella, Oxonii, 1822, 8vo. *Demosthenes:* Reiske, Lips. 1775, 8vo. *Euripides:* Beck, Cantab. 1829, 8vo. *Herodotus:* Schweighäuser, Strasburg, 1824, 8vo, 2 vols. *Hesiod:* Osornis, Neapol. 1791, 8vo. *Homer:* Apollonius Sophista, ed. Tollius, Lugd. Bat. 1788, 8vo: Schaufelberger, Zürich, 1761-8, 8vo, 8 vols.: Crusius, Hannover, 1836, 8vo: Wittich, London, 1843, 8vo: Döderlein, Erlangen, 8vo, 3 vols.: Eberling, Lipsiæ, 1875, 8vo: Autenrieth, Leipzig, 1873, 8vo; London, 1877, 8vo. *Isocrates:* Mitchell, Oxon. 1828, 8vo. *Pindar:* Portus, Hannov. 1606, 8vo. *Plato:* Timæus, ed. Koch, Lips. 1828, 8vo: Mitchell, Oxon. 1832, 8vo: Ast, Lips. 1835-38, 8vo, 3 vols. *Plutarch:* Wyttenbach, Lips. 1835, 8vo, 2 vols. *Sophocles:* Ellendt, Regiomonti Prussor. 1834-35, 8vo ed.; Genthe, Berlin, 1872, 8vo. *Thucydides:* Bétant, Gen. 1843-47, 8vo, 2 vols. *Xenophon:* Sturtz, Lips. 1801-4, 8vo, 4 vols.: Cannesin (Anabasis, Gr.-Finnish), Helsingissä, 1868, 8vo: Sauppe, Lipsiæ, 1869, 8vo. *Septuagint:* Hutter, Noribergæ, 1598, 4to: Biel, Hagæ, 1779-80, 8vo. *New Testament:* Lithocomus, Colon. 1552, 8vo: Parkhurst, ed. Major, London, 1845, 8vo: Schleusner (juxta ed. Lips. quartam), Glasguæ, 1824, 4to.

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The French Academy, after five years' consideration, began their dictionary, 7th February 1639, by examining the letter A, which took them nine months to go through. The word Académie was for some time omitted by oversight. They decided, 8th March 1638, not to cite authorities, and they have since always claimed the right of making their own examples. Ollivier justifies them by saying that for eighty years all the best writers belonged to their body, and they could not be expected to cite each other. Their design was to raise the language to its last perfection, and to open a road to reach the highest eloquence. Antoine Furetière, one of their members, compiled a dictionary which he says cost him forty years' labour for ten hours a day, and the manuscript filled fifteen chests. He gave words of all kinds, especially technical, names of persons and places, and phrases. As a specimen, he published his *Essai*, Paris, 1684, 4to; Amst. 1685, 12mo. The Academy charged him with using the materials they had prepared for their dictionary, and expelled him, 22d January 1685, for plagiarism. He died 14th May 1688, in the midst of the consequent controversy and law suit. His complete work was published, with a preface by Bayle, La Haye and Rotterdam, 1690, fol. 3 vols.; again edited by Basnage de Beauval, 1701; La Haye, 1707, fol. 4 vols. From the edition of 1701 the so-called very popular *Dictionnaire de Trevoux*, Trevoux, 1704, fol. 2 vols., was made by the Jesuits, who excluded everything that seemed to favour the Calvinism of Basnage. The most of its many editions is Paris, 1771, fol. 8 vols. The Academy's Dictionary was first printed Paris, 1694, fol. 2 vols. They began the revision in 1700; second edition 1718, fol. 2 vols.; 3d, 1740, fol. 2 vols.; 6th, 1835, 2 vols. 4to, reprinted 1855; Supplément, by F. 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Hebrew.—About 875, Zemach, head of the school of Pumbeditha, wrote a Talmudical dictionary of words and things, arranged in alphabetical order, which is lost. About 880, Jehudah ben 'Alan, of Tiberias, and Jehudah ibn Koreish, of Tahurt, in Morocco, wrote Hebrew dictionaries. Saadia ben Joseph (born 892, died 942), of Fayyûm, in Upper Egypt, wrote ספר אגרון, probably a Hebrew-Arabic dictionary. Menachem ben Jacob Ibn Sarûk (born 910, died about 970), of Tortosa and Cordova, wrote a copious Hebrew dictionary, first printed by Herschell F. Filipowski, Edinburgh, 1855, 8vo, from five MSS. David ben Abraham, of Fâs, wrote, in Arabic, a large Hebrew dictionary, the MS. of which, a quarto of 313 leaves on cotton paper, was found about 1830 by A. Firkowitz, of Eupatoria, in the cellar of a Karaite synagogue in Jerusalem. The age of this work cannot be ascertained. About 1050, Ali ben Saleimân wrote a dictionary in Arabic, on the plan of that of David ben Abraham. The MS. of 429 leaves belongs to Firkowitz. Haja ben Sherira, the famous teacher of the Academy of Pumbeditha, wrote a Hebrew dictionary in Arabic, called *El Châvi* (The Gathering), arranged alphabetically in the order of the last radical letter. This dictionary is lost, as well as that of the Spaniard Isaac ben Saul, of Lucena. Iona ibn Ganach, of Cordova, born about 985, wrote a Hebrew dictionary in Arabic called *Kitâb el Asul* (Book of Roots). This, as well as a Hebrew translation by Samuel ibn Tabbon, is extant in MS., and was used by Gesenius in his *Thesaurus*. Rabbi David ben Joseph Kimchi died soon after 1232. His lexicon of roots, called שרשים, was printed at Naples 1490, fol.; Constantinople, 1513, fol.; Naples, 1491, 8vo; Venice, 1552; Berolini, 1838, 4to. *Tishbi* (The Tishbite), by Elijah ben Asher, the Levite, so called because it contained 712 roots, was printed at Isny 1541, 8vo and 4to, and often afterwards. LATIN.—Munster, Basileæ, 1523, 8vo; 5 editions to 1564: Zamora, Compluti, 1526, fol.: Pellicanus, Argentorati, 1540, fol.: Reuchlin, Basil. 1556, fol.: Avenarius, Wittebergæ, 1568, fol.; auctus, 1589: Pagnini, Lugd. Bat. 1575, fol.; 1577; Genevæ, 1614: Buxtorf, Basil. 1607, 8vo; 1615; and many other editions: Frey (Lat.-Eng.), 2d ed. London, 1815, 8vo: Gesenius, *Thesaurus*, Leips. 1829–58, 4to, 3 vols. ENGLISH.—Bale, London, 1767, 4to: Parkhurst, *ib.* 1792, 4to: Lee, *ib.* 1840, 8vo: Gesenius, translated by Robinson, *ib.* 1844, 8vo; by Tregelles, *ib.* 1846, 4to: Fuerst, 4th ed. transl. by Davidson, *ib.* 1866, 8vo; 1871, 8vo, 1547 pages. FRENCH.—Leigh, Amst. 1708, 4to: Glaire, Paris, 1830, 8vo; 1843. GERMAN.—Gesenius, Leipzig, 1810–12, 8vo, 2 vols: Fuerst, *ib.* 1842, 16mo; *ib.* 1876, 8vo, 2 vols. ITALIAN.—Modena, Venetia, 1612, 4to; 1640: Coen, Reggio, 1811, 8vo: Fontanella, Venezia, 1824, 8vo. DUTCH.—Waterman, Rotterdam, 1859, &c., 8vo. HUNGARIAN.—Ehrentheil (Pentateuch), Pest, 1868, 8vo. ROMAIC.—Loundes, Melité, 1845, 8vo, 987 pages.

Rabbinical and Chaldee.—Nathan ben Jehiel of Rome wrote in the beginning of the 12th century a Talmudic dictionary, *Aruch*, printed 1480 (?), *s.l.*, fol.; Pesaro, 1517, fol.; Venice, 1531; and often: Isaiah ben Loeb, Berlin, wrote a supplement to *Aruch*, vol. i., Bresslau, 1830, 8vo; vol. ii. (ל to ת), Wien, 1859, 8vo: Munster, Basil, 1527, 4to; 1530, fol.: Elijah ben Asher, the Levite, transl. by Fagius, Isnæ, 1541, fol.; Venet. 1560: David ben Isaac de Pomis, *Zamach David*, Venet. 1587, fol.: Buxtorf, Basileæ, 1639, fol.; ed. Fischer, Leips. 1866–75, 4to: Otho, Geneva, 1675, 8vo; Altona, 1757, 8vo: Zanolini, Patavii, 1747, 8vo: Hornheim, Halle, 1807, 8vo: Landau, Prag, 1819–24, 8vo, 5 vols.: Dessauer, Erlangen, 1838, 8vo: Nork (*i.e.*, Korn), Grimma, 1842, 4to: Schönhak, Warschau, 1858, 8vo, 2 vols. TARGUMS.—Levy, Leipzig, 1866–68, 4to, 2 vols.; 1875: Id. (Eng.), London, 1869, 8vo, 2 vols. TALMUD.—Löwy (in Heb.), Wien, 1863, 8vo: Levy, Leipzig, 1876, &c., 4to. PRAYER-BOOK.—Hecht, Kreuznach, 1860, 8vo: Nathan, Berlin, 1854, 12mo. SYNONYMS.—Pantavitius, Lodevæ, 1640, fol. FOREIGN WORDS.—Rabeini, Lemberg, 1857, 8vo, &c. JEWISH-GERMAN.—Callenberg, Halle, 1736, 8vo: Vollbeding, Hamburg, 1808, 8vo: Stern, München, 1833, 8vo, 2 vols.: Theile, Berlin, 1842–48, 8vo, 2 vols: Avé-Lallemant, *Das Deutsche Gaunerthum*, Leipzic, 1858, 8vo, 4 vols; vol. iv. pp. 321–512.

Phœnician.—M. A. Levy, Breslau, 1864, 8vo.

Samaritan.—Crinesius, Altdorphi, 1618, 4to: Morini, Parisiis, 1657, 12mo: Hilligerus, Wittebergæ, 1679, 4to: Cellarius, Cizæ, 1682, 4to; Frankof. 1705: Uhlemann, Leipsiæ, 1837, 8vo: Nicholls, London, 1859, 8vo.

Assyrian.—Norris, London, 1868, 8vo, 3 vols. PROPER NAMES.—Menant, Paris, 1861, 8vo.

Accadian.—Lenormant, Paris, 1875, 8vo.

Syriac.—Joshua ben Ali, a physician, who lived about 885, made a Syro-Arabic lexicon, of which there is an MS. in the Vatican. Hoffmann printed this lexicon from Alif to Mim, from a Gotha MS., Kiel, 1874, 4to. Joshua bar Bahlul, living 963, wrote another, great part of which Castelli put into his lexicon. His MS. is now at Cambridge, and, with those at Florence and Oxford, was used by Bernstein. Elias bar Shinaya, born 975, metropolitan of Nisibis, 1009, wrote a Syriac and Arabic lexicon, entitled *Kitâb et Tarjuman fi Taalem Loghat es Sûriân* (Book called the Interpreter for teaching the Language of the Syrians), of which there is a MS. in the British Museum. It was translated into Latin by Thomas à Novaria, a Minorite friar, edited by Germanus, and published at Rome by Obicinus, 1636, 8vo. It is a classified vocabulary, divided in 30 chapters, each containing several sections. Crinesius, Wittebergæ, 1612, 4to: Buxtorf, Basileæ, 1622, 4to: Ferrarius, Romæ, 1622, 4to: Trost, Cothenis Anhaltor. 1643, 4to: Gutbir, Hamburgi, 1667, 8vo: Schaaf, Lugd. Bat. 1708, 4to: Zanolini, Patavii, 1742, 4to: Castellus, ed. Michaelis, Göttingen, 1788, 4to, 2 vols.: Bernstein, Berlin, 1857, &c. fol.: Smith (Robt. Paine), Dean of Canterbury, Oxonii, 1868, &c. fol.; fasc. 1–3 contain 538 pages: Zingerle, Romæ, 1873, 8vo, 148 pages.

Arabic.—The native lexicons are very many, voluminous, and copious. In the preface to his great Arabic-English lexicon, Lane describes 33, the most remarkable of which are—the *Eyn*, so called from the letter which begins its alphabet, commonly ascribed to El Khaleel, (who died before A.H. 175 [A.D. 791], aged 74: the *Sihah* of El Jowharee (died 398 [1008]): the *Mohkam* of Ibn Seedah the Andalusian, who was blind, and died A.H. 458 [A.D. 1066], aged about 60: the *Asas* of Ez Zamakhsharee (born 467 [1075], died 538 [1144]), "a most excellent repertory of choice words and phrases": the *Lisân el 'Arab* of Ibn Mukarram (born 630 [1232], died 711 [1311]); Lane's copy is in 28 vols. 4to: the *Kamoos* (The Sea) of El Feroozábádee (born 729 [1328], died 816 [1413]): the *Taj el Aroos*, by Murtada Ez Zebadee (born A.D. 1732, died 1791)—the copy made for Lane is in 24 vols. thick 4to. The *Sihah* was printed Hardervici Getorum, 1774, 4to; Bulak, 1865, fol. 2 vols.: *Kamoos*, Calcutta, 1817, fol. 2 vols.; Bombay, 1855, fol. 920 pages: *Sirr el Lagal*, by Farish esh Shidiac, Tunis, fol. 609 pages: *Muheet al Muheet*, by Beitrus Al Bustânee, Beyrout, 1867–70, 2 vols. 4to, 2358 pages (abridged as *Katr Al Muheet*, *ib.* 1867–69, 2 vols. 8vo, 2352 pages), is excellent for spoken Arabic. PERSIAN.—The *Soorah*, by Jumal, Calcutta, 1812–15, 2 vols. 4to: *Samachsharii Lexicon*, ed. Wetzstein, Leipz. 1845, 4to; 1850: *Muntakhal al Loghat*, Calcutta, 1808; *ib.* 1836; Lucknow, 1845; Bombay, 1862, 8vo, 2 vols.: *Muntaha l'Arabi*, 4 vols. fol. 1840: *Shams al Loghat*, Bombay, 1860, fol. 2 vols. 509 pages. TURKISH.—*Achteri Kabir*, Constantinople, 1827, fol.: *El Kamoos*, *ib.* 1816, fol. 3 vols.; translated by Açan Effendi, Boulac, 1835, fol. 3 vols.: *El Sihah*, translated by Al Vani, Constantinople, 1728, fol. 2 vols.; 1755–56; Scutari, 1802, fol. 2 vols. LATIN.—Raphelengius, Leiden, 1613, fol.: Giggeius, Mediolani, 1632, fol. 4 vols.: Golius, Lugd. Bat. 1653, fol. (the best except Lane's): Jahn, Vindobonæ, 1802, 8vo: Freytag, Halle, 1830–38, 4 vols. 4to; abridged, *ib.* 1837, 4to. ENGLISH.—Catafago (Arab.-Eng. and Eng.-Arab.), London, 1858, 8vo, 2 vols.; 2d ed. 1873, 8vo: Lane, London, 1863-74, fol. book i. parts i.-v. 2218 pages. The Arabic title is *Medd el Kamoos*, meaning either The Flow of the Sea, or The Extension of the Kamoos. It was undertaken in 1842, at the suggestion and at the cost of the late duke of Northumberland, then Lord Prudhoe, by Mr Lane, who returned to Egypt for the purpose, and lived in Cairo for seven years to study, and obtain copies of, the great MS. lexicons in the libraries of the mosques, few of which had ever been seen by a European, and which were so quickly disappearing through decay, carelessness, and theft, that the means of composing such a work would not long have existed. His work is divided into two books, the first, to be completed in 8 parts, containing words and meanings commonly known to learned Arabs; the second, those that are of rare occurrence, and not commonly known. It does not contain proper names or modern words. The publication, interrupted by his death, will be carried on by his nephew, Mr Stanley Lane Poole. The preface to Part vi., now in the press, will state fully how far Mr Lane had advanced in this work, and what materials he has left for continuing it. Dr Badger is preparing an English-Arabic dictionary of at least 1000 pages 4to, which will be very useful when finished. Newman (modern), *ib.* 1872, 8vo, 2 vols. 856 pages. FRENCH.—Ruphy (Fr.-Ar.), Paris, 1802, 4to: Bochtor (do.), Paris, 1828, 4to, 2 vols.; 2d ed. *ib.* 1850: Roland de Bussy (Algiers, Fr.-Ar.) Alger, 1835, 16mo: Id., 1836, 8vo; 1839: Berggren (Fr.-vulg. Ar., Syria and Egypt), Upsala, 1844, 4to: Farhat (Germanos), revu par Rochaid ed Dahdah, Marseille, 1849, 4to: Biberstein Kasimirski, Paris, 1846, 8vo, 2 vols.; 1853–56; 1860, 2 vols. 3032 pages: Marcel (vulgar dialects of Africa), Paris, 1830; 1835, 8vo; 1837; enlarged, 1869, 8vo: Paulmier (Algeria), 2d ed. Paris, 1860, 8vo, 931 pages; 1872: Bernard (Egypt), Lyon, 1864, 18mo: Cuche, Beyrouth, 1862, 8vo; 1867: Nar Bey (A. Calfa), 2d ed. Paris, 1872, 12mo, 1042 pages: Cherbonneau (written language), Paris, 1876, 2 vols. 8vo: Id. (Fr.-Ar.), Paris, 1872, 8vo: Beaussier (Algiers, Tunis, legal, epistolary), Alger, 1871, 4to, 764 pages; 1873. GERMAN.—Seyfarth (Algeria), Grimma, 1849, 16mo: Wolff (Mod. Ar.), Leipzig, 1867, 8vo: Wahrmund (do.), Giessen, 1870–75, 8vo, 4 vols. ITALIAN.—Germano, Roma, 1636, 8vo; (Ar. Lat. It.), Romæ, 1639, fol.: *Dizionario*, Boulak, 1824, 4to: Schiaparelli, Firenze, 1871, 4to, 641 pages. SPANISH.—Alcala, Grenada, 1505, 4to: Cañes, Madrid, 1787, fol. 3 vols. SUFI TECHNICAL TERMS.—Abd Errahin, ed. Sprenger, Calcutta, 1845, 8vo. TECHNICAL TERMS OF THE MUSSULMAN SCIENCES.—Abd al Hagg and Gholam Kadir, Calcutta, 1853–62, 4to, 1593 pages. MEDICAL TERMS.—Pharaon and Bertherand, Paris, 1860, 12mo. MATERIA MEDICA.—Muhammed Abd Allah Shirazi, *Ulfaz Udwiyeh*, translated by Gladwin (Eng. Pers. Hindi), Calcutta, 1793, 4to, 1441 words. NOMS DES VÊTEMENTS.—Dozy, Amst. 1845, 8vo. WÖRTER IN ENTGEGENGESETZTEN BEDEUTUNGEN.—Redslob, Göttingen, 1873, 8vo. KORAN.—Willmet (also in Haririum et vitam Timuri), Lugd. Bat. 1784, 4to; Amst. 1790: Fluegel, *Concordantia*, Leips. 1842, 4to: Penrice, *Dictionary and Glossary*, London, 1873, 4to. EL TABRISI'S LOGIC.—Mir Abufeth (French), Boulac, 1842, 8vo. MALTESE.—Vassali, Romæ, 1796, 4to: Falzon (Malt. Ital. Eng.), Malta, *s.a.* 8vo: Vella, Livorno, 1843, 8vo.

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i. to vii., 1680 pages). BENGALI.—*Sabdasindhu*, Calcutta
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DICTYS CRETENSIS, one of the early historians from whom the later Roman grammarians imagined that Homer derived materials for the *Iliad* and *Odyssey*. According to an introduction prefixed by an unknown writer to the Latin translation entitled *Dictys Cretensis de Bello Trojano*, the author followed Idomeneus, king of Crete, in the Trojan war; and the MS. of his work, written in Phœnician characters, was found in his tomb at Gnossus at the time of the occurrence of an earthquake in the thirteenth year of Nero's reign, and translated into Greek by order of that prince. A Latin version of the first five books has alone come down to us; but this is generally regarded as a forgery. There is little doubt, however, that there was a Greek original which was probably composed about the time of Nero. The main interest of the work consists in the fact that, along with that of DARES (*q.v.*), it was the source from which the Homeric legends were introduced into the romantic literature of the Middle Ages. The *editio princeps* dates as far back as 1470. The work is now usually printed along with that of Dares. The best editions are those of Perizonius and Dederich (Bonn, 1837).

DIDEROT, DENIS (1713–1784), one of the most active and original of the famous group of men of letters in France in the middle of the 18th century. He was born at Langres in 1713; he was educated by the Jesuits, like most of those who afterwards became the bitterest enemies of Catholicism; and, when his education was at an end, he vexed his brave and worthy father's heart by turning away from respectable callings, like law or medicine, and throwing himself into the vagabond life of a bookseller's hack in Paris. An imprudent marriage (1743) did not better his position. His wife was a devout Catholic, but her piety did not restrain a narrow and fretful temper, and Diderot's domestic life was irregular and unhappy. He sought consolation for chagrins at home in attachments abroad, first with a Madame Puisieux, a fifth-rate female scribbler, and then with Mdlle. Voland, to whom he was constant for the rest of her life. His letters to her are among the most graphic of all the pictures that we have of the daily life of the philosophic circle in Paris. An interesting contrast may be made between the Bohemianism of the famous literary set who supped at the Turk's Head with the Tory Johnson and the Conservative Burke for their oracles, and the Bohemianism of the set who about the same time dined once a week at the Baron D'Holbach's, to listen to the wild sallies and the inspiring declamations of Diderot. For Diderot was not a great writer; he stands out as a fertile, suggestive, and daring thinker, and a prodigious and most eloquent talker.

Diderot's earliest writings were of as little importance as Goldsmith' *Enquiry into the State of Polite Learning* or Burke's *Abridgement of English History*. He earned 100 crowns by translating Stanyan's *History of Greece;* with two colleagues he produced a translation of James's *Dictionary of Medicine;* and about the same date (1745) he published a free rendering of Shaftesbury's *Inquiry Concerning Virtue and Merit*, with some original notes of his own. With strange and characteristic versatility, he turned from ethical speculation to the composition of a volume of stories, which are gross without liveliness, and impure without wit. In later years he repented of this shameless work, just as Boccaccio is said in the day of his gray hairs to have thought of the sprightliness of the *Decameron* with strong remorse. From tales Diderot went back to the more congenial region of philosophy. Between the morning of Good Friday and the evening of Easter Monday he wrote the *Philosophic Thoughts* (1746), and he presently added to this a short complementary essay *On the Sufficiency of Natural Religion*. The gist of these performances is to press the ordinary rationalistic objections to a supernatural revelation; but though Diderot did not at this time pass out into the wilderness beyond natural religion, yet there are signs that he accepted that less as a positive doctrine, resting on grounds of its own, than as a convenient point of attack against Christianity. In 1747 he wrote the *Sceptic's Walk*, a rather poor allegory—pointing first to the extravagances of Catholicism; second, to the vanity of the pleasures of that world which is the rival of the church; and third, to the desperate and unfathomable uncertainty of the philosophy which professes to be so high above both church and world.

Diderot's next piece was what first introduced him to the world as an original thinker, his famous *Letter on the Blind* (1749). The immediate object of this short but pithy writing was to show the dependence of men's ideas on their five senses. It considers the case of the intellect deprived of the aid of one of the senses; and in a second piece, published afterwards, Diderot considered the case of a similar deprivation in the deaf and dumb. The *Letter on Deaf-Mutes*, however, is substantially a digressive examination of some points in æsthetics. The philosophic significance of the two essays is in the advance they make towards the principle of Relativity. But what interested the militant philosophers of that day was an episodic application of the principle of relativity to the master-conception of God. What makes the *Letter on the Blind* interesting at the present moment is its presentation, in a distinct though undigested form, of the modern theory of variability, and of survival by superior adaptation. It is worth noticing, too, as an illustration of the comprehensive freedom with which Diderot felt his way round any subject that he approached, that in this theoretic essay he suggests the possibility of teaching the blind to read through the sense of touch. If the *Letter on the Blind* introduced Diderot into the worshipful company of the philosophers, it also introduced him to the penalties of philosophy. His speculation was too hardy for the authorities, and he was thrown into the prison of Vincennes. Here he remained for three months; then he was released, to enter upon the gigantic undertaking of his life.

A certain bookseller had applied to him with a project for the translation into French of Ephraim Chambers's *Cyclopædia*. Diderot accepted the proposal, but in his busy and pregnant intelligence the scheme became transformed. Instead of a mere reproduction of Chambers, he persuaded the bookseller to enter upon a new work, which should collect under one roof all the active writers, all the new ideas, all the new knowledge, that were then moving the cultivated class to its depths, but still were comparatively ineffectual by reason of their dispersion. His enthusiasm infected the publishers; they collected a sufficient capital for a vaster enterprise than they had at first planned; D'Alembert was persuaded to become Diderot's colleague; the requisite permission was procured from the Government; in 1750 an elaborate prospectus announced the project to a delighted public; and in 1751 the first volume was given to the world. The last of the letter-press was issued in 1765, but it was 1772 before the subscribers received the final volumes of the plates. These twenty years were to Diderot years not merely of incessant drudgery, but of harassing persecution, of sufferings from the cabals of enemies, and of injury from the desertion of friends. The ecclesiastical party detested the *Encyclopædia*, in which they saw a rising stronghold for their philosophic enemies. By 1757 they could endure the sight no longer. The subscribers had grown from 2000 to 4000, and this was a right measure of the growth of the work in popular influence and power. To any one who turns over the pages of these redoubtable volumes now, it seems surprising that their doctrines should have stirred such portentous alarm. There is no atheism, no overt attack on any of the cardinal mysteries of the faith, no direct denunciation even of the notorious abuses of the church. Yet we feel that the atmosphere of the book may well have been displeasing to authorities who had not yet learnt to encounter the modern spirit on equal terms. The *Encyclopædia* takes for granted the justice of religious tolerance and speculative freedom. It asserts in distinct tones the democratic doctrine that it is the common people in a nation whose lot ought to be the main concern of the nation's government. From beginning to end it is one unbroken process of exaltation of scientific knowledge on the one hand, and pacific industry on the other. All these things were odious to the old governing classes of France; their spirit was absolutist, ecclesiastical, and military. Perhaps the most alarming thought of all was the current belief that the *Encyclopædia* was the work of an organized band of conspirators against society, and that a pestilent doctrine was now made truly formidable by the confederation of its preachers into an open league. When the seventh volume appeared, it contained an article on "Geneva," written by D'Alembert. The writer contrived a panegyric on the pastors of Geneva, of which every wor was a stinging reproach to the abbés and prelates o Versailles. At the same moment Helvétius's book *L'Esprit*, appeared, and gave a still more profound, and, le us add, a more reasonable shock to the ecclesiastical party Authority could brook no more, and in 1759 th *Encyclopædia* was formally suppressed.

The decree, however, did not arrest the continuance o the work. The connivance of the authorities at the breac of their own official orders was common in those times o distracted government. The work went on, but with it difficulties increased by the necessity of being clandestine. And a worse thing than troublesome interference by the police now befell Diderot. D'Alembert, wearied of shift and indignities, withdrew from the enterprise. Other powerful colleagues, Turgot among them, declined to contribute further to a book which had acquired an evil fame. Diderot was left to bring the task to an end as he best could. For seven years he laboured like a slave at the oar. He wrote several hundred articles, some of them very slight, but many of them most laborious, comprehensive, and ample. He wore out his eyesight in correcting proofs, and he wearied his soul in bringing the manuscript of less competent contributors into decent shape. He spent his days in the workshops, mastering the processes of manufactures, and his nights in reproducing on paper what he had learnt during the day. And he was incessantly harassed all th time by alarms of a descent from the police. At the last moment, when his immense work was just drawing t an end, he encountered one last and crowning mortification he discovered that the bookseller, fearing the displeasure of the Government, had struck out from the proof sheets, after they had left Diderot's hands, all passages that he chose to think too hardy. The monument to which Diderot had given the labour of twenty long and oppressive years was irreparably mutilated and defaced. It is calculated that the average annual salary received by Diderot for his share in the *Encyclopædia* was about £120 sterling. "And then to think," said Voltaire, "that an army contractor makes £800 in a day!"

Although the *Encyclopædia* was Diderot's monumental work, he is the author of a shower of dispersed pieces that sowed nearly every field of intellectual interest with new and fruitful ideas. We find no masterpiece, but only thoughts for masterpieces;—no creation, but a criticism with the quality to inspire and direct creation. He wrote plays—*le Fils Naturel* and *le Père de Famille*—and they are very insipid performances in the sentimental vein. But he accompanied them by essays on dramatic poetry, including especially the *Paradoxe sur le Comédien*, in which he announced the principles of a new drama,—the serious, domestic, bourgeois drama of real life, in opposition to the stilted conventions of the classic French stage. It was Diderot's lessons and example that gave a decisive bias to the dramatic taste of Lessing, whose plays, and his *Hamburgische Dramaturgie* (1768), mark so important an epoch in the history of the modern theatre. In the pictorial art, Diderot's criticisms are no less rich, fertile, and wide in their ideas. His article on "Beauty" in the *Encyclopædia* shows that he had mastered and passed beyond the metaphysical theories on the subject, and the *Essay on Painting* was justly described by Goethe, who thought it worth translating, as "a magnificent work, which speaks even more helpfully to the poet than to the painter, though to the painter too it is as a blazing torch." Diderot's most intimate friend was Grimm, one of the conspicuous figures of the philosophic body. Grimm wrote news-letters to various high personages in Germany reporting what was going on in the world of art and literature in Paris, then without a rival as the capital of the intellectual activity of Europe. Diderot helped his friend at one time and another between 1759 and 1779, by writing for him an account of the annual exhibitions of paintings. These *Salons* are among the most readable of all pieces of art criticism. They have a freshness, a reality, a life, which took their readers into a different world from the dry and conceited pedantries of the ordinary virtuoso. As has been said by Ste-Beuve, they initiated the French into a new sentiment, and introduced people to the mystery and purport of colour by ideas. "Before Diderot," Madame Necker said, "I had never seen anything in pictures except dull and lifeless colours; it was his imagination that gave them relief and life, and it is almost a new sense for which I am indebted to his genius."

Greuze was Diderot's favourite among contemporary artists, and it is easy to see why. Greuze's most characteristic pictures were the rendering in colour of the same sentiment of domestic virtue and the pathos of common life, which Diderot attempted with inferior success to represent upon the stage. For Diderot was above all things interested in the life of men,—not the abstract life of the race, but the incidents of individual character, the fortunes of a particular family, the relations of real and concrete motives in this or that special case. He delighted with the enthusiasm of a born casuist in curious puzzles of right and wrong, and in devising a conflict between the generalities of ethics and the conditions of an ingeniously contrived practical dilemma. Mostly his interest expressed itself in didactic and sympathetic form; in two, however, of the most remarkable of all his pieces, it is not sympathetic but ironical. *Jacques le Fataliste* (written in 1773, but not published until 1796) is in manner an imitation of *Tristram Shandy* and *The Sentimental Journey*. Few modern readers will find in it any true diversion. In spite of some excellent criticisms dispersed here and there, and in spite of one or two stories that are not without a certain effective realism, it must as a whole be pronounced savourless, forced, and as leaving unmoved those springs of laughter and of tears which are the common fountain of humour. *Rameau's Nephew* is a far superior performance. If there were any inevitable compulsion to name a masterpiece for Diderot, one must select this singular "farce-tragedy." Its intention has been matter of dispute; whether it was designed to be merely a satire on contemporary manners, or a reduction of the theory of self-interest to an absurdity, or the application of an ironical clencher to the ethics of ordinary convention, or a mere setting for a discussion about music, or a vigorous dramatic sketch of a parasite and a human original. There is no dispute as to its curious literary flavour, its mixed qualities of pungency, bitterness, pity, and, in places, unflinching shamelessness. Goethe's translation (1805) was the first introduction of *Rameau's Nephew* to the European public. After executing it, he gave back the original French manuscript to Schiller, from whom he had it. No authentic French copy of it appeared until the writer had been nearly forty years in his grave (1823).

It would take several pages of this encyclopædia merely to contain the list of Diderot's miscellaneous pieces, from an infinitely graceful trifle like the *Regrets on My Old Dressing Gown* up to *D'Alembert's Dream*, where he plunges into the depths of the controversy as to the ultimate constitution of matter and the meaning of life. It is a mistake to set down Diderot for a coherent and systematic materialist. We ought to look upon him "as a philosopher in whom all the contradictions of the time struggle with one another" (Rosenkranz). That is to say, he is critical and not dogmatic. There is no unity in Diderot, as there was in Voltaire or in Rousseau. Just as in cases of conduct he loves to make new ethical assumptions and argue them out as a professional sophist might have done, so in the speculative problems as to the organization of matter, the origin of life, the compatibility between physiological machinery and free will, he takes a certain stand-point, and follows it out more or less digressively to its consequences. He seizes an hypothesis and works it to its end, and this made him the inspirer in others of materialist doctrines which they held more definitely than he did. Just as Diderot could not attain to the concentration, the positiveness, the finality of aim needed for a master-piece of literature, so he could not attain to those qualities in the way of dogma and system. Yet he drew at last to the conclusions of materialism, and contributed many of its most declamatory pages to the *Système de la Nature* of his friend D'Holbach,—the very Bible of atheism, as some one styled it. All that he saw, if we reduce his opinions to formulas, was motion in space: "attraction and repulsion, the only truth." If matter produces life by spontaneous generation, and if man has no alternative but to obey the compulsion of nature, what remains for God to do?

In proportion as these conclusions deepened in him, the more did Diderot turn for the hope of the race to virtue; in other words, to such a regulation of conduct and motive as shall make us tender, pitiful, simple, contented. Hence his one great literary passion, his enthusiasm for Richardson, our English novelist. Hence, also, his deepening aversion for the political system of France, which made the realization of a natural and contented domestic life so hard. Diderot had almost as much to say against society as even Rousseau himself. The difference between them was that Rousseau was a fervent theist. The atheism of the Holbachians, as he called Diderot's group, was intolerable to him; and this feeling, aided by certain private perversities of humour, led to a breach of what had once been an intimate friendship between Rousseau and Diderot (1757). Diderot was still alive when the *Confessions* appeared, and he was so exasperated by Rousseau's stories about Grimm, then and always Diderot's intimate, that in 1782 he transformed a life of Seneca, that he had written four years earlier, into an *Essay on the Reigns of Claudius and Nero*, which is much less an account of Seneca than a vindication of Diderot and Grimm, and is one of the most rambling and inept productions in literature. As for the merits of the old quarrel between Rousseau and Diderot, we may agree with the latter, that too many sensible people would be in the wrong if Jean Jacques was in the right.

Varied and incessant as was Diderot's mental activity, it was not of a kind to bring him riches. He secured none of the posts that were occasionally given to needy men of letters; he could not even obtain that bare official recognition of merit which was implied by being chosen a member of the Academy. The time came for him to provide a dower for his daughter, and he saw no other alternative than to sell his library. When the empress Catherine of Russia heard of his straits, she commissioned an agent in Paris to buy the library at a price equal to about £1000 of our money, and then she handsomely requested the philosopher to retain the books in Paris until she required them, and to constitute himself her librarian, with a yearly salary. In 1773 Diderot started on an expedition to thank his imperial benefactress in person, and he passed some months at St Petersburg. The empress received him cordially. The strange pair passed their afternoons in disputes on a thousand points of high philosophy, and they debated with a vivacity and freedom not usual in courts. "*Fi, donc,*" said Catherine one day, when Diderot hinted that he argued with her at a disadvantage, "*is there any difference among men?*" Diderot returned home in 1774. Ten years remained to him, and he spent them in the industrious acquisition of new knowledge, in the composition of a host of fragmentary pieces, some of them mentioned above, and in luminous declamations with his friends. All accounts agree that Diderot was seen at his best in conversation. "He who only knows Diderot in his writings," says Marmontel, "does not know him at all. When he grew animated in talk, and allowed his thoughts to flow in all their abundance, then he became truly ravishing. In his writings he had not the art of ensemble; the first operation which orders and places everything was too slow and too painful to him." Diderot himself was conscious of the want of literary merit in his pieces. In truth he set no high value on what he had done. It is doubtful whether he was ever alive to the waste that circumstance and temperament together made of an intelligence from which, if it had been free to work systematically, the world of thought had so much to hope. He was one of those simple, disinterested, and intellectually sterling workers to whom their own personality is as nothing in presence of the vast subjects that engage the thoughts of their lives. He wrote what he found to write, and left the piece, as Carlyle has said, "on the waste of accident, with an ostrich-like indifference." When he heard one day that a collected edition of his works was in the press at Amsterdam, he greeted the news with "peals of laughter," so well did he know the haste and the little heed with which those works had been dashed off.

Diderot died in the month of July 1784, six years after Voltaire and Rousseau, one year after his old colleague D'Alembert, and five years before D'Holbach, his host and intimate for a lifetime. Notwithstanding Diderot's peals of laughter at the thought, there is now just completed—nearly a hundred years since his death—an elaborate and exhaustive collection of his writings in twenty stout volumes, edited by MM. Assézat and Tourneux. (J. MO.)

DIDO, or ELISA, the reputed founder of Carthage, was the daughter of Mutgo, Belus, or Agenor, king of Tyre. She may have been an historical character, but the stories told of her by Justin and Virgil differ essentially. She was worshipped at Carthage, and as a deity may be identified with *Juno Cœlestis*, the Roman form of the Phœnician Astarte.

DIDOT, the name of a family of learned French printers and publishers.

FRANÇOIS DIDOT (1689–1757), founder of the family, was born at Paris. He began business as a bookseller and printer in 1713, and among his undertakings was a collection of the travels of his friend the Abbé Prévost, in 20 volumes (1747). It was remarkable for its typographical perfection, and was adorned with many engravings and maps.

FRANÇOIS AMBROISE DIDOT (1730–1804), son of François, made important improvements in type-founding, and was the first to attempt printing on vellum paper. Among the works which he published was the famous collection of French classics prepared by order of Louis XVI. for the education of the Dauphin, and the folio edition of *L'Art de vérifier les dates.*

PIERRE FRANÇOIS DIDOT (1732–1795), brother of the preceding, devoted much attention to the art of type-founding, and to paper-making. Among the works which issued from his press was an edition in folio of the *Imitatio Christi* (1788).

[illegible] DIDOT (1765–1852), son of Pierre François, is celebrated for his "microscopic" editions of various [illegible] works, for which he engraved the type when [illegible] seventy years of age. He was also the engraver of [illegible] issued by the Constituent and Legislative [illegible] the Convention.

[illegible] LÉGER, second son of Pierre François, was [illegible] of the paper-making machine known in [illegible] the Didot machine.

PIERRE DIDOT (1760–1853), eldest son of François Ambroise, is celebrated as the publisher of the beautiful "Louvre" editions of Virgil, Horace, and Racine. The Racine, in 3 volumes folio, was pronounced in 1801 to be "the most perfect typographical production of all ages."

FIRMIN DIDOT (1764–1836), second son of François Ambroise, sustained the reputation of the family both as printer and type-founder. He invented or revived the process of stereotyping, coined its name, and first made use of the process in his edition of Callet's *Tables of Logarithms* (1795), in which he secured an accuracy till then unattainable. He published stereotyped editions of French, English, and Italian classics at a very low price. He was the author of two tragedies—*La Reine de Portugal* and *La Mort d'Annibal;* and he wrote metrical translations from Virgil, Tyrtæus, and Theocritus.

AMBROISE FIRMIN DIDOT (1790–1876), was the eldest son of the preceding. After receiving a classical education, he spent three years in Greece and in the East; and on the retirement of his father in 1827 he undertook, in conjunction with his brother Hyacinthe, the direction of the publishing business. Their greatest undertaking was a new edition of the *Thesaurus Græcæ Linguæ* of Henry Stephens, under the editorial care of the brothers Dindorf and M. Hase (9 vols. 1855–59). Among the numerous important works published by the brothers, the 200 volumes forming the *Bibliothèque des auteurs grecs*, *Bibliothèque latine*, and *Bibliothèque française* deserve special mention. Ambroise Firmin Didot was the first to propose (1823) a subscription in favour of the Greeks, then in insurrection against Turkish tyranny. Besides a translation of Thucydides (1833), he wrote the articles "Estienne" in the *Nouvelle Biographie Générale*, and "Typographie" in the *Ency. Mod.*, as well as *Observations sur l'orthographie française* (1867), &c. In 1875 he published a very learned and elaborate monograph on Aldus Manutius. His collection of MSS., the richest in France, was said to be worth, at the time of his death, not less than 2,000,000 francs.

DIDRON, ADOLPHE NAPOLÉON (1806–1867), French archæologist, was born at Hautvillers, in the department of Marne, March 13, 1806. At first a student of law, he began in 1830, by the advice of Victor Hugo, to apply himself to the study of the Christian archæology of the Middle Ages. After visiting and examining the principal churches, first of Normandy, then of Central and Southern France, he was on his return appointed by M. Guizot secretary to the Historical Committee of Arts and Monuments (1835); and in the following years he delivered several courses of lectures on Christian iconography at the Bibliothèque Royale. In 1839 he visited Greece for the purpose of examining the art of the Eastern Church, both in its buildings and its manuscripts. In 1844 he originated the *Annales Archéologiques*, a periodical devoted to his favourite subject, which he edited until his death. In 1845 he established at Paris a special archæological library, and at the same time a manufactory of painted glass. In the same year he was admitted to the Legion of Honour. His most important work is the *Iconographie Chrétienne*, of which, however, the first portion only, *Histoire de Dieu* (1843), was published. It was translated into English by E. J. Millington. Among his other works may be mentioned the *Manuel d'Iconographie Chrétienne grecque et latine* (1845), the *Iconographie des chapiteaux du palais Ducal de Venise* (1857), and the *Manuel des objets de bronze et d'orfèvrerie* (1859). He died November 13, 1867.

DIDYMUS of Alexandria, an ecclesiastical writer, born in 309 or 314. Although he became blind at the age of four, before he had learned to read, he succeeded in mastering the whole circle of the sciences then known; and on entering the service of the church he was placed at the head of the Alexandrian theological school. He died in 394 or 399. Most of his theological works are lost. We possess, however, a Latin translation by Jerome, who was one of his pupils, of his Treatise on the Holy Ghost (*Liber de Spiritu Sancto*), and a similar translation by Epiphanius of his Brief Comments on the Canonical Epistles (*Breves Enarrationes in Epistolas Canonicas*). A Treatise against the Manichæans (*Liber adversus Manichæos*) is extant in the original Greek, and was first published at Bologna in 1769.

DIE (*Dea Vocontiorum*), the capital of an arrondissement in the department of Drôme, in France, is situated on the right bank of the Drôme, at the foot of Mont Glandaz, in a wide and fertile plain. The manufactures are woollen cloth, paper, leather, and silk; there is some trade in mules, cattle, and wood; and the neighbourhood produces excellent fruit, and the white wine called "Clairette de Die." The town was formerly the seat of a bishop, and, previous to the revocation of the Edict of Nantes in 1685, of a Calvinistic university. The most interesting structures of Die are the old cathedral, with granite columns from an ancient temple of Cybele, and a porch of the 11th century; the episcopal palace, the walls, flanked by towers, and the ruins of a castle—all of considerable age; the triumphal arch on the road towards Gap, known as the Porte St Marcel, portions of an aqueduct, and other Roman remains. In the vicinity are several mineral springs. The population in 1872 was 3876.

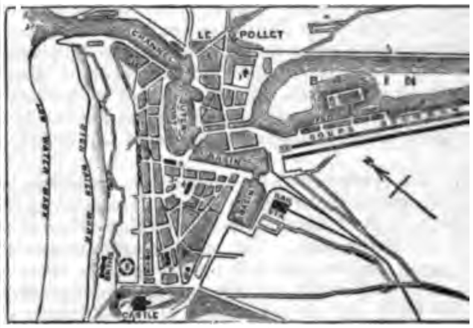
DIE SINKING. The preparation of dies for stamping coins and medals is a work requiring considerable skill and care. The steel selected should be of moderately fine grain and uniform texture, and, when polished, should show no spots or patches under a magnifying glass. Two short lengths having been cut from bars of this, and forged into rough dies, are next made as soft as possible by careful annealing,—being put in an iron pot of animal charcoal, heated to a cherry red, and allowed to cool gradually. After being faced up flatly and smoothly in a lathe, they pass into the hands of the engraver, who traces upon them their appropriate images, obverse and reverse, and works these out, with steel tools, in intaglio. (The inscription is generally stamped with punches and hammer.) The new *matrices*, or maternal dies, when, after repeated impressions on clay, &c., and alteration, they are found correct, are ready for hardening—a process simple enough as regards plain steel, but here very critical, seeing that a delicate engraving has to be kept intact. Each matrix is first protected with a mask, composed of fixed oil thickened with animal charcoal, or of lampblack and linseed oil. They are then placed face downwards in a crucible, and buried in animal charcoal. After being heated to a cherry red, they are taken out with a pair of tongs, plunged in a large body of water, moved about rapidly till all noise ceases, and left in the water till quite cool. If the matrix pipes or sings, there is probably a crack in it. The hardened die is next polished and tempered,—the former by holding it against a running iron disc coated with flour-emery and oil; the latter by putting it in water, which is gradually raised to the boiling point, then allowing it to cool slowly, or by placing it on a heated bar of iron till it acquires a rich straw colour. To increase its strength an iron ring may be shrunk upon it like a mechanical jacket. The matrix, treated as here described, might now be used to multiply coins or medals, but it is preferred to use it for first producing *punches*, or steel impressions in relief. With this view a steel block is procured, softened by annealing, and turned in the lathe, being made flat at the bottom and obtusely conical at the top. The block is put in the bed of a die-stamping press, and the matrix brought down on it with force by means of the central screw. Thus a copy is produced in relief on the conical surface. Further strokes may be required to perfect it, and the punch is therefore first re-annealed (its surface having been hardened by compression), then replaced in the press: the matrix, detached from the screw, is fitted on to it, and pressed in contact by the descent of a block of steel attached to the screw. Thus, after repeated blows and frequent annealing, the impression is completed, and after being retouched by the engraver is hardened and tempered like the matrix. The matrix is now laid aside, and the punch used to produce any number of steel dies by an operation substantially similar to that by which the punch itself was obtained. These are, of course, *fac-similes* of the matrix, and when completed are used for purposes of coinage. Besides coining and medalling, dies are required for a variety of purposes, such as the manufacture of buttons, steel seals, screws, and ornamental articles of metal, calico printing, &c.

DIEBITSCH-SABALKANSKI, Hans Karl Friedrich Anton (1785–1831), Count von Diebitsch and Narden, Russian field-marshal, was born in Silesia, May 13, 1785. He entered the Prussian army at the age of twelve; but four years later, by the desire of his father, a Prussian officer who had passed into the service of Russia, he also did the same. He served in the campaign of 1805, and was wounded at Austerlitz, fought at Eylau and Friedland, and after Friedland was promoted captain. During the next five years of peace he devoted himself to the study of military science, engaging once more in active service in the campaign of 1812. He distinguished himself by the recapture of Polozk; and by his defence of an important post he saved Wittgenstein's corps in retreat. He was now raised to the rank of major-general. In conjunction with General Yorck he took possession of Berlin. After the battle of Lützen he was sent into Silesia and took part in negotiating the secret treaty of Reichenbach. Having distinguished himself at the battles of Dresden and Leipsic, he was promoted lieutenant-general. In 1814 Diebitsch strongly urged the march of the allies on Paris; and after their entry the emperor Alexander conferred on him the order of St Alexander Newski. In 1815 he married, attended the Congress of Vienna, and was afterwards made adjutant-general to the emperor. As chief of the imperial staff he accompanied the emperor to Taganrog, and was present at his death. He obtained the confidence of the emperor Nicholas, and was created baron and afterwards count. In the Turkish war of 1828–1829 Diebitsch had the chief command; he took Varna, crossed the Balkan, and concluded peace at Adrianople. His passage of the Balkan is commemorated by his surname Sabalkanski; it procured him the rank of field-marshal. On the outbreak of the insurrection in Poland, in 1830, he was appointed to the chief command. His good genius, however, now failed him. After the battle of Ostrolenka he transferred his head quarters to Kleckzewo, near Pultusk, where he died of cholera, June 10, 1831.

DIEPENBECK, Abraham van (1599–1675), was born at Herzogenbusch, and studied painting at Antwerp, where he became one of Rubens's "hundred pupils." Rubens complains in his letters that, being overwhelmed with applications for apprentices' indentures, he refused to accept as disciples even the children of some of his best friends. Diepenbeck was one of those who was fortunate enough to obtain admission to Rubens's workshop. But he was not one of the cleverest of Rubens's followers, and he succeeded, at the best, in imitating the style and aping the peculiarities of his master. We see this in his earliest pictures—a portrait dated 1629 in the Munich Pinakothek, and a Distribution of Alms of the same period in the same collection. Yet even at this time there were moments when Diepenbeck probably fancied that he might take another path. A solitary copperplate executed with his own hand in 1630 represents a peasant sitting under a tree holding the bridle of an ass, and this is a minute and finished specimen of the engraver's art which shows that the master might at one time have hoped to rival the animal draughtsmen who flourished in the schools of Holland. However, large commissions now poured in upon him; he was asked for altar-pieces, subject-pieces, and pagan allegories. He was tempted to try the profession of a glass-painter, and at last he gave up every other occupation for the lucrative business of a draughtsman and designer for engravings. Most of Diepenbeck's important canvases are in Continental galleries. The best are the Marriage of St Catherine at Berlin, and Mary with Angels Wailing over the Dead Body of Christ in the Belvedere at Vienna, the first a very fair specimen of the artist's skill, the second a picture of more energy and feeling than might be expected from one who knew more of the outer form than of the spirit of Rubens. Then we have a fine Entombment at Brunswick, and St Francis Adoring the Sacrament at the museum of Brussels, Clelia and her Nymphs Flying from the Presence and Pursuit of Porsenna in two examples at Berlin and Paris, and Neptune and Amphitrite at Dresden. In all these compositions the drawing and execution are after the fashion of Rubens, though inferior to Rubens in harmony of tone and force of contrasted light and shade. Occasionally a tendency may be observed to imitate the style of Vandyck, for whom, in respect of pictures, Diepenbeck in his lifetime was frequently taken. But Diepenbeck spent much less of his leisure on canvases than on glass-painting. Though he failed to master the secrets of gorgeous tinting, which were lost, apparently for ever in the 16th century, he was constantly employed during the best years of his life in that branch of his profession. In 1635 he finished forty scenes from the life of St Francis of Paula in the church of the Minimes at Antwerp. In 1644 he received payment for four windows in St Jacques of Antwerp, two of which are still preserved, and represent the Virgins to whom Christ appears after the Resurrection. The windows ascribed to him at St Gudule of Brussels are now proved to have been executed from the cartoons of Theodore van Thulden. On the occasion of his matriculation at Antwerp in 1638–9, Diepenbeck was registered in the guild of St Luke as a glass-painter. He resigned his membership in the Artist Club of the Violette in 1542, apparently because he felt hurt by a valuation then made of drawings furnished for copper-plates to the engraver Pieter de Jode. The earliest record of his residence at Antwerp is that of his election to the brotherhood (Sodalitat) "of the Bachelors" in 1634. It is probable that before this time he had visited Rome and London, as noted in the work of Houbraken. In 1636 he was made a burgess of Antwerp. He married twice, in 1637 and 1652. His death took place in December 1675, and his funeral was celebrated at St Jacques of Antwerp on the 31st day of that month.

Consult, besides earlier authorities, the Antwerp *Liggeren*.

DIEPPE, a seaport town of France, at the head of an arrondissement in the department of Seine-Inférieure, 38 miles north of Rouen and 125 north-west of Paris by rail, in 49° 55′ 35″ N. lat. and 1° 5′ 9″ E. long. It lies at the mouth of the River Arques, in a hollow of the coast,—the main part of the town being on the west side of the river, and the suburb of Pollet on the east. Its principal street stretches for about a mile along the shore, and terminates in the west at the foot of the chalk cliff, which is surmounted by a castle of the 15th century, now employed as barracks. The whole town has a modern aspect; its streets ar and regular, and its houses mostly built of brick. l building is the c arch of St Jacques, whic



Plan of Dieppe.

1. Church of Pollet.
2. Bourse.
3. Statue of Duquesne.
4. Church of St Jacques.
5. Hôtel de Ville.
6. Theatre.
7. Church of St Remi.
8. Bazaar.
9. Protestant Church.

founded in the 13th century, but consists in good m of considerably later workmanship, and has in some po been restored in the present century; the main en (of the 14th century) and the Ango chapel are wor special remark. It is sufficient to mention the chu St Remi (1522–1640), the town-house, the hospita theatre, and the communal college which preserves fragments of Ango's mansion. As the chief town arrondissement, and an important seaport, Dieppe i seat of a large number of public offices. Its harbour, has been greatly improved during the present century, i tected by two piers, admits vessels of 500 tons burden has a large floating dock. There is regular steamboat munication with England, the passage to Newhaven accomplished in about six hours. The general trade town, both export and import, is extensive; and it c on ship-building, rope-spinning, cooperage, watchm and a remarkable manufacture of articles in ivory and which dates from the 15th century. The tobacco fac alone employ upwards of 1000 work people. Oyst large numbers are fattened in the *retenue des chasses* the fishermen of Pollet are among the main provid the Parisian markets. Ever since the time of the duch Berry (whose favourite residence, the *maison Queneu* still pointed out) the town has been a fashionable wat place; and in 1857 a large bathing establishmen erected after the model of the Crystal Palace. The so- Jardin Anglais, the Cours Bourbon, and the cliffs a principal promenades; and the castle of Arques, the M d'Ango, the abbey of St Victor, and the ancient locally known as *la cité des Limes*, are the most inter objects of interest in the neighbourhood. Populati 1851, 16,216; and in 1872, 19,757.

It may be safely asserted, on the authority of its nam Dieppe owed its origin to a band of Norman adventurer found its "diep" or inlet suitable for their ships. Its firs was probably built in 1188 by Henry II. of England, and counted a place of some importance when Philip Augustus at it in 1195. By Richard I. of England it was bestowed, in 1 the archbishop of Rouen in return for certain territory neighbourhood of the episcopal city. In 1339 it was plund the English, but it soon recovered from the blow, and in the opposition of the Lords of Hantot, managed to surrou with fortifications. Its commercial activity was already gre it is believed its seamen visited the coast of Guinea in 13 founded there a Petit Dieppe in 1365. A siege underta 1442 by Talbot in person was raised by the Dauphin, aft Louis XI., and the day of the deliverance continued for cent be celebrated by a great procession and miracle plays. beginning of the 16th century we find Parmentier, a native town, taking vessels to Brazil and Sumatra ; and a little later, its merchant prince, Ango, was able to blockade the Portuguese fleet in the Tagus. Its inhabitants in great numbers embraced the Reformed religion : and they were among the first to acknowledge Henry IV., who fought one of his great battles at the neighbouring village of Arques. Few of the cities of France suffered more from the revocation of the Edict of Nantes in 1685 ; and this blow was followed in 1694 by a terrible bombardment on the part of the English and Dutch. The town was rebuilt after the peace of Ryswick, but the decrease of its population and the deterioration of its port prevented the restoration of its commercial prosperity. Within the present century, however, especially since communication by rail was effected with Paris, it has made rapid advances. During the Franco-German war the town was occupied by the Germans from December 1870 till July 1871.

See Pierre Pillon, *Recueil général des édits, &c., donnez en faveur des habitants de Dieppe*, Dieppe, 1700 ; Vitet, *Histoire de Dieppe*, 1844 ; Cochet, *Les églises de l'arrondissement de Dieppe*, 1846–1850, and *Galerie Dieppoise*, 1862 : Jules Hardy, *Les Dieppois en Guinée en* 1364, 1864 ; Asseline, *Les Antiquités et Chroniques de la ville de Dieppe*, a 17th century account, which comes down only to 1694, and was first published in 1874 by Hardy, Guerillon, and Sauvage.

DIES, **Christoph Albert** (1755–1822), was born at Hanover, and learned the rudiments of art in his native place. For one year he studied in the academy of Düsseldorf, and then he started at the age of twenty with thirty ducats in his pocket for Rome. There he established his domicile, and lived a frugal life till 1796. Copying pictures, chiefly by Salvator Rosa, for a livelihood, his taste led him to draw and paint from nature in Tivoli, Albano, and other picturesque places in the vicinity of Rome. Naples, the birthplace of his favourite master, he visited more than once for the same reasons. In this way he became a bold executant in water colours and in oil, though he failed to acquire any originality of his own. Lord Bristol, who encouraged him as a copyist, predicted that he would be a second Salvator Rosa. But Dies was not of the wood which makes original artists. Besides other disqualifications, he had necessities which forced him to give up the great career of an independent painter. David, then composing his Horatii at Rome, wished to take him to Paris. But Dies had reasons for not accepting the offer. He was courting a young Roman whom he subsequently married. Meanwhile he had made the acquaintance of Volpato, for whom he executed numerous drawings, and this no doubt suggested the plan, which he afterwards carried out, of publishing, in partnership with Méchan, Reinhardt, and Frauenholz, the series of plates known as the *Collection de vues pittoresques de l'Italie*, published in 72 sheets at Nuremberg in 1799. With so many irons in the fire Dies naturally lost the power of concentration. Other causes combined to affect his talent. In 1787 he swallowed by mistake three-quarters of an ounce of sugar of lead. His recovery from this poison was slow and incomplete. His return to Germany was hastened by it. He had hoped that the air of his native country would improve his health. He settled at Vienna, and lived there in the old way on the produce of his brush as a landscape painter, and on that of his pencil or graver as a draughtsman and etcher. But instead of getting better as he had hoped, his condition became worse, and he even lost the use of one of his hands. In this condition he turned from painting to music, and spent his leisure hours in the pleasures of authorship. He did not long survive, dying at Vienna in 1822, after long years of chronic suffering. From two pictures now in the Belvedere gallery, and from numerous engraved drawings from the neighbourhood of Tivoli, we gather that Dies was never destined to rise above a respectable mediocrity. He followed Salvator Rosa's example in imitating the manner of Claude Lorraine. But Salvator adapted the style of Claude, whilst Dies did no more than copy it.

DIEST, a town and fortress of Belgium, in the province of Brabant, and the arrondissement of Lowen, is situated on the Demer, 28 miles E. by N. of Brussels. The manufactured are hats, leather, stockings, beer, and spirits. It was taken from the French by Marlborough in 1705 and recaptured the same year. The fortifications, which replace the old ramparts and walls, were commenced in 1837, and finished in 1853. The population in 1866 was 7561.

DIET (German, *Reichstag*). The origin of the German Diet is to be sought in the national assembly, which was a common institution of the Teutonic race. From the earliest recorded times we find all leading questions first discussed by the chiefs and then referred to the assembly of the clan or tribe, in which every freeman had a voice.

The earliest Diets of the German or Holy Roman Empire were assemblies in which the monarch deliberated with his subjects on the common interests of the empire. Originally all members were bound by their feudal tenure to be present, and if absent they not only forfeited their vote but were liable to fine. Thus the Diet was a feudal, not a representative, Parliament. As by degrees the feudatories of the emperor turned into independent sovereigns, the Diet became nothing more than a congress of princes. The emperor, instead of presiding in person, was represented by a delegate called principal commissarius, and the princes sent envoys, the right of suffrage being no longer personal, but attached to certain territories or districts.

At first the emperor was, in theory at least, elected by universal suffrage ; a candidate was chosen by the chief men, and their nominee approved by the people. Thus we read that at the election of Conrad II. 50,000, and at that of Lothaire II. 60,000 persons were present. In time this custom of nominating the emperor grew into an established right, which, under the name of *prætaxation*, was arrogated by the chief princes of the empire. Thus the chief function of the Diet, the choice of an emperor, became the prerogative of a few of its most powerful members, who claimed the right not only of election but of deposition. Thus in 1298 Adolphus of Nassau was deposed, and Albert of Austria chosen in his stead. The right of the electors and the forms and rules of election were defined and settled by the famous instrument of Charles IV. known as the Golden Bull, 1356.

The Diet consisted of three bodies, who met and voted in separate colleges,—(1) the electoral college, (2) the princes of the empire spiritual and temporal, (3) the free imperial cities.

1. In a law of Otho IV. (1208), we find the right of electing an emperor vested in the electoral college of seven. These consisted of three spiritual princes—the archbishops of Mentz, Treves, and Cologne,—and four secular electors—the duke of Saxony, the count palatine of the Rhine, the king of Bohemia, and the margrave of Brandenburg. The former sat as recognized heads of the German church. The latter would naturally have been the dukes of Saxony, Franconia, Swabia, and Bavaria ; but when Bavaria was united with the county palatine its right was transferred to Bohemia ; that of Swabia was, on the accession of Frederick (who by his election was incapacitated from voting), delegated to Brandenburg, and by it retained ; and probably that of Franconia was for similar reason forfeited (see Dunham, *Germanic Empire*, i. 216).

2. The princes of the empire had in all other respects, save that of electing an emperor, the same rights as the dukes or electors. They consisted of the archbishop of Salzburg, 20 bishops, 4 abbots, and 2 prebendaries, and of 44 temporal princes, though this number was afterwards largely augmented. Of these several, such as the archduke of Austria, and the dukes of Brunswick and Burgundy, were in rank and power more than equals of the electors.

3. The free imperial cities formed a college divided into two benches,—the Swabian, with 37 cities, and the Rhenish, with 14. They first appear at the Diet under Henry VII., but their position was not recognized till the peace of Westphalia. The power exercised by this municipal constituent of the Diet was small and strictly limited. Only what had been agreed upon by the electors and princes could be submitted to the college of cities for their sanction. The lower nobility, the knights of the empire, and the commons were unrepresented.

Each college voted separately; when the three colleges agreed, the decree or *recess* of the Diet, as it was called, was submitted to the emperor for his ratification; but the emperor had no power to modify it, and no resolution which affected the general interests of the empire could be passed without the approbation of the Diet.

Besides extraordinary meetings, the Diet was regularly convened twice a year. At the spring session the general business of the empire was discussed, laws were passed, alliances concluded, rebels proscribed, and grants of fiefs confirmed. The autumn session was occupied with finance and attended only by dukes, counts, and officers of administration. From 1663 the Diet met at Regensburg.

From the end of the Thirty Years' War the power of the Diet steadily declined. The Peace of Westphalia, while confirming the rights of the Diet as against the emperor, at the same time, by recognizing the territorial independence of the German princes, so limited the province of the federative assembly that, to quote the words of Frederick the Great, the Diet became "a mere shadow, a congress of publicists more busied with forms than things, like dogs who bay the moon."

The most important Diets were the following:—

1105. Mentz. Henry IV. deposed on motion of his son.
1142. Frankfort. Conrad surrendered Saxony to Henry the Lion.
1356. Nuremberg. The Golden Bull.
1495. Worms. Private defiance forbidden, and Imperial Chamber established.
1521. Worms. Edict against Luther.
1526. Spires. Choice of religion allowed to the several states.
1529. Spires. Edict of Worms re-enacted.
1530. Augsburg. The confession of Augsburg presented.
1806. Regensburg. Napoleon's envoy announces the dissolution of the empire. Francis II. resigns imperial crown.
1816. Frankfort. First Diet of Germanic confederation.

DIETETICS. The application of science to the regulation of the continuous demands of the body for nutriment aims mainly at three objects—Health, Pleasure, and Economy. They are rarely inconsistent with one another, but yet require separate consideration, as under varying circumstances each may claim the most prominent place in our thoughts.

Influence of Diet upon Health.

The influence of diet upon the health of a man begins at the earliest stage of his life, and indeed is then greater than at any other period. It is varied by the several phases of internal growth and of external relations, and in old age is still important in prolonging existence, and rendering it agreeable and useful.

Infant Dietary.—No food has as yet been found so [illegible] for the young of all animals as their mother's [illegible] from want of seeking. [illegible] (*Tr[illegible] des Enfans*, [illegible]) [illegible] and [illegible] substitute bread [illegible] beer and honey for milk, which latter he calls "brute's food." Baron Liebig has followed the lead with a "Food for infants," in the prescription for which half ounces and quarter grains figure freely, and which has to be prepared on a slow fire, and after a few minutes boiled well. And after all not nearly such a close imitation of human milk is made as by the addition to fresh cow's milk of half its bulk of soft water, in each pint of which has been mixed a heaped up teaspoonful of powdered "sugar of milk" and a pinch of phosphate of lime. Indeed, in default of these cheap chemicals, the milk and water alone, when fresh and pure, are safer than an artificial compound which requires cooking. And experience shows that the best mode of administering food to the young is also the one which is most widely adopted throughout warm-blooded nature, namely, in a fresh, tepid, liquid state, frequently, and in small quantities at a time.

Empirical observation is fully supported in these deductions by physiological and chemical science. Milk contains of—

Water	88 per cent.
Oleaginous matter (cream or butter)	3 "
Nitrogenous matter (cheese and albumen)	4 "
Hydrocarbon (sugar)	4½ "
Saline matter (phosphate of lime, chloride of sodium, iron, &c.)	½ "

These are at once the constituents and the proportions of the constituents of food suited to a weakly rapidly-growing animal. The large quantity of water makes it pass easily through the soft absorbent walls of the digestive canal, and the complete suspension in an alkaline fluid of the finely divided fat and nitrogenous matter introduce more of them than could be effected were they in a solid form. The fat is the germ of new cellular growth, and the nitrogenous matter is by the new cells formed into flesh, which is doubling its bulk monthly. The phosphate of lime is required for the hardening bones, the chloride of sodium and the iron for the daily increasing amount of blood in circulation. Milk may be said to be still alive as it leaves the breast fresh and warm, and quickly becomes living blood in the infant's veins. A very slight chemical change is requisite. Its frequent administration is demanded by the rapid absorption, and the absence of regular meals prevents the overloading of the delicate young stomach with more than it can hold at once.

The wholesomest nutriment for the first six months is milk alone. A vigorous baby can indeed bear with impunity much rough usage, and often appears none the worse for a certain quantity of farinaceous food; but the majority do not get habituated to it, without an exhibition of dislike which indicates rebellion of the bowels.

To give judicious diet its fair chance the frame must be well protected from the cold; and just in proportion as the normal temperature of the body is maintained so does growth prosper, as is satisfactorily proved by experiments on the young of the lower animals.

It is only when the teeth are on their way to the front, as shown by dribbling, that the parotid glands secrete an active saliva capable of digesting bread stuffs. Till then anything but milk must be given tentatively, and considered in the light of a means of education for its future mode of nutrition. Among the varieties of such means, the most generally applicable are broth and beef tea, at first pure, and then thickened with tapioca and arrowroot. Chicken [illegible] made with a little cream and sugar, serves as a change. [illegible] biscuit powder, tops and bottoms, should all have their turn; change is necessary in the imperfect [illegible] which but art supplies, and for change the stomach should be prepared by habit.

The consequences of premature weaning are insidious. The external aspect of the child is that of health, its muscles strong, but the bones do not harden in proportion, and tries to walk its limbs give way, and it is said to be ering from rachitis or "rickets."

hese consequences follow in other animals as surely as he human race; and in them it was possible to make experiment crucial. A gentleman named Guérin set self to find if he could produce rickets at will. He : a number of puppies in equally good condition, and ing let them suckle for a time, he suddenly weaned half hem and fed them on raw meat, a fare which at first ght would seem the most suitable for carnivorous animals. ertheless, after a short time, those which continued to the mother's milk had grown strong and hearty, lst those which had been treated with a more substantial ary pined, and frequently threw up their victuals, then ir limbs bent, and at the end of about four months they wed all the symptoms of confirmed rickets. From these eriments we must conclude that the rachitis depended inly on the derangements of nutrition brought on by proper diet. A diet which is taken at a wrong season y fairly be called improper. For carnivora, it is flesh fore the age of suckling has passed; for herbivora (and experiment bearing on the point has been made on pigs), is vegetable feeding begun when they ought to be at teat.[1]

The time for weaning should be fixed partly by the ild's age, partly by the growth of the teeth. The troubles which children are subject at this crisis are usually stric, such as are induced by summer weather; therefore that season the weaning should be postponed, whereas winter it should be hurried forward. The first group of eth nine times out of ten consists of the lower central ont teeth, which may appear any time during the sixth and venth month. The mother may then begin to diminish e number of suckling times; and by a month she can ve reduced them to twice a day, so as to be ready when e second group makes its way through the upper front ms to cut off the supply altogether. The third group, e lateral incisors and first grinders, usually after the st anniversary of birth give notice that solid food can be ewed. But it is prudent to let dairy milk form a considerable portion of the fare till the eye teeth are cut, hich seldom happens till the eighteenth or twentieth onth. At this period children are liable to diarrhœa, onvulsions, irritation of the brain, rashes, and febrile tarrhs. In such cases it is often advisable to resume a omplete milk diet, and sometimes a child's life has been ved by its reapplication to the breast. These means are ost feasible when the patient is accustomed to milk; deed, if not, the latter expedient is hardly possible.

Diet in Childhood and Youth.—At this stage of life e diet must obviously be the best, which is a transition om that of infancy to that of adult age. Growth not completed, but yet entire surrender of every nsideration to the claim of growth is not possible, nor deed desirable. Moreover that abundance of adipose sue, or reserve new growth, which a baby can bear, is an pediment to the due education of the muscles of the boy girl. The supply of nutriment needs not to be so conmous as before, but at the same time should be more quent than for the adult. Up to at least fourteen or teen years of age the rule should be four meals a day, ried indeed, but nearly equal in nutritive power and in antity, that is to say, all moderate, all sufficient. The turity the body then reaches involves a hardening d enlargement of the bones and cartilages, and a ngthening of the digestive organs, which in healthy ung persons enables us to dispense with some of the watchful care bestowed upon their diet. Three full meals a day are generally sufficient, and the requirements of mental training may be allowed to a certain extent to modify the attention to nutrition which has hitherto been paramount. But it must not be forgotten that the changes in figure and in internal organs are not completed till several years have passed, and that they involve increased growth and demand full supplies. As less bulky food is used, care should be taken that it is sufficiently nutritious, and habits should be acquired which conduce to making the most of it for the maintenance of strength.

The nutritiousness of food depends on *digestibility* and *concentration.* Food is digestible when it yields readily its constituents to the fluids destined for their reduction to absorbable chyme. It is more or less concentrated, according as a given weight contains more or less matter capable of supporting life. The degree in which they possess these qualifications united constitutes the absolute nutritive value of alimentary matters.

The degree of cohesion in the viands influences digestibility. Tough articles incapable of being completely ground up by the teeth, remain unused, while fluids and semifluids lead the van of digestibles. The tissues of young vegetables and young animals are for this reason more digestible than old specimens. It is desirable also that the *post mortem* rigidity, which lasts several days in most instances, should have merged into softness before the meat is cooked, or should have been anticipated by cooking before the flesh is cold. In warm climates and exceptionally warm weather the latter course is the preferable. The dietician, especially when the feeding of the young is in question, will prefer those methods of culinary preparation which most break up the natural cohesion of the viands. And it may be noticed that the force of cohesion acts in all directions, and that it is no advantage for an article to be laterally friable if it remains stringy in a longitudinal direction.

Fat interposed between the component parts of food diminishes its digestibility. It is the interstitial fat between the fasciculi of muscular fibre in beef which renders it to young persons and to dyspeptics less digestible than mutton.

A temperature above that of the body retards digestion. Meat, which is digested by the gastric juice in the stomach, has time to cool before it gets there; but farinaceous food, which depends for its conversion into chyme on the salivary glands, suffers a serious loss if by reason of being too hot it cannot avail itself of the saliva supplied by the mouth. It should also be borne in mind that a temperature much above that of the body cracks the enamel of the teeth.

Excessive concentration impairs digestibility. The principal medium by which nutriment is carried through the absorbent membrane of the digestive canal is water. There is no doubt it passes more rapidly by endosmosis than anything else. The removal, then, of water is an injury to viands, and drying, salting, over-frying, over-roasting, and even over-boiling renders them less soluble in the digestive juices, and so less nutritious. A familiar illustration of this may be taken from eggs. Let an egg be lightly boiled, poached in water, custarded, or raw, and the stomach even of an invalid can bear it; but let it be baked in a pudding which requires a hot oven, or boiled hard, or otherwise submitted to a high temperature for a prolonged period, and it becomes a tasteless, leathery substance, which can be of no more use in the stomach than so much skin or hair. It is obvious then that it is mainly in a commercial point of view that articles of diet can be called nutritious in proportion to their concentration. About this there can be no question; milk adulterated from the pump is worth so much less than pure milk, and a pound of beef steak sustains a man longer than a pint of veal broth.

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[1] Trousseau, *Clinique Médicale*, vol. iii. p. 484, 3d edit.

The attainment of nutritiousness by concentration is of considerable importance to travellers and in military medicine. There are not a few strategists who attribute the success of the Germans in the war of 1870 to the easily carried and easily prepared food supplied to them by the sausage-makers of Berlin. Concentration of viands carried to excess, so as to be likely to affect the health, is usually made manifest by a diminution in the secretion of urine and its condensed condition; while, on the other hand, if dilution is needlessly great, the action of the kidneys is excessive. Now the urine of young persons is naturally of lower specific gravity, that is, more aqueous, than that of adults. If it is found to equal in density the excretion of full growth, or if it is observed to be voided but rarely, the meals should be made more bulky, or better still, more frequent, so as not to overload the stomach.

An over-concentrated diet often induces costiveness. This should be counteracted by green vegetables and other dilute appetizing dishes, and never by purgative drugs. The habit of taking a considerable quantity and variety of fresh green vegetables has the further advantage of preventing that tendency to minor developments of scurvy which is not uncommonly found in youths nourished mainly on animal food. A softness or friability of the gums is one of the first signs of this. If the mouth bleeds after the application of a tooth brush, the use of fresh vegetables at every meal should be enforced.

The young are peculiarly liable to be affected by poisons conveyed in fluids. Their sensitive frames absorb quickly, and quickly turn to evil account such substances, even when diluted to an extent which makes them harmless to adults. The water therefore with which families, and still more with which schools are supplied, should be carefully subjected to analysis. Wherever a trace of lead is found, means should be adopted to remove the source of it; and organic products should have their origin clearly accounted for, and all possibility of sewage contamination excluded. These precautions are essential, in spite of the grown-up portion of the household having habitually used the water without injury.

Fresh milk has long had a bad popular reputation as occasionally conveying fever, and in some parts of Ireland the peasantry can hardly ever be got to take it "raw." This is quite irrespective of the state of the cattle which furnish it; no cases of disease thus communicated have ever been traced home to sick cows. It is probably always due either to adulteration with dirty water, or to the vessels being washed in that dangerous medium, or to their being exposed to air loaded with elements of contagion.

Up to the period of full development the daily use of wine should be allowed only during illness and the express attendance of a medical adviser. Its habitual consumption by healthy children hastens forward the crisis of puberty, checks growth, and habituates them to the artificial sensations produced by alcohol.

Diet for Bodily Labour.—It seems certain that the old theory of Liebig, which attributed the whole of the force evolved in muscular movements to the oxidation of the muscular tissue, is untenable. There is not enough of the tissue oxidized, that is to say, destroyed and carried away as urea and other nitrogenous excretions, to give so much force, as measured by the method of Joule. On the other hand, Traube goes too far when he would make out that in the performance of muscular work the metamorphosis of the organized constituents of the muscle is not involved, and that non-nitrogenous substances alone are consumed. The prolonged feats of walking performed by the pedestrian Weston in 1876 vastly increased the amounts excreted of those elements of the urine which are derived from the oxidation of muscle and nerve.[1] The urea formed by the destructive assimilation of contractile fibre, and the phosphates whose main source is nervous tissue, were each nearly doubled during and shortly after the extraordinary strain upon those parts of the body. As might be expected, the machinery wears away quicker when it is harder worked, and requires to be repaired immediately by an enhanced quantity of new material, or it will be worn beyond the power of repair. The daily supply, therefore, of digestible nitrogenous food, meat *par excellence*, must be increased whenever the muscular exercise is increased. In making the recent extension of railways in Sicily, the progress was retarded by the slack work done by the Sicilian navvies compared with that got through by the English gangs. The former took scarcely any meat, preferring to save the wages expended by their comrades in that way. The idea occurred to the contractor of paying the men partly in money and partly in meat; and the result was a marked increase in the amount of work executed, which was brought nearly up to the British average. A mixed diet, with an increase in the proportionate quantity of meat when extra corporeal exertion is required, is the wholesomest, as well as the most economical, for all sorts of manual labourers.

It is absolutely essential that the fleshly machinery for doing work should be continuously replaced by flesh food, as it becomes worn out. Nitrogenous aliment after a few chemical changes replaces the lost muscle which has passed away in the excretions; just as the engineer makes ore into steel and renews the corroded boiler plate or thinned piston. Now, as the renewal of the plate or piston is a "stimulus" to the augmented performances of the engine, so meat is a "stimulus" to augmented muscular action. Taken in a digestible form during exertion, it allows the exertion to be continued longer, with greater ease and less consequent exhaustion. According to the testimony of soldiers experimentally put through forced marches of twenty miles a day, with loads of half a hundredweight each, "meat-extract" bears away the palm from the other reputed stimulants commonly compared with it (viz., rum and coffee). "It does not put a spirit into you for a few miles only, but has a lasting effect; if I were ordered for continuous marching, and had my choice, I would certainly take the meat extract," said an unprejudiced sergeant to Dr Parkes, who was the conductor of the experiments alluded to.[2]

When the continuous repair of the muscular machinery is fully secured, the production of heat and force is most readily provided for by vegetable aliment, by reason of the large proportion of carbon which it contains. In assigning their physiological functions to the several sorts of food, nearly all the business of begetting active force should apparently be ascribed to the solid hydrocarbons, starch and fat, by their conversion into carbonic acid. It is not necessary to be acquainted with every step of the process, which in the body we confessedly are not, to appreciate the argument. It is clearly important that these elements of diet should be furnished in sufficient quantity and in a digestible form. In additions to diet made in consequence of additional bodily work not only should the stimulus of animal food be attended to, but the bulk of starch and fat in the rations should be augmented even in larger

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[1] See Dr Pavy on Weston's walk, in *Lancet* of Dec. 23, 1876. The urea excreted when walking bore to that excreted during rest the relation of 17 to 10, phosphoric acid 19 to 10, lime 15 to 10, &c.

[2] *On the Issue of a Spirit Ration during the Ashantee Campaign of* 1874, by E. A. Parkes, M.D., Professor of Military Hygiene in the Army Medical School. London, 1875.

m, for these aliments are the most direct con-
of force [1]
ning" for athletic sports is based on the principles
unciated. The usual time allotted to it is six
d the objects to be attained in this period may be
as—

removal of superfluous fat and water;
increase of contractile power in the muscles;
eased endurance;
'ind," that is to say, a power of breathing and circulating
he blood steadily in spite of exertion.

st is aimed at by considerably adding to the daily
f nitrogenous and by diminishing farinaceous and
od, and providing that it should be so consumed
ully digested. The second and third are secured
ally increasing the demands made upon the
ill they have learnt to exert at will all the powers
they are capable, and for as long a period as the
ructure of the individual frame permits. "Wind"
ed by choosing as part of the training an exercise,
unning, which can be sustained only when the
y and circulating organs do their duty fairly.
example, the Oxford system of training for the
oat-races may be cited. It may be considered a
egimen for fully developing a young man's
powers to fulfil the demands of an extraordinary
a standard which may be modified according to
astances for which the training is required. It is
:—

A Day's Training.

7 A.M.	A short walk or run.	Not compulsory.
at 8.30	Of tea,	As little as possible.
	Meat, beef or mutton	Underdone.
	Bread or dry toast...	Crust only recommended
forenoon	None.	
2 P.M	Meat, much the same as for breakfast.	
	Bread..................	Crust only recommended.
	Vegetables, none.....	Not always adhered to.
	Beer, one pint.........	
....	About 5 o'clock start for the river, and row twice over the course, the speed increasing with the strength of the crew.	
8.30 or .... 10.	Meat, cold.	
	Bread, and perhaps a little jelly or water-cresses.	
	Beer, one pint.	

The Cambridge system differs very slightly, and in neither is any exaggerated severity of discipline enforced, while some latitude is permitted to peculiarities and a wish for variety, and plenty of time is left for business and social intercourse. Other plans are objectionable, from involving, without any corresponding advantage, a complete departure from the usual habits of the educated classes. For instance, according to Clasper, dinner is to be at noon, with only a light tea afterwards, and no supper. Then a country walk of four or five miles is to be taken before breakfast, and two hours row afterwards, and another hard row between dinner and tea.[3] "Stonehenge," again, requires the time between breakfast and dinner to be spent entirely on billiards, skittles, quoits, rowing, and running, in spite of another hour's row being prescribed at 6 P.M. He also requires the aspirant for athletic honours to sleep between 10 and 11 hours.[4] Only professionals will carry out such rules, and even they do not either benefit their health or lengthen their lives by the sacrifice. For it is notorious that "over-training" leads to a condition of system in which the sufferers describe themselves as "fallen to pieces." The most peculiar symptom is a sudden loss of voluntary power after exertion. It is sometimes called "fainting," but there is no loss of sense, and it is quickly relieved by liquid food. It is to the pathologist a timely warning of that consequence of overstrained muscle which constitutes paralysis scriptorum, turner's palsy, and blacksmith's palsy, and which results in fatty degeneration of the red muscular fibre. To get and to keep its health a muscle needs a constant alternation of active contraction and rest, and an enforced protraction of either one or the other leads to the loss of vital properties. The limbs of an Indian fakir, voluntarily held in a strained posture, or those of a bed-ridden invalid, are equally apt to become useless. Overtrained persons are also liable to a languor and apparent weakness, which is found on examination to depend on an excessive secretion of urea by the kidneys.

Such are not the results, however, of the training adopted at the universities, by which it would appear that the constitution is strengthened, the intellect sharpened, and life lengthened. Dr John Morgan (*University Oars*, 1873), has collected statistics of the subsequent health of those who have rowed in the university races since 1829, and he finds that, whereas at twenty years of age, according to Farr's life tables, average expectation of survival is forty years, for these oarmen it is forty-two years. Moreover, in the cases of death, inquiry into its causes exhibits evidence of good constitutions rather than the contrary, the causes consisting largely of fevers and accidents, to which the vigorous and active are more exposed than the sick. And

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well illustratrated by a remarkable feat performed on
Westerr Railway in the summer of 1872. It was neces-
ft the rails from the broad to the narrow gauge on
500 miles of permanent way within a fortnight. The
rmous, for the Great Western is one of the few English
rails are held down by bolts screwed into nuts. All these
nscrewed and replaced after removing the heavy rail two
t 3000 men were employed, working double time, some-
l in the morning till 9 at night; and, without one being
nk, they accomplished the work in the prescribed time.
for generating muscular power was this. The men were
; the line, so as not to waste their strength by coming and
hey brought with them bacon, bread, cheese, cocoa, &c., to
r usual meals at usual times. But they had no beer, nor
any form. A pound and a half of oatmeal and half a
gar was allowed extra to each man daily, and for every
cock was provided. The first thing done in the morning
kfast; and then the cook and his caldron started along the
r was found convenient; a fireplace of stones was built,
boiled. Oatmeal was then sprinkled into it with sugar, and thoroughly well boiled till thin gruel was made. As soon as the "shout for drink" was heard, buckets were filled and carried round with small pannikins to convey the liquid to the panting mouths. The men liked it exceedingly, and learned by experience the importance of having it well cooked.

The incident may remind the reader of classical medicine of Hippocrates, who considers the culinary preparation of oatmeal ptisan so important that in a short treatise *On the Treatment of Acute Disease* he devotes to it the only cookery recipe he has inserted in his works. He describes how it is to be boiled till it can swell no longer (so that it may swell no more in the stomach), how it is to be settled and strained (through a coarse cullender). He prescribes it indeed for sick people but he would have been the first to agree with our advanced physiologists in the opinion that overstrained muscular effort produces the same effects as continued fever (*ἐς πυρετὸν καθίσταται μακρότερον*), its chief dangers lying in rise of temperature and arrested cutaneous action, and that its true antagonist is nutriment capable of rapid absorption, dissolved in that most essential nutriment, water.

[2] See Maclaren's *Training in Theory and Practice*, appendix to edition 1866.

[3] *Rowing Almanac*, 1863.

[4] Article "Boat-Racing," in *British Rural Sports*. 1841.

it is not at the expense of the mind that the body is cultivated, for this roll of athletes is adorned with the names of bishops, poets, queen's counsel, &c.

Training greatly increases the vital capacity of the chest, so that much more air can be blown in and out of the lungs, and with greater force, than previously. And this vital capacity endures longer than the other improvements. It is evidence of the permanent elasticity of the pulmonary tissue, and an efficient protection against asthma, emphysema, and other degenerations of the organ of breathing.

Indigestion, sleeplessness, nervous indecision, palpitation of heart, and irregularity of bowels disappear under training; but if they exist, the regimen should be entered upon with more than usual caution.

An important modification of training is that which contemplates the reduction of CORPULENCE (*q. v.*), which has increased to the extent of interfering with comfort and preventing active exercise. If an exhausting amount of muscular effort is enforced, the digestion of meat is interfered with, while at the same time there still goes on the absorption of such fat as is unavoidably present in the victuals, so that the muscles and nerves lose strength, while the adipose tissue grows. Besides this, if by violent means the weight is worked down, then, to keep it down, those violent means must be persisted in; and if they be neglected for more interesting occupations, the burden rapidly increases to a greater degree than ever. Many uncomfortably obese persons are very active in mind and body, and could not add to their muscular exercise without risk of harm.

Regimen, then, is more essentially important to them than to other trainers, and they will probably be more induced to attend to it if they understand the principles on which it is based. This is simply to exclude from the bill of fare all those articles which contain fat or which by the chemical actions of the digestive viscera may be converted into fat.

For the reduction of corpulence the following rules may be observed for a three weeks' course :—

Rise at 7, rub the body well with horse-hair gloves, have a cold bath, and take a short turn in the open air. Breakfast (alone) at 8 or 8.30, on the lean of beef or mutton (cutting off the fat and skin), dry toast, biscuit or oat cake, a tumbler of claret and water, or tea without milk or sugar, or made in the Russian way with a slice of lemon. Lunch at one on bread or biscuit, Dutch cheese, salad, water-cresses, or roasted apples, hung beef or anchovies, or red-herring, or olives, and similar relishes. After eating, drink claret and water, or unsweetened lemonade, or plain water, in moderation. Dine at any convenient hour. Avoid soup, fish, or pastry, but eat plain meat of any sort except pork, rejecting the fat and skin. Spinach, haricots, or any other green vegetable may be taken, but no potatoes, made dishes, or sweets. A jelly, or a lemon-water-ice, or a roast apple, must suffice in their place. Take claret and water at dinner, and one glass of sherry or Madeira afterwards.

Between meals, as a rule, exercise must always be taken to the extent of inducing perspiration. Running, when practicable, is the best form in which to take it.

Seven or eight pounds is as much as it is prudent to lose during the three weeks. If this loss is arrived at sooner, or indeed later, the severe parts of the treatment may be gradually omitted, but it is strongly recommended to modify the general habits in accordance with the principle of taking as small a quantity as possible of fat and sugar, or of substances which form fat and sugar, and sustaining the respiratory function. By this means the weight may be gradually reduced for a few months with safety.

Small quantities of dilute alcoholic liquids taken with meals slightly increase the activity of the renewal of the nitrogenous tissues, mainly muscle; that is to say, there is a more rapid reconstruction of those parts, as is shown by the augmented formation of urea and the sharpened appetite. Life is fuller and more complete, old flesh is removed and food appropriated as new flesh somewhat more quickly, than when no alcohol is ingested. There appears to be a temporary rise in the digestive powers of the stomach, which is probably the initiative act. The nerve functions are blunted, and a lessened excretion of phosphorus exhibits a temporary check in the wear and renewal of the nerve tissue. The "vital capacity" of the lungs, as indicated by the spirometer, is reduced, showing a diminished oxidation of the blood.

The effect on a healthy man of taking with a meal such a quantity of fermented liquor as puts him at ease with himself and the world around, without untoward exhilaration, is to arrest the wear of the nervous system, especially that part employed in emotion and sensation. Just as often, then, as the zest for food is raised to its normal standard by a little wine or beer with a meal, the moderate consumer is as much really better as he feels the better for it. Where the food is as keenly enjoyed without it, the consumption of a stimulant is useless. But alcohol is not a source of force, and its direct action is an arrest of vitality.

Diet for Mental Work.—An expression of Büchner's—"No thinking without phosphorus"[1]—has gained an unhappy notoriety. Strictly speaking, it is a groundless assumption, for we cannot say that intellectual being may not exist joined to any form of matter, or quite independent of matter. We certainly do not know enough of the subject to lay down such a negative statement. And if it be held to mean that the amount of phosphorus passing through the body bears a proportion to the intensity of thought, it is simply a mis-statement. A captive lion, tiger, leopard, or hare assimilates and parts with a greater amount of phosphorus than a hard-thinking man; while a beaver, noted for its powers of contrivance, excretes so little phosphorus that chemical analysis cannot find it in the excreta. All that the physiologist is justified in asserting is that for the mind to energize in a living body that body must be kept living up to a certain standard, and that for the continuous renewal of life a supply of phosphatic salts is required. The same may be said with equal justice of water, fat, nitrogen, chloride of sodium, oxygen, &c. The phosphates are wanted indeed, but wanted by pinches, whereas water is required by pailfuls. A few days without water, or a few minutes without oxygen, will terminate the train of consciousness. The practical points taught us by physiology are that for the integrity of thought integrity of the nervous tissue is requisite, and for the integrity of the nervous tissue a due quantity of such food as contains digestible phosphatic salts.

The most perfect regimen for the healthy exercise of thought is such as would be advised for a growing boy, viz., frequent small supplies of easily soluble mixed food, so as to furnish the greatest quantity of nutriment without overloading the stomach, or running the risk of generating morbid half-assimilated products. For it is essential to the intellectual direction of the nervous system that it should not be oppressed by physical impediments. The presence in the stomach or blood of imperfectly assimilated nutriment impedes its functions in close proportion to their amount, so that not only the constituents, but the mode of administering food, must come into the calculation. "*Repletus venter non studet libenter*" is an old proverb, the application of which saves many a brain and many a stomach from being worked against the grain. Rest from brain-work for twenty minutes before meals, entire abstinence from it during meals, and rest again till the weight has passed from the stomach, are essential to the reconcilement of psychical exertion with bodily health.

The physiology of the action of alcohol has a very important bearing on the physical management of the mental functions. Alcohol has the power of curbing, arresting, and suspending all the manifestations of the

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[1] Ohne Phosphor kein Gedanke. *Kraft und Stoff*, sect. 122.

m, so that we feel its influence on our
er than on any other part of the system.
brings them more completely under our
trols and steadies them; more often it con-
nects them, and then breaks off our power
ogether. When a man has tired himself by
xertion, a moderate quantity of alcoholic
n with food acts as an anæsthetic, stays the
stem which is going on, and allows the nerve
rned to the due digestion of the meal. But
lowed by rest from toil, and is in essence a
me treatment which includes rest—it is an
To continue to labour and at the same time
sthetic is a physiological inconsistency. The
blunts the useful feeling of weariness, and
m acting as a warning. There is no habit
a literary man than that of taking stimulants
s; the vital powers go on wearing out more
hout their cry for help being perceived, and
ak down irrevocably.
tity, the appetite for solid food is the safest
better dinner or supper is eaten when it is
y a certain amount of fermented liquor, that
most suitable; if a worse, then an excess is
wever little be taken.
f the diet should be (to quote the words
ton) "to preserve the body's health and
render lightsome, clear, and not lumpish
the mind, to the cause of religion and our
rty, when it shall require from hearts in
to stand and cover their stations."
ially when the mind of genius is over-
the dark clouds of threatened insanity, of
is, or of hysteria, that a rational mode of life
Nothing but daily exercise, temperate meals,
al observance of regular hours of rest and
ve kept burning the flickering reason in poor

the proper quantity of alcohol that may be
following questions naturally occur—How is
w when he has had enough? and what are
oo much? The ancients used to wear dark
engraved gems, which they considered preser-
st excess, and called them ἀμεθυστοί,
," "amethysts." The name is now limited
ock crystal, but in early times it was applied
er stones, cut in intaglio, and worn on the
ve gatherings. So long as the wearer could de-
ute works of art they bore, he had not reached
ore delicate test still is the appreciation of
y the skin; if a draught does not chill, if a
s to produce the usual discomfort, the wise
e has exceeded and must stop at once. In
st rule is that when there is a consciousness
cal effect at all beyond that of satisfaction at
odily weariness—such a satisfaction as is felt
good meal by a vigorous person—then the
deration have been attained. On ordinary
aily life, and "for the stomach's sake," no
be taken. Each fresh drop is a step down-
evil results of alcohol. But to the practiser
erance, festive occasions are safe and may
A man may from time to time keep up
the above mentioned sense of satisfaction
igestible wine in good company without fear
nk or failure of health, if he makes it a law
stop as soon as he experiences any hurry of
inctness of the senses.
others.—During pregnancy as much care
en not to get too fat as is taken by an athlete training for a race. The rules for modified training explained above will afford hints on the subject, but it is not desirable to carry the process so far.

There is a temptation at this time to increase the usual allowance of stimulant; alcohol is taken between meals to overcome the nausea and depression incident to the state of body. And by this mistaken expedient the nausea gradually becomes dyspeptic vomiting. On leaving it off the sickness ceases. A mother should also remember that nearly all the alcohol she consumes mixes with her blood, which now is one with the blood of the fœtus.

During lactation the most suitable drink for a mother is cow's milk, fresh and unskimmed. If it turns sour on the stomach, lime-water mixed with it not only corrects the acescence, but also supplies a valuable aid to the growing bones of the infant. In her solid dietary also milk may be fairly taken as the type of a due admixture of alimentary principles, because it is not individual growth, or the production of muscular force, but the secretion of milk, that is the object of the selection of diet.

Supposing the full diet to consist of three pounds of solid food, that will require six pints extra of uncombined aqueous fluid to make it as fluid as milk; and, to combine the nitrogenous and carbonaceous constituents in due proportion, the three pounds of solid food should consist of

14½ oz. of meat.
13 oz. of fat, butter, and sugar.
20 oz. of farinaceous food and vegetables.
½ oz. of salt, lime, &c.

At first, from the exhaustion consequent on childbed, from the want of exercise and of fresh air, the appetite turns against meat. Let then milk, especially boiled milk with arrowroot or the like, chicken broth, or egg custards, fill up the deficiency.

Any increase in the habitual allowance of alcohol is as unfitting to this period of life as during pregnancy.

Diet of Old Age.—It is a remark extant from the rough times when famine was more frequent than now, that the older a human being is the better deficiency of food is borne. Old men suffer least from abstinence,[1] and benefit therefore most from temperance in eating. Everybody who has passed the age of fifty, or thereabouts, with a fairly unimpaired constitution, will act wisely in diminishing his daily quantity of solid food. There is less demand for the materials of growth, and consequently animal food should bear a smaller proportion than heretofore to vegetable, and it is mainly in that ingredient of the diet that reduction should be effected. Neglect of this rule in declining years is often punished by gout, a disease attributable to excess of nitrogenous aliment, and for this reason common in elderly men.

In the autumn of life the advantages derived from fermented liquor are more advantageous, and the injuries it can inflict less injurious to the body than in youth. The effect of alcohol is to check the activity of destructive assimilation, to arrest that rapid flux of the substance of the frame which in healthy youth can hardly be excessive, but which in old age exhausts the vital force. Loss of appetite is a frequent and a serious symptom in old age. It usually arises from deficient formation of gastric juice, which, in common with other secretions, diminishes with years. It is best treated physiologically rather than by drugs.

Diet in Sickness.—In all that has gone before health has been presupposed. The modifications necessitated by sickness are of three kinds:—first the avoidance of such articles of consumption as would increase the disease under the special circumstances, although ordinarily wholesome; second, the maintenance of the functions

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[1] Hippocrates, *Aphorism* xiii.

[illegible] which [illegible] the phenomena of a [illegible] both [illegible] by [illegible].

In the fevers which are caused [illegible] supplying [illegible] going on [illegible] [illegible] at the same moment that it makes an urgent demand for nutriment. [illegible] we regard, what is [illegible], "the tale of the bricks is doubled," and we know by the quantity of urea and phosphates in the urine, and by the fæcal excretion, that the muscles and nerves of the bed-ridden sufferer are melting away as fast as if he were scaling the Alps with nothing to eat. It is quite reasonable to transfer the experiences derived from health to sickness, and to feel satisfied that we are not wasting precious opportunities when we are giving fever patients such a time-honoured diet as oatmeal gruel, care being taken that it is thoroughly well boiled. After three days the tissues are beginning to suffer, and it is advisable to add chicken broth, meat jelly, and strong soup. Let that be supplied which the examination shows to be passing away—nitrogenous tissue.

The administration of alcohol is to be regulated partly by the temperature and partly by the condition of the nervous system. Usually if the heat of the blood (as taken at the axilla) is above 103°, and always if it is above 105°, there is a necessity for it. Again, if there is great prostration of strength, or tremor of the hands, or quivering in the voice and respiration, if there is low muttering delirium when the patient is left quiet, it is required.

Green-sickness, or anæmia, is characterized by the rapid disappearance of the red particles which float in the blood. To what a strange extent this goes may be seen by looking at the insides of the lips, which naturally hold such a quantity of the fluid as to be quite scarlet, but which now are pale like those of a corpse. It is calculated that the loss of material in marked cases of green-sickness may amount to three pounds of this important constituent of the blood.[1] Yet it is capable of complete renewal by diet. If by dint of remedies, notably iron, the appetite can be so regulated as to enjoy meat in excess of the immediate wants of the body, that meat is converted into hæmatine, and the healthy hue returns to the cheeks as quickly as it left. Wine is useful at meals on account of the stimulus it gives to the appetite; it is injurious between meals by spoiling it.

Acute rheumatism and *acute gout* are best treated on an expectant principle. A nutrient nitrogenous diet, which the patient assimilates only too readily, retards recovery, and will even bring on a relapse during convalescence. If meat in any form, solid or liquid, be eaten, it seems to turn to acid which is already in excess in the blood. The power of fully converting it into living flesh is wanting, and until this power is regained a semi-conversion into an organic acid takes place. The redder and more muscular the meat is, the more it disagrees.

Chronic gout is undoubtedly due to good cheer indulged in either by the sufferer or his ancestors. When a man day after day swallows more nitrogenous food than is wanted for [illegible] the [illegible] of his [illegible], the following results may be expected, with variations dependent upon his original constitution. If the digestive solvents are weak and scanty, the excess passes through the canal in an undigested state, and is partially decomposed there. Thereon ensue all sorts of abdominal derangements, which, however, have the advantage of getting rid of the offending matters. If, on the other hand, the stomach secretes vigorously on being stimulated, then indeed the excess is digested and absorbed, and is subject to the future changes consequent on assimilation. An active out-of-door life neutralizes this in some measure by augmenting oxidation; much of the albumen goes to form glycogen, and acts as a fuel for the maintenance of muscular force. The balance is wasted in an unexplained way, and does not necessarily injure a hardy frame. The violent muscular exertion and high training needful for oxidation being inconsistent with the habits of intellectual society, a man in the prime of life who puts too much meat into a good stomach habitually retains in his blood an excess of uric acid, into which the nitrogenous waste converts itself. Uric acid in the blood has been distinctly traced as the essence of gout. Perhaps this imaginary first offender develops the full consequences; and that is the best thing that can happen, inducing greater carefulness in future.

These views can suggest but one line of preventive treatment. The children of gouty families should be brought up to a life of strict abstemiousness and muscular activity. From the earliest years vegetables and "maigre" soups should form a considerable portion of their dietary.

Gouty adults require meat but once in twenty-four hours. The bill of fare should be varied from day to day, but as simple as possible at each meal. Rich sauces are to be eschewed, and a lemon, an infusion of herbs and pepper, bread-sauce, or a purée of vegetables, adopted in their place. Sugar at the end of meals generates an excess of organic acid, and is to be avoided; if cheese is eaten it should be new, and is best toasted and creamed.

Dilute alkaline waters containing soda, such as Apollinaris or the weaker Vichy, are a rational drink during meals; but it is probably best to keep to pure water. Those who live idle lives require no alcohol; and it should not be an habitual accompaniment to meals.

Red gravel is evidence of a constitution so closely allied to gout, that nothing need be said further about its appropriate regimen.

In *Bright's disease* of the kidneys, in *contracted liver*, and in short in all degenerative lesions, alcohol has a baneful influence. Its action upon the tissues is directly the same as theirs. Moreover, if we agree with its latest expositor, Dr Sibson, that Bright's disease is closely associated with increased arterial tension, alcohol (whose effect is also to increase tension) must be peculiarly poisonous.[2]

For the cure of these diseases, independent of the nutrition of the rest of the body, a milk diet has been proposed, and it seems to offer a fair prospect, if the patients can be persuaded to persist in it. How safely a milk diet may be adopted in middle life is shown by the example of Dr Cheyne, a Bath physician of the last century, who at about fifty-five restricted himself entirely to milk and biscuits, and yet was able to fulfil the duties of his laborious profession. He took at first of the former six pints, of the latter twelve ounces; but he shortly diminished the quantity to half, and after sixteen years' experience found it fully sufficient, and indeed capable of further reduction in quantity.[3]

W[illegible] and slow digestion is a condition which enforces especial care for meat and drink. The cause of the imperfection lies in a deficiency in the supply of nerve power to the stomach, so that it both secretes its solvent fluid and also rotates its contents too slowly; and the more it is loaded the slower it goes. Of the medicinal means of curing such a state this is not the place to speak; but none of them will avail without the aid of a rational dietary. Time must be given to the oppressed organ wherein to empty itself of every complete meal, and such a period of rest given as will allow of the recovery of force; or if the meals are frequent they must be very sparing. The observations of Busch (Virchow's *Archiv.* xiv.) show that a period of five hours elapses in the healthy subject before a fully filled stomach can empty itself, and in the dyspeptic the process is still longer. Whenever, therefore, the organ is loaded as healthy people rightly load it, a man should allow at least seven or eight hours to elapse before sitting down to another meal. And he must never eat till the need for food is announced by appetite. Perhaps a more generally applicable and easier obeyed law is not to make full meals at all, but to stop short at the feeling of repletion, and, when that has gone off, again to take in the supply allowed by circumstances. Three moderate meals are usually sufficient to keep up the strength.

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[1] [illegible] Lect. 3.

[2] Sibson's Harveian Lectures, *British Med. Journ.*, Feb. 10, 1877.

[3] *The Natural Method of Curing Diseases of the Body, &c.*, by Geo. Cheyne, M.D., 1742.

Meat should be once cooked. Mutton, feathered fowl, venison, lamb, and beef are digestible in the order they here are placed in. The more difficult dishes should have the longest time allowed to them. Of the farinaceous articles of diet, bread and biscuits are the most easily penetrated by the gastric juices, and all their preparations are safe. The best bread is the "aerated," which is free from decomposing yeast. Macaroni is good if soaked till quite macerated. Pastry is difficult of solution. Vegetables are very necessary; cauliflowers, Jerusalem artichokes, beetroot, French beans, soft peas, stewed celery, turnip-tops, spinach, are the most readily disposed of.

When the usual mixture of meat and vegetables is found to induce flatulence, it is a good expedient to eat vegetables only at one meal and meat and bread only at another. The principle on which this plan is based is that starchy food is dissolved mainly by the alkaline saliva, whereas meat is dissolved by the acid gastric juice. In a vigorous person both these are copious enough to render immaterial their mutual neutralization, but when they are scanty, their separate employment is a physiological economy.

Consumption is a disease whose treatment is almost wholly dietetic. The children of a mother whose pedigree xhibits proof of a consumptive tendency may with ropriety be put to a healthy wet nurse immediately on irth, and, on being weaned, be fed from a Channel Island w. The milk should be boiled and then cooled down to pidity. A small tea-spoonful of "saccharated solution lime" may be advantageously added to each quart of ilk when the coming teeth require the elements of their trition to be added to the diet. The rules already given r the healthy management of the young should be adhered with unusual strictness, and any departure from them ould be made only to provide for some peculiar necessity the case according to medical advice.

In cases of consumption it is difficult to say that drugs useless, but certainly those that come nearest to nents have most evidence in their favour, such as iron, liver oil, and the phosphates of lime. Their effect on appetite must be sedulously watched, and the end must be sacrificed to the means; that is to say, if they spoil appetite, they must be left off. The reason for ministering oil is to afford an easily assimilated basis of wed organic growth, to take the place of the abnormal dency to form tubercular matter. If anything prevents its easy assimilation it is obviously useless. The use of climate in the treatment of phthisis may be tested by its dietetic action; if it improves the appetite, it is doing good; if it injures the appetite, it is doing harm.

In *chronic jaundice* the function of the liver is best restored by the free use of green vegetables at all meals.

Diabetes, when it has once assumed a chronic form, is never really cured, but life may be much prolonged by the employment of a diet from which sugar and starch are excluded as far as practicable, and the patient nourished on animal food. The best fare for diabetic patients is that given by Professor Bouchardat in his work *Du Diabète sucrée*, Paris, 1852.

In *functional nervous diseases*, such as hysteria and hypochondriasis, the appetite, muscular elasticity, and mental powers will often be observed to be deficient in the early part of the day, and to recover their tone in the evening. At this latter time, therefore, it is advisable to make the principal meal.

Scurvy is a notable example of a disease of which, more than any other, the prevention depends on the adoption of a suitable diet. Its symptoms so far resemble those of general starvation that from the earliest time of its appearance in history it has been suspected that it is due to a dietary defective in some necessary ingredient; and practical observation soon showed that this was fresh vegetables. It was found on every long voyage that the crew suffered from scurvy in proportion to the length of time they were restricted to dry food, and that they recovered rapidly as soon as they got access to a supply of succulent plants. This requisite for health is obviously the most difficult of all things to procure aboard ship, and efforts were made to find a substitute capable of marine transport. From the time of Hawkins[1] (1593) downwards the opinion has been expressed by all the most intelligent travellers that a substitute is to be found in the juice of fruits of the orange tribes, such as oranges, lemons, &c. But in its natural state this is expensive and troublesome to carry, so that skippers and owners for a couple of centuries found it expedient to be sceptical. The pictures of scurvy as it appeared during the 18th century are horrible in the extreme. But the statute of 1795, passed through the exertions of Captain Cook and Sir Gilbert Blane, has enforced the carrying of lime-juice. This invaluable preventive has shown its influence all the more decidedly by the disease still appearing occasionally under strong promoting circumstances, and to a certain extent in spite of the antidote; but it is so modified as to be usually more of the nature of a warning or demonstration than of a serious invasion. Some indeed have questioned and even denied altogether the blessings derived from the enforced use of lime-juice. But they make a very scanty show when weighed with those whom they undertake to oppose; and it is superfluous here to enter into the arguments and results of observation constituting the ponderous *Report of the Committee appointed by the Lords Commissioners of the Admiralty to Enquire into the Causes of the Outbreak of Scurvy in the recent Arctic Expedition, &c., and presented to both Houses of Parliament, May 7th* 1877," which seems to settle for ever the preventive powers against scurvy of the use of lime-juice.

The committee alluded to was appointed in consequence of one of those exceptional outbreaks of scurvy induced by exceptional circumstances. The ships sent on the exploring expedition of 1875 were amply provided with lime-juice, and with printed expositions of its value. During the voyage out and in the long inaction of the winter the men's health was so well preserved by general attention to hygiene that no cases of even mild scurvy were detected; the pallor and languor and depression of spirits of some among the sailors were attributed to the want of sunlight for 142 days, and it was expected that a few days sledge travelling in the open air would reinvigorate them. There was plenty of lime-juice aboard; but it seems that it is not the custom to add to the weight of provisions, which Polar sledging parties have to propel, by including the preservative amongst them. Sir George Nares, the commander of the expedition, cites the names of 10 admirals, 10 doctors, and 15 captains who have conducted land explorations in this fashion without it; and they returned unscathed to any serious extent. But on this recent occasion the crews seem to have been peculiarly predisposed to illnesses of scorbutic nature by the more than ordinary scarcity of fresh meat in their dietary, arising out of the deficiency of game in the extremely high latitude where they wintered. With few exceptions the whole of the crews of the "Alert" and the "Discovery" were employed in sledging, and the consequence was, that of the 122 officers and men, 59 were more or less incapacitated by scurvy, and 4 died.

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[1] Sir Rd. Hawkins's *Voyage*, edited by Hakluyt Society, p. 60.

The real reason for not carrying lime-juice in such expeditions is its cumbersomeness. Including bottles, though in truth they are not wanted in a hard frost, it may be said that 1lb a week for each man would have to be added to the baggage,[1]—a serious item, no doubt. And with a view of remedying the inconvenience, medical men have long sought to discover to what constituent of the complicated mixture afforded by nature it is that it owes its efficacy. In a contribution to the *Medico-Chirurgical Review* for 1848, Dr Parkes examined exhaustively the evidence concerning the various deficiencies in ship food as compared with fresh food which might be filled up by one or other of the components of lime-juice; and by exclusion he is led to the conclusion that the cause of scurvy is to be found in deficiency of salts whose acids form carbonates in the system, viz., citric, tartaric, acetic, lactic, and malic acids.

Though not so good as when in their natural form, because less digestible and pleasant, yet a supply of citrates, tartrates, lactates, and malates of potash might be packed in small bulk, and, under circumstances where weight is of importance, might take the place of lime-juice. Or bolo-lozenges might be made of lime-juice freed from its aqueous portion and preserved with sugar. Three or four of these a day might be easily swallowed without stopping work.

Before leaving the subject of maritime scurvy, it may be suggested how useful it would be if those who sail in desolate regions were to carry seeds of antiscorbutic vegetables, which, strewn broadcast in uninhabited places, would form a flora capable of saving the lives of many a wrecked or weather-bound crew

Scurvy, as landsmen see it in time of peace, amounts to little more than anæmia with a softening and bleeding condition of the gums. But it indicates the use of exactly the same preventives and remedies as the more severe complaint.

Starvation is a disease which it is a platitude to say may be prevented by diet; nevertheless there are connected with it a few peculiarities of scientific and practical interest which may not be unworthy of notice. "Inedia," as it is called in the nomenclature of diseases by the London College of Physicians, is of two kinds, arising from *want of food* and from *want of water*.

When entirely deprived of nutriment the human body is capable of supporting life under ordinary circumstances for little more than a week. In the spring of 1869 this was tried on the person of a "fasting girl" in South Wa[illegible] The parents made a show of their child, decking her out like a bride on a bed, and asserting that she had eaten no food for two years. Some reckless enthusiasts for truth set four trustworthy hospital nurses to watch her: the Celtic obstinacy of the parents was roused, and in defence of their imposture they allowed death to take place in eigh days. Their trial and conviction for manslaughter may b found in the daily periodicals of the date; but, strange t say, the experimental physiologists and nurses escaped sco free. There is no doubt that in this instance the unnatu quietude, the grave-like silence, and the dim religious lig in which the victim was kept contributed to defer death.

One thing which remarkably prolongs life is a supply water. Dogs furnished with as much as they wished drink were found by M. Chossat (*Sur l'Inanition*, Pa 1843) to live three times as long as those who were depri of solids and liquids at the same time. Even wetting skin with sea-water has been found useful by shipwre sailors. Four men and a boy of fourteen who got shu the Tynewydd mine near Porth, in South Wales, the winter of 1876–7 for ten days without food, were n only alive when released, but several of them were ab to walk, and all subsequently recovered. The thoroug saturation of the narrow space with aqueous vapour, an the presence of drain water in the cutting, were probabl their chief preservatives,—assisted by the high eve temperature always found in the deeper headings of coa mines, and by the enormous compression of the confined air. This doubtless prevented evaporation, and retarded vital processes dependent upon oxidation. The accumula tion of carbonic acid in the breathed air would also ha a similar arrestive power over destructive assimilati These prisoners do not seem to have felt any of the seve pangs of hunger, for they were not tempted to eat th candles. With the instinctive feeling that darkness ad a horror to death, they preferred to use them for light.

It is a paradoxical fact, that the supply of the sto even from the substance of the starving individual's bo should tend to prolong life. In April 1874, a case [illegible] recorded of exposure in an open boat for 32 days of th men and two boys, with only ten days provisions, exclu of old boots and jelly-fish. They had a fight in th delirium, and one was severely wounded. As the blo gushed out he lapped it up; and instead of suffering t fatal weakness which might have been expected from t hemorrhage, he seems to have done well. Experime have been performed by a French physiologist, [illegible] Anselmier (*Archives Gén. de Médecine*, 1860, vol. i. p. 16 with the object of trying to preserve the lives of dogs what he calls "artificial autophagy." He fed them on [illegible] blood taken from their own veins daily, depriving them all other food, and he found that the fatal cooling incid to starvation was thus postponed, and existence prolong Life lasted till the emaciation had proceeded to six-te of the animal's weight, as in Chossat's experiments, exte ing to the fourteenth day, instead of ending on the te day, as was the case with other dogs which were not ble

These instances of the application of the art of dietetic to the treatment of disease are sufficient to show the principles which should be kept in sight. The pathology of the ailment should be considered first, then its bearing upon the digestive organs, and lastly the bearing of the digestive organs upon it.

And before quitting the subject of health as affected by diet, the common-sense hint may be given to those who are in good sanitary condition, that they cannot do better than let well alone. The most trustworthy security for future health is present health, and there is some risk of overthrowing nature's work by overcaring.

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[1] In merchant ships lime-juice is used during Polar service in a ration of an ounce daily. See "Report" above cited. But the opinions of the officers examined seems to agree that the quantity is not sufficient, and advise half as much again or more.

Pleasure as an object of Dietetics.

The social importance of gratifying the palate has certainly never been denied in practice by any of the human race. Feasting has been adopted from the earliest times as the most natural expression of joy, and the readiest means of creating joy. If ascetics have seemed to put the pleasure away from them, they have done so in the hope of purchasing by their sacrifice something greater and nobler, and have thus tacitly conceded, if not exaggerated, its real value. Experience shows that its indulgence, unregulated by the natural laws which govern our progress in civilization, leads to unutterable degradation and meanness, brutalizes the mind, and deadens its perception of the repulsiveness of vice and crime. But that is no cause why this powerful motive power, governed by right reason, should not be made subservient to the highest purposes.

The times of meals must be regulated with a regard to the disposal of the remainder of the day, whether that depends on choice or on necessity. Violent exertion of either mind or body retards digestion; and therefore, when this is practised, food is not called for so soon as on a day of rest. The heaviest meal should be postponed till the day's work is done; it is then that social home joys give the requisite repose to the body and mind. Light eaters may dine as late as they please, but those of larger appetite should lengthen the interval between their repast and bed-time. After the night's sleep and the long fast which has emptied the digestive canal of its nutritive contents, a breakfast should be taken before any of the real business of life be begun. It is no proof of health or vigour to forego it without inconvenience; but it is proof of health and vigour to be able to lay in then a solid foundation for the day's labour. Not less than four and not more than six hours should elapse before the store is again replenished. A light farinaceous lunch with vegetables and fruit may be made most appetizing, and is followed by a cheerful afternoon, whereas a ponderous meat and wine meal entails heaviness of spirit.

Diet in relation to Economy.

Due Proportion of Animal and Vegetable Food.—It has been taken for granted thus far, that the mixed fare, which has met the approval of so many generations of men, is that which is most in accordance with reason. But there are physiologists who argue that our teeth resemble those of the vegetable-feeding apes more than those of any other class of animal, and that therefore our most appropriate food must be of the fruits of the earth.[1] And if we were devoid of the intelligence which enables us to fit food for digestion by cookery, it is probable no diet would suit us better. But our reason must not be left out of account, and it is surely quite as natural for a man to cook and eat every thing that contains in a convenient form starch, fat, albumen, fibre, and phosphorus, as it is for a monkey to eat nuts or an ox grass. The human race is naturally omnivorous.

Moreover, man is able not only to develop his highest faculties and perform all his duties on any form of digestible aliment, but he is able also very much to diminish the requisite quantities by a due admixture. The diet which supplies the demand most accurately will be the most economical in the highest sense. And that this diet is a mixed one can be shown by the following method of calculation. We can measure by experiment the ultimate elements of all that is thrown off from the body as the result of vital decomposition, the ashes, the smoke, and the gases which the fire of life produces; and thus we can lay down a rule for the minimum quantity of those elements which the daily food must contain to keep up the standard weight. If the diet be such as to make it necessary to eat too much of one element in order to secure a sufficient amount of another, there is a waste, and the digestive viscera are burdened with a useless load. But there is no single article procurable for the food of the adult population which presents the exact proportion of elements required by an adult, and therefore no single article alone can supply human wants without waste.

As an example, apply this reckoning to the elements carbon and nitrogen, which constitute the main bulk of the solids in our food and in our bodies. Suppose a gang of 100 healthy prisoners to excrete, in the shape of breathed air and evacuations, 71½ ℔ of carbon and 4½ ℔ of nitrogen (which is pretty nearly the actual amount of those elements in the dried solids of the secreta, as estimated by current physiological works). Both nitrogen and carbon to that extent must of course be supplied in the food. Now, if you fed them on bread only, there would be wanted daily at least 380 ℔ of it to sustain them alive long, for it takes that weight to yield the 4½ ℔ of nitrogen daily excreted; while, in the 380 ℔ of bread there are 128½ ℔ of carbon, which is 57 ℔ above the needful quantity of that substance.[2]

If, on the other hand, the bread were replaced by a purely animal diet, there would have to be found 354 ℔ of lean meat in order to give the 71½ ℔ of carbon; and thus there would be wasted 105 ℔ of nitrogen contained in the meat, over and above the 4½ ℔ really required to prevent emaciation.[3]

In the first case each man would be eating about 4 ℔ of bread, in the second 3½ ℔ of meat *per diem*. If he ate less, he would lose his strength. The first would carry about with him a quantity of starch, and the last a quantity of albuminous matter not wanted for nutrition, and would burden the system with an useless mass very liable to decompose and become noxious.

When work is undertaken, much more is actually wanted. According to Mr Vizetelly, the labourer in a Spanish vineyard consumes daily between 8 and 9 ℔ of vegetable food, consisting of bread, onion-porridge, and grapes.[4] And when animal food alone is taken, as in the case of the Esquimaux, 20 ℔ of it a day is the usual allowance.

Now, if a mixed dietary be adopted for the gang of 100 prisoners before mentioned, 200 ℔ of farinaceous food, with 56 ℔ of animal muscle, would fulfil the requirements of the case; 2 ℔ of bread and a little more than ½ ℔ of meat a head would be enough, under ordinary circumstances, for each man's daily food.

200 lbs. of bread contains.........	60	of carbon,	2	of nitrogen.
60 lbs. of meat (including 12½ lbs. of fat on it), contains	12	„	2½	„
	72		4½	

Balance of Food and Work.—The most important modification to be made in the above estimate arises from the differences of work demanded. Men may exist in inaction on a scale of food-supply which is followed by death from starvation when they are put to hard labour. It is of importance, therefore, to have some measure of the effects of physical exertion. And here mechanical science has contributed to physiology a precision rarely attainable in our dealings with social economy. Mr Joule of Manchester analyzed, about thirty years ago, the relation which the heat, used as a source of power in machinery, bore to the force of motion thus made active. He showed that raising the temperature of 1 ℔ of water 1° Fahr. was equivalent to raising 772 ℔ to the height of 1 foot; and conversely, that the fall of 772 ℔ might be so applied as to heat 1 ℔ of water 1° Fahr. Thus, the mechanical work represented in lifting 772 ℔ 1 foot, or 1 ℔ 772 feet, forms the "dynamic equivalent," the measure of the possible strength of 1° of temperature as marked by the thermometer in 1 ℔ of water. Physiologists seized eagerly on the opportunity which Joule's demonstration seemed to afford them of estimating in actual numerals the relation of living bodies to the work they have to do. So much earth raised on an embankment represents so much heat developed in the machinery, be it living or dead. The fully digested food, converted through several stages into gaseous, liquid, and solid excretory matters, produces by its chemical changes a definite amount of heat, of which a definite amount escapes and a definite amount is employed in working the involuntary machinery of the body, and the rest is available for conversion at will into voluntary muscular actions.

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[1] Milne-Edwards, *Cours de Physiologie*, vol. vi. p. 198.

[2] Dr Letheby's analysis gives 8·1 per cent. of nitrogenous matter to bread (*Lectures on Food*, p. 6). Of this ⅐th is nitrogen, Boussingault's analysis of gluten giving 14·60 per cent. (*Annales de Chim. et Phys.*, lxiii. 229). M. Payen makes the proportion of nitrogen to carbon in bread as 1 to 30.

[3] The proportion of nitrogen to carbon in albumen is as 1 to 3½ (15·5 to 53·5 by Mulder's analysis, quoted in Lehmann, *Phys. Chemie*, i. 343). In red meat there is 74 per cent. of water (ditto iii. 96).

[4] *Facts about Sherry*, chap. i. 1876; and Sir John Ross's *Second Voyage for the Discovery of the North-West Passage*, p. 413.

It may be reckoned that the daily expenditure of force in working the machinery of the body—in raising the diaphragm about 15 times and contracting the heart about 60 times a minute, in continuously rolling the wave of the intestinal canal, and in various other involuntary movements, without anything to be fairly called work,—it may be reckoned that the expenditure of force in doing this is equal to that which would raise a man of 10 stone 10,000 feet.

There are several reasons for believing that in assigning their physiological functions to the several sorts of food, nearly all the business of begetting force should be ascribed to the solid hydrocarbons, starch and oil, by their conversion into carbonic acid and water, just as there are good grounds for thinking that it is the conversion of the solid hydrocarbon of coal into the same substances which drives a locomotive. To the nitrogenous aliments seems allotted primarily the task of continuously replacing the wear and tear of the nitrogenous tissues, while any excess of them assists the starch and oil in keeping up the animal heat.

One of the most cogent of the reasons for this view is that the chief nitrogenous excretion, the urea, is not increased in amount in proportion to the work done, as shown by the experiments of Messrs Fink and Wiscelenus; whereas the excretion of carbonic acid in a decided manner follows the amount of muscular exertion. Now, it is very clear that if the supply of power to do work depended on the decomposition and renewal of the muscles by flesh food, the urea must be exactly proportioned to the exertion, which is not the case.

To give an example of the mode of working out a problem by this theory. Professor Frankland, in a series of experiments made in 1866 at the Royal Institution, and published in the *London Philosophical Magazine*, vol. xxxii. p. 182, ascertains with the "calorimeter" (which reckons the *amount* of heat evolved as a thermometer does its *degree*) the quantity of energy or force evolved under the form of heat during the oxidation of a given weight of alimentary substance. It has been explained that heat and mechanical work, being convertible into one another, bear a constant proportion to one another; so that a definite production of so much heat invariably represents the potentiality of so much motion, used or wasted according to circumstances. From the reading of the calorimeter therefore may be calculated how many extra pounds ought to be raised a foot high by a man who has eaten an extra pound of the food in question; how many steps a foot high he ought to raise a weight of ten stone (say himself) before he has worked out the value of his victuals. Professor Frankland has thus estimated the comparative value of foods as bases of muscular exertion, and he has made out a table of the weight and cost of various articles that would require to be consumed daily to enable a man to support life, the equivalent of which has been already reckoned as the muscular force in action which would raise a man of 10 stone 10,000 feet.

Name of Food.	Weight in pounds required.	Price per Lb.		Cost.	
		s.	d.	s.	d.
Cheshire cheese..........	1·156	0	10	0	11½
Potatoes	5·068	0	1	0	5¼
Apples	7·815	0	1½	0	11¾
Oatmeal	1·281	0	2¾	0	3½
Flour..	1·311	0	2¾	0	3½
Peameal.....................	1·335	0	3¼	0	4½
Ground rice.........	1·341	0	4	0	5½
Arrowroot	1·287	1	0	1	3½
Bread........................	2·345	0	2	0	4¾
Lean beef....................	3·532	1	0	3	6½
Lean veal....................	4·300	1	0	4	3½
Lean ham (boiled).......	3·001	1	6	4	6
Mackerel	3·124	0	8	2	1
Whiting................. ..	6·369	1	4	9	4
White of egg................	8·745	0	6	4	4½
Hard-boiled egg..........	2·209	0	6½	1	2½
Isinglass	1·377	16	0	22	0½
Milk	8·021	0	2½	1	8
Carrots	9·685	0	1½	1	2½
Cabbage	12·020	0	1	1	0½
Cocoa-nibs..................	0·735	1	6	1	1¼
Butter................... ...	0·693	1	6	1	0½
Beef fat......................	0·555	0	10	0	5½
Cod-liver oil................	0·553	3	6	1	11¼
Lump sugar	1·505	0	6	0	9
Commercial grape sugar	1·537	0	3½	0	5½
Bass's pale ale (bottled)	9 bottles.	0	10	7	6
Guinness's stout..........	6¾ bottles.	0	10	5	7½

After the supply of sufficient albuminoid matters in the food to provide for the necessary renewal of the tissues, the best materials for the production of internal and external work are non-nitrogenous matters, such as oil, fat, sugar, starch, gum, &c. When the work is increased, not so much extra meat as vegetable food, or its dietetic equivalent, fat, is demanded.

In comparing the cost of a daily sufficiency of the various foods to produce the required force, we must not forget the inconveniences which many of them entail. These inconveniences must be added to the cost. For example, suppose a man to have been living upon potatoes only, just supporting life with 5 ℔ a day, and then to get work which enabled him and required him to take a double supply of non-nitrogenous food, he would act unwisely if he were to swallow it in the form of 12 ℔ of cabbage. He would be knocked up by the shear labour of carrying 12 ℔ extra in a vessel so ill-adapted to sustain heavy loads as the stomach. A similar objection would lie against milk, or veal, or apples, however cheap accident might make them; and a more serious objection still would hold against nine bottles of ale, or seven of stout. On the other hand, the over-concentration of cheese, beef dripping, and lump sugar, makes them nauseous when in large quantity or monotonously persisted in, though when introduced as a variety they are appetizing and digestible. There is no saving in using that against which the stomach is set, or which the absorbents refuse to assimilate.

Reverting to the illustration of the gang of a hundred prisoners, and supposing it were requisite to put them on hard labour equivalent to half "Frankland's unit" of 10 stone raised 10,000 feet—such, for instance, as carrying up ladders, altogether 1⅛ mile high, three tons of stone daily—calculation would show that to add this amount of labour to the outgoings caused by the functioning of physiological life, would involve the addition to their spare diet of at least 117 ℔ of bread, or of 58 ℔ of bread with 44 ℔ of lean meat and 63 ℔ of potatoes. The slightest imperfection or indigestion of any of this would cause a loss of bodily weight, and cases of illness would be culpably frequent. Were a draught of milk, or a cup of cocoa and sugar, or some oatmeal porridge and treacle, or even a little dripping or butter or bacon given, the danger would probably be averted.

The most conspicuous fault in the dietary of the working classes is want of variety. Many of the articles which combine ample nutritiousness with small cost are habitually neglected, because when used exclusively they are disagreeable and unwholesome. From never being eaten they become absolutely unknown. There are many sorts of cheap beans, vetches, and pease, unheard of except at gentlemen's tables, of which a complete meal may be made, or which may support the dish of meat; while beet-root, cresses, kail, carrots, and other plants easily grown are left unused.

Quantity of Food required.—The calculations of Dr Playfair "on the food of man in relation to his useful work[1]" enable us by another route to arrive at an estimate of what amount of solid victuals is required by an adult living by bodily labour to preserve his health under various circumstances. The circumstances which chiefly affect the question can be classified thus:—(1) bare existence; (2) moderate exercise; (3) active work; and (4) hard work.

1. The first is calculated from the mean of sundry prison dietaries, of the convalescents' diet at hospitals, that of London needlewomen, and of that supplied during the Lancashire cotton-famine, as reported by Mr Simon. The result is that, in a condition of low health, without activity, 2½ ounces of nitrogenous food, 1 ounce of fat, 12 ounces of starch, and ½ of an ounce of mineral matters a day are necessary. The amount of carbon in this is equal to 7·44 ounces. In other words, a man's life will be shortened or burdened by disease in the future, or he will die of gradual starvation, unless his provision for a week is equivalent to 3 ℔ of meat with 1 ℔ of fat on it, or with the same quantity of butter or lard, two quartern loaves of bread, and about an ounce of salt and other condiments. If he cannot get meat, he must supply its place with at least two extra quartern loaves, or about a stone and a half of potatoes, or between 5 and 6 ℔ of oatmeal.—unless he is, indeed, so fortunate as to be able to get skim milk, of which 5 pints a week will replace the meat.

A person reduced to bare existence diet can undertake no habitual toil, mental or bodily, under the penalty of breaking down.

"Bare existence" diet is that which requires to be estimated for administration to certain classes of the community who have a claim on their fellow-countrymen that their lives and health shall be preserved *in statu quo*, but nothing further. Such are prisoners, paupers, or the members of a temporarily famine-stricken community.

It would be obviously unjust to apply the same scale of quantity and quality to all persons under varying circumstances of constitution and outward surroundings; and to attempt to feed in the same way all these people for short or long periods, idle or employed, with light work or hard work, in hot or in cold weather, excited by hope or depressed by failure, involves an error of either excess or defect, or both at once. The dietaries recommended by the Home Office for prisoners very properly take all these circumstances into consideration. They allot "bare existence" diet only to those sentenced for short terms without labour. And they recognize the fact that a man's health is not injured (perhaps sometimes it is improved) by a few days of such abstinence as would in the long run be deleterious to him. Under a sentence of seven days a prisoner gets daily 1 ℔ of bread, and a quart of gruel containing 4 oz. of oatmeal. For more than seven and under twenty-one days he has an extra ½ ℔ of bread. For longer terms it is advised to add potatoes and meat.

The nutritive value of the first named diet is thus calculated by Dr Pavy (*Treatise on Food*, p. 415):—

Nitrogenous matter	1·300 oz.
Fat	·480 „
Carbohydrates	10·712 „

of the second—

Nitrogenous matter	2·448 oz.
Fat	·608 „
Carbohydrates	14·792 „

In the convict establishments prisoners are all under long sentence, and are classified for dietetic purposes according to their occupation.

The sparest of all is called "punishment diet," and is administered for offences against the internal discipline of the prison. It is equivalent to corporeal chastisement, being designed to make the stomach a source of direct pain. It is limited to a period of three days, and fully answers its proposed end as a deterrent by causing the solar plexus to experience the greatest amount of distress it is capable of; for after the expiration of that period sensation becomes blunted. It consists of 1 ℔ of bread and as much water as the prisoner chooses to drink. This last-named concession is not an unimportant one; for it has been already remarked that a supply of fluid enables starvation, and by implication abstinence, to be longer borne. At the same time it probably postpones the anæsthesia, and therefore makes the intended suffering more real. "Punishment diet" contains, in Dr Pavy's estimate,—

Nitrogenous matter	1.296 oz.
Carbohydrates	8·160 „
Fat	0·256 „
Mineral matter	0·368 „
Total of dry solids	10·080 „

This is about half of what an average man requires to sustain himself without work, and under its discipline he would probably lose 3 or 4 ounces of his weight daily till his bodily substance was reduced by six-tenths, at which period, according to Chossat's experiments, he would die.

"Penal diet" is that which is apportioned for more protracted punishment. It may be continued for three months. It consists of 20 oz. of bread, 8 oz. of oatmeal, 20 oz. of milk, and 16 oz. of potatoes daily. Its chemical constituents are as follows:—

Nitrogenous matter	3·784 oz.
Carbohydrates	19·864 „
Fat	1·580 „
Mineral matter	0·972 „
Total of dry solids	26·200 „

Upon this diet a fair amount of work may be done. The combustion of the carbohydrates evolves sufficient force to raise a ton 4193 feet; and thus the effete muscular substance may be worn off by destructive assimilation, making place for new muscle derived from the nitrogenous matter of which a bare sufficiency, but yet probably a sufficiency, is supplied. A man of strong constitution is usually found at the end of it to be in good health and of normal weight;

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[1] *Lecture delivered at the Royal Institution, London*, April 28, 1865.

yet he has never probably experienced the content which arises from a *luxus*-consumption of food. It is intended to deny him the normal pleasure of the accumulation of reserve-force in the gastric region. This pleasurable sensation under ordinary circumstances much promotes digestion, so that the whole of the ingesta are made the best use of; and therefore in "penal diet," as above quoted, it has been found expedient to introduce the slight excess to be noticed above what is needful to accomplish the required work in "foot-tons" (see before). The penalty of the regimen involves a certain degree of waste.

A close imitation of "penal diet" is that which the duty of a responsible Government demands should be served out during a temporary famine, that is, one calculated not to last above three months. It is more economical to introduce the elements of variety in the diet than to be too monotonous,—that is, to save in the daily issue and to be occasionally liberal, to feast from time to time as a break in the regular fast. The expense of the excess is more than replaced by the diminished habitual ration, and that powerful preservative of life, anticipation of pleasure, is brought into play. A reduction of the allowance below what experience has indicated as "bare existence diet," made during the famine in Madras in the beginning of 1877, was attended with disastrous results.

By dint of mixing and varying his diet and making it consist of very nutritious articles, such as bread, meat, yolk of eggs, and soup, Signor Cornaro (see CORNARO) succeeded in reducing the quantity he daily consumed to as little as 12 oz. (Venetian). But then he made the solids go much further by taking 14 oz. of good wine. And the probability is that this gentlemen had a peculiar constitution, for, in spite of his many readers, he has had no imitators of the experiment on their own persons.

2. The appropriate food of the second class may be fairly represented by the dietaries of European soldiers in time of peace. The English soldier on home service, according to Dr Parkes, receives from Government 5¼ ℔ of meat and 7 ℔ of bread weekly, and buys additional bread, vegetables, milk, and groceries out of his pay. Such a diet is sufficient for anybody under ordinary circumstances of regular light occupation; but should extra demands be made upon mind or body, weight is lost, and if the demands continue to be made the health will suffer. Mr F. Buckland, surgeon in the Guards, remarks (*Soc. of Arts Journal*, 1863, quoted by Dr Playfair) that though the sergeants in the Guards fatten upon their rations, the quantity is not enough for recruits during their drill.

The Prussian soldier during peace gets weekly from his canteen 11 ℔ 1 oz. of rye bread, and not quite 2½ ℔ of meat. This is obviously insufficient, but under the conscription system it is reckoned that he will be able to make up the deficiency out of his own private means, or obtain charitable contributions from his friends. Dr Hildesheim (*Die Normal-Diät*, Berlin, 1856, p. 60) states that asthenic diseases are very common in the army, which leads to the inference that the chance assistance on which the authorities lean is not trustworthy. As the legal ration in these two services does not profess to be a man's full food, it is needless to analyze it. In the French infantry of the line each man during peace gets weekly 15 ℔ of bread, $3\frac{3}{10}$ ℔ of meat, 2½ ℔ of haricot beans or other vegetables, with salt and pepper, and 1¾ oz. of brandy. This seems to be enough to support a man under light employment. Its analysis gives—

Water	179·83 oz.
Nitrogenous matter (or albuminates)	30·17 ,,
Fat	9·29 ,,
Carbohydrates (or starch)	126·84 ,,
Total of dry solids	166·30 ,,

An Austrian under the same circumstances receives 13·9 ℔ of bread, ½ ℔ of flour, and 3·3 ℔ of meat. The alimentary contents are—

Water	129·50 oz.
Nitrogenous matter	27·40 ,,
Fat	8·23 ,,
Carbohydrates	119·45 ,,
Total of dry solids	155·08 ,,

The Russian conscript is allowed weekly[1]—

Black bread	7 ℔.
Meat	7 ℔.
Kawass (beer)	7·7 quarts.
Sour cabbage	24½ gills, = 122½ oz.
Barley	24½ gills, = 122½ oz.
Salts	10½ oz.
Horse radish	28 grains.
Pepper	28 grains.
Vinegar	5¼ gills, = 26¼ oz.

The "moderate exercise" of brain and muscle combined in the above classes is fairly represented in the convict scale by "light labour" (such as oakum-picking), and by "industrial employment" (such as tailoring, cobbling, Roman mosaic and mat making, basket weaving, &c). The dietary for prisoners thus engaged is nearly identical, except that the artisans using their brains are supplied with about an ounce extra daily.

The "industrial employment diet" for a week is thus analysed by Dr Pavy:—

Weekly Allowance.		Nitrogenous matter.	Carbohydrates.	Fat.	Mineral Matter.	Total water-free matter.
	oz.	oz.	oz.	oz.	oz.	oz.
Cocoa	3·500	0·560	1·540	1·295	0·105	3·500
Oatmeal	14·000	1·764	8·932	0·784	0·420	11·900
Milk	28·000	1·148	1·456	1·092	0·224	3·920
Molasses	7·000	...	5·390	...	...	5·390
Salt	3·500	...	...	...	3·500	3·5[illegible]
Barley	1·000	0·063	0·748	0·024	0·020	0·85[illegible]
Bread	148·000	11·988	75·480	2·368	3·404	93·24[illegible]
Cheese	4·000	1·340	...	0·972	0·216	2·528
Flour	8·625	0·931	6·081	0·172	0·147	7·33[illegible]
Meat (cooked, without bone or gravy)	16·000	4·416	...	2·472	0·472	7·36[illegible]
Shins (made into soup)	8·000	1·688	...	0·320	2·072	4·0[illegible]
Suet	1·500	...	...	1·244	0·030	1·2[illegible]
Carrots	1·000	0·013	0·145	0·002	0·015	0·1[illegible]
Onions	3·000	0·036	0·216	...	0·015	0·2[illegible]
Turnips	1·000	0·012	0·072	...	0·008	0·0[illegible]
Potatoes	96·000	2·016	21·120	0·192	0·672	2[illegible]
Total water-free matter		25·975	121·175	10·937	11·815	1[illegible]

This is probably a fair model for the most economic[illegible] dietary on which an artisan or labourer on light work [illegible] thrive. It may be observed that the principle of varie[illegible] is very conspicuous, and in private life it is possible to [illegible]troduce still more variety by cookery (see COOKERY.) [illegible] the English and Prussian armies the introduction of varie[illegible] is left to be attained by forcing the soldier to purchase [illegible] portion of his food out of his own pocket; in the Fre[illegible] scale it is managed by issuing spices and various vegetab[illegible] and trusting to the innate genius of the Gaulish warrior [illegible] cooking. The issue of an occasional glass of brandy [illegible] holidays makes an agreeable change and benefits digesti[illegible] but if wine could be obtained it would be better, and [illegible] extravagant. The Austrian bill of fare is sadly monoton[illegible] The Russian ration may be noticed as particularly lib[illegible] of accessory and antiscorbutic food, from which civ[illegible] well as military dieticians might take an useful [illegible]

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[1] Report of Sanitary Commission, 1858, p. 425, quoted [illegible] Parkes.

Vinegar and other vegetable acids are too much neglected by our handicraftsmen and soldiers. The Carthaginians are stated by Aristotle to have used vinegar as a substitute for wine during their campaigns; and the recipes given by Cato for flavouring vinegar with fruits show that it was in use among the labouring population in Italy.

3. "Active" labourers are those who get through such an amount of work daily, exclusive of Sundays, as may be represented by a walk of 20 miles. In this class are soldiers during a campaign, letter carriers, and engineers employed on field work or as artisans. These habitually consume on the average about a fifth more nitrogenous food and twice as much fat as the last class, while the quantity of vegetable hydrocarbons is not augmented, except in the Royal Engineers.

The "hard labour diet" of convict prisons fairly represents what the authorities consider the minimum. It is the same as that already described as "industrial employment diet," with the following additions:—barley, 1 oz.; bread, 20 oz.; shins for soup, 8 oz.; carrots, 1 oz.; onions, ½ oz.; turnips, 1 oz. It contains, however, 14 oz. less milk, and 1 oz. less "meat."

The nutritive value of the additions may be seen by Dr Pavy's alimentary analysis, which is as follows:—

Weekly Additions.		Nitrogenous matter.	Carbohydrates.	Fat.	Mineral matter.	Total water-free matter.
	oz.					
Barley	1·000	0·063	0·743	0·024	0·020	0·850
Bread	20·000	1·620	10·280	0·320	0·460	12·680
Shins............	8·000	1·688	...	0·320	2·072	4·080
Carrots............	1·000	0·013	0·145	0·002	0·010	0·170
Onions	0·500	0·006	0·036	...	0·003	0·045
Turnips.	1·000	0·012	0·072	...	0·006	0·090
Total water-free matter		3·402	11·276	0·666	0·571	17·915

From these totals must be deducted the articles cut off:—

Weekly Diminutions.		Nitrogenous matter.	Carbohydrates.	Fat.	Mineral matter.	Total water-free matter.
Milk...............	14·000	0·574	0·728	0[illegible]46	0·112	1·960
Meat...............	1·000	0·276	...	0·154	0·030	0·460
Total water-free matter		0·850	0·728	0·700	·142	2·420

The same food is given summer and winter, though the demand must be greater to provide for the extra quantity of heat required to be produced in cold weather. But then the amount of work is diminished at the latter season by 1½ hours, which is equivalent to an augmentation of the diet. The additions are more judicious than those made by the classes above mentioned who partly furnish their own food; for bread and vegetables constitute a large portion of the convict ration, and the extra quantity of soup replaces the lost milk, without risk of the waste in cooking common when the uneducated deal with solid meat.

4. "Hard work" is that got through by English navvies, hard-worked weavers, and blacksmiths, &c. which is more earnest and intense than the enforced "hard labour" of the convict. It is difficult to obtain accurate information, but it would appear from Dr Playfair's estimates that the customary addition to the diet is entirely in nitrogenous constituents. The higher their wages the more meat the men eat.

The neglect of vegetables by the last two classes is in a physiological point of view imprudent, and possibly may be a contributing cause of an inordinate thirst for alcohol which impoverishes and degrades many among them. To satisfy their instinctive craving for a hydrocarbon, they take one convenient indeed in some respects, but of which any excess is unwholesome. The discovery already mentioned of the production of force from the assimilation of starch leads to a knowledge, opposed to old prejudices but supported by experience, that the raising of the energies to their full height of usefulness may be effected by vegetable food quite as well as by the more stimulating and more expensive animal nutriment, or by the more rapidly absorbed alcohol.

With regard to the tables quoted above in which ultimate analyses are used as data for dietetic rules, it must be noticed that their authors deprecate arguments being founded on any but the very broadest characters of the articles analyzed. Specimens, even when of the highest quality, differ strangely from one another. Season, soil, modes of culture, the variations of species, and many other little known influences come into play and prevent our taking the market names of eatables as representatives of a definite chemical constitution. And it may be added that ample scope should be allowed for the peculiarities of the individual and of his life-history. In the application of general rules some one must be trusted to relax or strain them when circumstances require, or failures of a fatal character may occasionally result, and more often a galling perversion of justice.

Estimates for the thrifty management of food-supply have usually reference to the feeding of others rather than to the calculation of a man's own dietary. Enough has been said on that point under the head of the influence of diet upon health, and if a person really wants to bring down the expense of feeding himself to the lowest point, he can readily rate himself under one of the classes enumerated above, and act accordingly. It may, however, be doubted whether it is wise to reduce the diet to the minimum which the work requires. The certain evils of an accidental deficiency or of a miscalculation are so serious that the danger outweighs the possible inconvenience of a slight excess. It were an unthrifty thrift indeed which imperilled vigour of mind and body to effect a pecuniary saving; for there is no investment so remunerative as high health. A man need not consider that he is wasteful when he spends money upon making his bill of fare palatable and provocative of indulgence to the extent of moderate superfluity. Pleasure and prudence here walk hand in hand. (T. K. CH.)

DIETRICH, Christian Wilhelm Ernst (1712-1774), was born at Weimar, where he was brought up early to the profession of art by his father Johann George, then painter of miniatures to the court of the grand duke. Being sent to Dresden to perfect himself under the care of Alexander Thiele, he had the good fortune to finish in two hours, at the age of eighteen, a picture which attracted the attention of the king of Saxony. Augustus II. was so pleased with Dietrich's readiness of hand that he gave him means to study abroad, and visit in succession the chief cities of Italy and the Netherlands. There he learnt to copy and to imitate masters of the previous century with a versatility truly surprising. Winckelmann, to whom he had been recommended, did not hesitate to call him the Raphael of landscape. Yet in this branch of his practice he merely imitated Salvator Rosa, Roos, and Everdingen. He was more successful in aping the style of Rembrandt, and numerous examples of this habit may be found in the galleries of St Petersburg, Vienna, and Dresden. At Dresden, indeed, there are pictures acknowledged to be his, bearing the fictitious dates of 1636 and 1638, and the name of Rembrandt. Among Dietrich's cleverest reproductions we may account that of Ostade's manner in the Itinerant Singers at the National Gallery. His skill in catching the character of the later masters of Holland is shown in candle-light scenes, such as the Squirrel and the

Peep-Show at St Petersburg, where we are easily reminded of Godfried Schalcken. Dietrich tried every branch of art except portraits, painting Italian and Dutch views alternately with Scripture scenes and still life. In 1741 he was appointed court painter to August III. at Dresden, with an annual salary of 400 thalers (£60), conditional on the production of four cabinet pictures a year. This condition, no doubt, accounts for the presence of 52 of the master's panels and canvases in one of the rooms at the Dresden museum. These pieces enable the spectator, if careless of more serious occupation, to study the numerous varieties of a changing style. It is needless, perhaps, to add that Dietrich, though popular and probably the busiest artist of his time, never produced anything of his own; and his imitations are necessarily inferior to the originals which he affected to copy. His best work is certainly that which he gave to engravings. A copious collection of these at the British Museum, produced on the general lines of earlier men, such as Ostade and Rembrandt, reveal both spirit and skill. Dietrich, after his return from the Peninsula, generally signed himself "Dietericij," and with this signature most of his extant pictures are inscribed. His death took place at Dresden, after he had successively filled the important appointments of director of the school of painting at the Meissen porcelain factory and professor of the Dresden academy of arts.

DIEZ, Friedrich Christian (1794–1876), the founder of Romance philology, was born at Giessen, in Hesse-Darmstadt, March 15, 1794, and died at Bonn, May 29, 1876. He was educated first at the gymnasium and then at the university of his native town. There he studied classics under Welcker, who had just returned from a two years' residence in Italy to fill the chair of archæology and Greek literature. It was Welcker who kindled in him a love of Italian poetry, and thus gave the first bent to his genius. In 1813 he joined the Hesse corps as a volunteer and served in the French campaign. Next year he returned to his books, and this short taste of military service was the only break in a long and uneventful life of literary labours. By his parents' desire he applied himself for a short time to law, but a visit to Goethe in 1818 gave a new direction to his studies, and determined his future career. Goethe had been reading Raynouard's *Selections from the Romance Poets*, and advised the young scholar to explore the rich mine of Provençal literature which the French savant had opened up. This advice was eagerly followed, and henceforth Diez devoted himself to Romance literature. After supporting himself for some years by private teaching, he removed in 1822 to Bonn, where he held the position of privat-docent, which is the lowest grade of the German professoriate. In 1823 he published his first work, *An Introduction to Romance Poetry*; in the following year appeared *The Poetry of the Troubadours*, and in 1829 *The Lives and Works of the Troubadours*. In 1830 he was called to the chair of modern literature. The rest of his life was mainly occupied with the composition of the two great works on which his fame rests, the *Grammar of the Romance Languages*, 1836–1844, and the *Lexicon of the Romance Languages—Italian, Spanish, and French*, 1853.

In these two works Diez has done for the Romance group of languages what Jacob Grimm has for the Teutonic family. In both cases much remains to be accomplished, many words and forms are not yet accounted for, some errors have already been pointed out, but all future philologists must build on the foundations which these two men have laid. "Nothing," says Max Muller, "can be a better preparation for the study of the comparative grammar of the ancient Aryan language than a careful perusal of the comparative grammar of the six Romance languages by Professor Diez."

In order to appreciate the importance of Diez's work it is necessary to take a rapid glance at the history of philology in France. The earliest philologists, such as Perion and Henri Estienne, sought to discover the origin of French in Greek and even in Hebrew. For more than a century Ménage's *Etymological Dictionary* held the field without a rival. Considering the time at which it was written (1650), it was a meritorious work, but philology was then in the empirical stage, and many of Ménage's derivations (such as that of "rat" from the Latin "mus," or of "haricot" from "faba") have since become by-words among philologists. A great advance was made by Raynouard, who by his critical editions of the works of the Troubadours, published in the first years of the present century, laid the foundations on which Dies afterwards built. The difference between Diez's method and that of his predecessors is well stated by him in the preface to his dictionary. In sum it is the difference between science and guess-work. The scientific method is to follow implicitly the discovered principles and rules of phonology, and not to swerve a foot's breadth from them unless plain, actual exceptions shall justify it; to follow the genius of the language, and by cross-questioning to elicit its secrets; to guage each letter and estimate the value which attaches to it in each position; and lastly to possess the true philosophic spirit which is prepared to welcome any new fact, though it may modify or upset the most cherished theory.

Such is the historical method which Diez pursues in his grammar and dictionary. To collect and arrange facts is, as he tells us, the sole secret of his success, and he adds in other words the famous apophthegm of Newton, "hypotheses non fingo."

The introduction to the grammar consists of two parts:—the first discusses the Latin, Greek, and Teutonic elements common to the Romance languages; the second treats of the six dialects separately, their origin, and the elements peculiar to each. The grammar itself is divided into four books, on phonology, on flexion, on the formation of words by composition and derivation, and on syntax.

His dictionary is divided into two parts. The first contains words common to two at least of the three principal groups of Romance,—Italian, Spanish and Portuguese, and Provençal and French. The Italian, as nearest the original, is placed at the head of each article. The second part treats of words peculiar to one group. There is no separate glossary of Wallachian.

Of the introduction to the grammar there is an excellent translation into French by Gaston Paris, a pupil of Diez, and an English translation by C. B. Cayler. The dictionary has been published in a remodelled form for English readers by T. C. Donkin. A second edition, enlarged and corrected, appeared in 1861, and a third edition was begun in 1869.

DIFFERENTIAL CALCULUS. See Infinitesimal Calculus.

DIFFUSION. Some liquids, such as mercury and water, when placed in contact with each other do not mix at all, but the surface of separation remains distinct, and exhibits the phenomena described under Capillary Action. Other pairs of liquids, such as chloroform and water, mix, but only in certain proportions. The chloroform takes up a little water, and the water a little chloroform; but the two mixed liquids will not mix with each other, but remain in contact separated by a surface showing capillary phenomena. The two liquids are then in a state of equilibrium with each other. The conditions of the equilibrium of heterogeneous substances have been investigated by Professor J. Willard Gibbs in a series of papers published in the *Transactions of the Connecticut Academy of Arts and Sciences*, vol. iii. part 1. p. 108. Other pairs of liquids, and all gases, mix in all proportions

wo fluids are capable of being mixed, they cannot
equilibrium with each other; if they are placed
with each other the process of mixture begins
and goes on till the state of equilibrium is
which, in the case of fluids which mix in all
s, is a state of uniform mixture.

ocess of mixture is called diffusion. It may be
rved by taking a glass jar half full of water and
strong solution of a coloured salt, such as
f copper, through a long-stemmed funnel, so as
the lower part of the jar. If the jar is not
we may trace the process of diffusion for weeks,
years, by the gradual rise of the colour into
part of the jar, and the weakening of the colour
er part.

owever, is not a method capable of giving
neasurements of the composition of the liquid
it depths in the vessel. For more exact deter-
we may draw off a portion from a given stratum
ed liquid, and determine its composition either
l methods or by its specific gravity, or any other
rom which its composition may be deduced.

he act of removing a portion of the fluid inter-
the process of diffusion, it is desirable to be
certain the composition of any stratum of the
ithout removing it from the vessel. For this
ir W. Thomson places in the jar a number
beads of different densities, which indicate
es of the strata in which they are observed to
principal objection to this method is, that if
contain air or any other gas, bubbles are apt
the glass beads, so as to make them float in a
less density than that marked on them.

has observed the diffusion of cane-sugar in
assing a ray of plane-polarized light horizontally
he vessel, and determining the angle through
plane of polarization is turned by the solution
This method is of course applicable only to
tances which cause rotation of the plane of
ight.

method is to place the diffusing liquids in a
s prism, with its refracting edge vertical, and
ne the deviation of a ray of light passing
ie prism at different depths. The ray is bent
on account of the variable density of the
s well as towards the thicker part of the prism;
king it pass as near the edge of the prism as pos-
ertical component of the refraction may be made
; and by placing the prism within a vessel of
ng parallel sides of glass, we can get rid of the
art of the deviation, and are able to use a prism
gle, so as to increase the part due to the diffus-
nce. At the same time we can more easily
l register the temperature.

s of diffusion were first investigated by Graham.
ion of gases has recently been observed with
acy by Loschmidt, and that of liquids by Fick
it.

s *as a molecular motion.*—If we observe the
diffusion with our most powerful microscopes,
follow the motion of any individual portions of
We cannot point out one place in which the
is ascending, and another in which the upper
scending. There are no currents visible to us,
notion of the material substances goes on as
bly as the conduction of heat or of electricity.
motion which constitutes diffusion must be
ed from those motions of fluids which we can
eans of floating motes. It may be described as
f the fluids, not *in mass*, but by *molecules*.

When we reason upon the hypothesis that a fluid is a continuous homogeneous substance, it is comparatively easy to define its density and velocity; but when we admit that it may consist of molecules of different kinds, we must revise our definitions. We therefore define these quantities by considering that part of the medium which at a given instant is within a certain small region surrounding a given point. This region must be so small that the properties of the medium as a whole are sensibly the same throughout the region, and yet it must be so large as to include a large number of molecules. We then define the density of the medium at the given point as the mass of the medium within this region divided by its volume, and the velocity of the medium as the momentum of this portion of the medium divided by its mass.

If we consider the motion of the medium relative to an imaginary surface supposed to exist within the region occupied by the medium, and if we define the flow of the medium through the surface as the mass of the medium which in unit of time passes through unit of area of the surface, then it follows from the above definitions that the velocity of the medium resolved in the direction of the normal to the surface is equal to the flow divided by the density. If we suppose the surface itself to move with the same velocity as the fluid, and in the same direction, there will be no flow through it.

Having thus defined the density, velocity, and flow of the medium as a whole, or, as it is sometimes expressed, "in mass," we may now consider one of the fluids which constitute the medium, and define its density, velocity, and flow in the same way. The velocity of this fluid may be different from that of the medium in mass, and its velocity relative to that of the medium is the velocity of diffusion which we have to study.

Diffusion of Gases according to the Kinetic Theory.

So many of the phenomena of gases are found to be explained in a consistent manner by the kinetic theory of gases, that we may describe with considerable probability of correctness the kind of motion which constitutes diffusion in gases. We shall therefore consider gaseous diffusion in the light of the kinetic theory before we consider diffusion in liquids.

A gas, according to the kinetic theory, is a collection of particles or molecules which are in rapid motion, and which, when they encounter each other, behave pretty much as elastic bodies, such as billiard balls, would do if no energy were lost in their collisions. Each molecule travels but a very small distance between one encounter and another, so that it is every now and then altering its velocity both in direction and magnitude, and that in an exceedingly irregular manner.

The result is that the velocity of any molecule may be considered as compounded of two velocities, one of which, called the velocity of the medium, is the same for all the molecules, while the other, called the velocity of agitation, is irregular both in magnitude and in direction, though the average magnitude of the velocity may be calculated, and any one direction is just as likely as any other.

The result of this motion is, that if in any part of the medium the molecules are more numerous than in a neighbouring region, more molecules will pass from the first region to the second than in the reverse direction, and for this reason the density of the gas will tend to become equal in all parts of the vessel containing it, except in so far as the molecules may be crowded towards one direction by the action of an external force such as gravity. Since the motion of the molecules is very swift, the process of equalization of density in a gas is a very rapid one, its velocity of propagation through the gas being that of sound.

Let us now consider two gases in the same vessel, the proportion of the gases being different in different parts of the vessel, but the pressure being everywhere the same. The agitation of the molecules will still cause more molecules of the first gas to pass from places where that gas is dense to places where it is rare than in the opposite direction, but since the second gas is dense where the first one is rare, its molecules will be for the most part travelling in the opposite direction. Hence the molecules of the two gases will encounter each other, and every encounter will act as a check to the process of equalization of the density of each gas throughout the mixture.

The interdiffusion of two gases in a vessel is therefore a much slower process than that by which the density of a single gas becomes equalized, though it appears from the theory that the final result is the same, and that each gas is distributed through the vessel in precisely the same way as if no other gas had been present, and this even when we take into account the effect of gravity.

If we apply the ordinary language about fluids to a single gas of the mixture, we may distinguish the forces which act on an element of volume as follows:—

1st. Any external force, such as gravity or electricity.

2d. The difference of the pressure *of the particular gas* on opposite sides of the element of volume. [The pressure due to other gases is to be considered of no account].

3d. The resistance arising from the percolation of the gas through the other gases which are moving with different velocity.

The resistance due to encounters with the molecules of any other gas is proportional to the velocity of the first gas relative to the second to the product of their densities, and to a coefficient which depends on the nature of the gases and on the temperature. The equations of motion of one gas of a mixture are therefore of the form

$$\rho_1\frac{\delta_1 u_1}{\delta t}+\frac{dp_1}{dx}-X_1\rho_1+C_{12}\rho_1\rho_2(u_1-u_2)+C_{13}\rho_1\rho_3(u_1-u_3)+\&c.=0\,,$$

where the symbol of operation $\frac{\delta_1}{\delta t}$ prefixed to any quantity denotes the time-variation of that quantity at a point which moves along with that medium which is distinguished by the suffix ($_1$), or more explicitly

$$\frac{\delta_1}{\delta t}=\frac{d}{dt}+u_1\frac{d}{dx}+v_1\frac{d}{dy}+w_1\frac{d}{dz}$$

In the state of ultimate equilibrium $u_1=u_2=\&c.=0$, and the equation is reduced to

$$\frac{dp_1}{dx}-X\rho_1=0\,,$$

which is the ordinary form of the equations of equilibrium of a single fluid. Hence, when the process of diffusion is complete, the density of each gas at any point of the vessel is the same as if no other gas were present.

If V_1 is the potential of the force which acts on the gas, and if in the equation $p_1=k_1\rho_1$, k_1 is constant, as it is when the temperature is uniform, then the equation of equilibrium becomes

$$k_1\frac{d\rho_1}{dx}+\frac{dV_1}{dx}\rho_1=0\,,$$

the solution of which is

$$\rho_1=A_1e^{-\frac{V_1}{k_1}}\,.$$

Hence if, as in the case of gravity, V is the same for all gases, but k is different for different gases, the composition of the mixture will be different in different parts of the vessel, the proportion of the heavier gases, for which k is smaller, being greater at the bottom of the vessel than at the top. It would be difficult, however, to obtain experimental evidence of this difference of composition except in a vessel more than 100 metres high, and it would be necessary to keep the vessel free from inequalities of temperature for more than a year, in order to allow the process of diffusion to advance to a state even half-way towards that of ultimate equilibrium. The experiment might, however, be made in a few minutes by placing a tube, say 10 centimetres long, on a whirling apparatus, so that one end shall be close to the axis, while the other is moving at the rate, say, of 60 metres per second. Thus if equal volumes of hydrogen and carbonic acid were used, the proportion of hydrogen to carbonic acid would be about $\frac{1}{17}$ gre
end of the tube nearest the axis. The experimental ve
the result is important, as it establishes a method of ef
partial separation of gases without the selective action o
agents.

Let us next consider the case of diffusion in a vertica
Let m_1 be the mass of the first gas in a column of unit a
ing from the bottom of the vessel to the height x, and le
volume which this mass would occupy at unit pressure,

$$k_1m_1=v_1\,,$$

$$\rho_1=\frac{dm_1}{dx}\,,\qquad \rho_1u_1=-\frac{dm_1}{dt}\,,$$

$$p_1=\frac{dv_1}{dx}\,,\qquad p_1u_1=-\frac{dv_1}{dt}\,;$$

and the equation of motion becomes

$$\frac{1}{k_1\left|\frac{dv_1}{dx}\right|^2}\left\{\frac{d^2v_1}{dx^2}\left|\frac{dv_1}{dt}\right|^2-\frac{d^2v_1}{dt^2}\left|\frac{dv_1}{dx}\right|^2\right\}+\frac{d^2v_1}{dx^2}-\frac{X}{k_1}\frac{dv_1}{dx}$$

$$+\frac{C_{12}}{k_1k_2}\left\{\frac{dv_2}{dt}\frac{dv_1}{dx}-\frac{dv_1}{dt}\frac{dv_2}{dx}\right\}+\&c.=0\,.$$

If we add the corresponding equations together for all
we find that the terms in C_{12} destroy each other, and t
medium is not affected with sensible currents the firs
each equation may be neglected. In ordinary experimen
also neglect the effect of gravity, so that we get

$$\frac{d^2}{dx^2}(v_1+v_2)=0\,,$$

or

$$v_1+v_2=px\,,$$

where p is the uniform pressure of the mixed medium.

$$\frac{dv_2}{dt}=-\frac{dv_1}{dt}\quad\text{and}\quad\frac{dv_2}{dx}=p-\frac{dv_1}{dx}\,,$$

and the equation becomes

$$\frac{d^2v_1}{dx^2}=\frac{C_{12}}{k_1k_2}p\frac{dv_1}{dt}\,,$$

an equation, the form of which is identical with the w
equation for the conduction of heat. We may write it

$$\frac{dv_1}{dt}=D\frac{d^2v_1}{dx^2}$$

D is called the coefficient of diffusion. It is equal to

$$\frac{k_1k_2}{C_{12}p}\,.$$

It therefore varies inversely as the total pressure of the
and if the coefficient of resistance, C_{12}, is independent o
perature, it varies directly as the product k_1k_2, *i.e.*, as the
the absolute temperature. It is probable, however, that
of temperature is not so great as this would make it.

In liquids D probably depends on the proportion of the i
of the mixed medium as well as on the temperature. T
sions of D are L^2T^{-1}, where L is the unit of length
unit of time.

The values of the coefficients of diffusion of several pai
have been determined by Loschmidt.[1] They are refer
following table to the centimetre and the second as uni
temperature 0°C and the pressure of 76 centimetres of m

	D
Carbonic acid and air, ...	0·14
Carbonic acid and hydrogen, ...	0·55
Oxygen and hydrogen, ...	0·72
Carbonic acid and oxygen, ...	0·14
Carbonic acid and carbonic oxide, . .	0·14
Carbonic acid and marsh gas, . . .	0·15
Carbonic acid and nitrous oxide, . .	0·09
Sulphurous acid and hydrogen, . .	0·48
Oxygen and carbonic oxide, . .	0·18
Carbonic oxide and hydrogen, . .	0·64

Diffusion in Liquids.

The nature of the motion of the molecules in l
less understood than in gases, but it is easy to se
there is any irregular displacement among the molec
mixed liquid, it must, on the whole, tend to cause e
ponent to pass from places where it forms a large p
of the mixture to places where it is less abundant
also manifest that any relative motion of two constit
the mixture will be opposed by a resistance arisi

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[1] Imperial Academy of Vienna, 10th March 1870.

the encounters between the molecules of these components. The value of this resistance, however, depends, in liquids, in more complicated conditions than in gases, and for the present we must regard it as a function of all the physical properties of the mixture at the given place, that is to say, its temperature and pressure, and the proportions of the different components of the mixture.

The coefficient of interdiffusion of two liquids must therefore be considered as depending on all the physical properties of the mixture according to laws which can be ascertained only by experiment.

Thus Fick has determined the coefficient of diffusion for common salt in water to be 0·00000116, and Voit has found that of cane-sugar to be 0·00000365.

It appears from these numbers that in a vessel of the same size the process of diffusion of liquids requires a greater number of days to reach a given stage than the process of diffusion of gases in the same vessel requires seconds.

When we wish to mix two liquids, it is not sufficient to place them in the same vessel, for if the vessel is, say, a metre in depth, the lighter liquid will lie above the denser, and it will be many years before the mixture becomes even sensibly uniform. We therefore stir the two liquids together, that is to say, we move a solid body through the vessel, first one way, then another, so as to make the liquid contents eddy about in as complicated a manner as possible. The effect of this is that the two liquids, which originally formed two thick horizontal layers, one above the other, are now disposed in thin and excessively convoluted strata, which, if they could be spread out, would cover an immense area. The effect of the stirring is thus to increase the area over which the process of diffusion can go on, and to diminish the distance between the diffusing liquids; and since the time required for diffusion varies as the square of the thickness of the layers, it is evident that by a moderate amount of stirring the process of mixture which would otherwise require years may be completed in a few seconds. That the process is not instantaneous is easily ascertained by observing that for some time after the stirring the mixture appears full of streaks, which cause it to lose its transparency. This arises from the different indices of refraction of different portions of the mixture which have been brought near each other by stirring. The surfaces of separation are so drawn out and convoluted, that the whole mass has a woolly appearance, for no ray of light can pass through it without being turned many times out of its path.

Graham observed that the diffusion both of liquids and gases takes place through porous solid bodies, such as plugs of plaster of Paris or plates of pressed plumbago, at a rate not very much less than when no such body is interposed, and this even when the solid partition is amply sufficient to check all ordinary currents, and even to sustain a considerable difference of pressure on its opposite sides.

But there is another class of cases in which a liquid or a gas can pass through a diaphragm, which is not, in the ordinary sense, porous. For instance, when carbonic acid gas is confined in a soap bubble it rapidly escapes. The gas is absorbed at the inner surface of the bubble, and forms a solution of carbonic acid in water. This solution diffuses from the inner surface of the bubble, where it is strongest, to the outer surface, where it is in contact with air, and the carbonic acid evaporates and diffuses out into the atmosphere. It is also found that hydrogen and other gases can pass through a layer of caoutchouc. Graham showed that it is not through pores, in the ordinary sense, that the motion takes place, for the ratios are determined by the chemical relations between the gases and the caoutchouc, or the liquid film.

According to Graham's theory, the caoutchouc is a colloid substance,—that is, one which is capable of combining, in a temporary and very loose manner, with indeterminate proportions of certain other substances, just as glue will form a jelly with various proportions of water. Another class of substances, which Graham called crystalloid, are distinguished from these by being always of definite composition, and not admitting of these temporary associations. When a colloid body has in different parts of its mass different proportions of water, alcohol, or solutions of crystalloid bodies, diffusion takes place through the colloid body, though no part of it can be shown to be in the liquid state.

On the other hand, a solution of a colloid substance is almost incapable of diffusion through a porous solid, or another colloid body. Thus, if a solution of gum and salt in water is placed in contact with a solid jelly of gelatine and alcohol, alcohol will be diffused into the gum, and salt and water will be diffused into the gelatine, but the gum and the gelatine will not diffuse into each other.

There are certain metals whose relations to certain gases Graham explained by this theory. For instance, hydrogen can be made to pass through iron and palladium at a high temperature, and carbonic oxide can be made to pass through iron. The gases form colloidal unions with the metals, and are diffused through them as water is diffused through a jelly. Root has lately found that hydrogen can pass through platinum, even at ordinary temperatures.

By taking advantage of the different velocities with which different liquids and gases pass through parchment-paper and other solid bodies, Graham was enabled to effect many remarkable analyses. He called this method the method of Dialysis.

Diffusion and Evaporation, Condensation, Solution, and Absorption.

The rate of evaporation of liquids is determined principally by the rate of diffusion of the vapour through the air or other gas which lies above the liquid. Indeed, the coefficient of diffusion of the vapour of a liquid through air can be determined in a rough but easy manner by placing a little of the liquid in a test tube, and observing the rate at which its weight diminishes by evaporation day by day. For at the surface of the liquid the density of the vapour is that corresponding to the temperature, whereas at the mouth of the test tube the air is nearly pure. Hence, if p be the pressure of the vapour corresponding to the temperature, and $p = k\rho$, and if m be the mass evaporated in time t, and diffused into the air through a distance h,[1] then

$$D = \frac{khm}{pt}$$

This method is not, of course, applicable to vapours which are rarer than the superincumbent gas.

The solution of a salt in a liquid goes on in the same way, and so does the absorption of a gas by a liquid.

These processes are all accelerated by currents, for the reason already explained.

The processes of evaporation and condensation go on much more rapidly when no air or other non-condensible gas is present. Hence the importance of the air-pump in the steam engine.

Relation between Diffusion of Matter and Diffusion of Heat.

The same motion of agitation of the molecules of gases which causes two gases to diffuse through each other also causes two portions of the same gas to diffuse through each other, although we cannot observe this kind of diffusion, because we cannot distinguish the molecules of one portion from those of the other when they are once mixed. If, however, the molecules of one portion have any property whereby they can be distinguished from those of the other, then that property will be communicated from one part of the medium to an adjoining part, and that either by convection—that is by the molecules themselves passing out of one part into the other, carrying the property with them—or by transmission—that is by the property being communicated from one molecule to another during their encounters. The chemical properties by which different substances are recognized are inseparable from their molecules, so that the diffusion of such properties can take place only by the transference of the molecules themselves, but the momentum of a molecule in any given direction and its energy are also properties which may be different in different molecules, but which may be communicated from one molecule to another. Hence the diffusion of momentum and that of energy through the medium can take place in two different ways, whereas the diffusion of matter can take place only in one of these ways.

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[1] h should be taken equal to the height of the tube above the surface of the liquid, together with about ⅓ of the diameter of the tube.—See Clerk Maxwell's *Electricity*, Art. 309.

In gases the great majority of the particles, at any instant, are describing free paths, and it is therefore possible to show that there is a simple numerical relation between the coefficients of the three kinds of diffusion,—the diffusion of matter, the lateral diffusion of velocity (which is the phenomenon known as the internal friction or viscosity of fluids), and the diffusion of energy (which is called the conduction of heat). But in liquids the majority of the molecules are engaged at close quarters with one or more other molecules, so that the transmission of momentum and of energy takes place in a far greater degree by communication from one molecule to another, than by convection by the molecules themselves. Hence the ratios of the coefficient of diffusion to those of viscosity and thermal conductivity are much smaller in liquids than in gases.

Theory of the Wet Bulb Thermometer.

The temperature indicated by the wet bulb thermometer is determined in great part by the relation between the coefficients of diffusion and thermal conductivity. As the water evaporates from the wet bulb heat must be supplied to it by convection, conduction, or radiation. This supply of heat will not be sufficient to maintain the temperature constant till the temperature of the wet bulb has sunk so far below that of the surrounding air and other bodies that the flow of heat due to the difference of temperature is equal to the latent heat of the vapour which leaves the bulb.

The use of the wet bulb thermometer as a means of estimating the humidity of the atmosphere was employed by Hutton[1] and Leslie,[2] but the formula by which the dew-point is commonly deduced from the readings of the wet and dry thermometers was first given by Dr Apjohn.[3]

Dr Apjohn assumes that, when the temperature of the wet bulb is stationary, the heat required to convert the water into vapour is given out by portions of the surrounding air in cooling from the temperature of the atmosphere to that of the wet bulb, and that the air thus cooled becomes saturated with the vapour which it receives from the bulb.

Let m be the mass of a portion of air at a distance from the wet bulb, θ its temperature, p_0 the pressure due to the aqueous vapour in it, and P the whole pressure.

If σ is the specific gravity of aqueous vapour (referred to air), then the mass of water in this portion of air is $\frac{p}{P}\sigma m$.

Let this portion of air communicate with the wet bulb till its temperature sinks to θ_1, that of the wet bulb, and the pressure of the aqueous vapour in it rises to p_1, that corresponding to the temperature θ_1.

The quantity of vapour which has been communicated to the air is

$$(p_1-p_0)\frac{\sigma m}{P},$$

and if L is the latent heat of vapour at the tempe quantity of heat required to produce this vapour is

$$(p_1-p_0)\frac{\sigma m}{P}L.$$

According to Apjohn's theory, this heat is supplied air and vapour in cooling from θ to θ_1.

If S is the specific heat of the air (which will not b ferent from that of dry air), this quantity of heat is

$$(\theta_0-\theta_1)\,mS.$$

Equating the two values we obtain

$$p_0=p_1-\frac{PS}{L\sigma}(\theta_0-\theta_1).$$

Here p_0 is the pressure of the vapour in the atmo temperature—for which this is the maximum pressure point, and p_1 is the maximum pressure corresponding t ture θ_1 of the wet bulb. Hence this formula, combine of the pressure of aqueous vapour, enables us to find t from observations of the wet and dry bulb thermomet

We may call this the convection theory of the wet we consider the temperature and humidity of a p brought from a distance to be affected directly by without communication either of heat or of vapour wi tions of air.

Dr Everett has pointed out as a defect in this theor not explain how the air can either sink in temperatu in humidity unless it comes into absolute contact bulb. Let us, therefore, consider what we may call t and diffusion theory in calm air, taking into account radiation.

The steady conduction of heat is determined by the

$\theta=\theta_0$ at a great distance from the bulb,
$\theta=\theta_1$ at the surface of the bulb,
$\nabla^2\theta=0$ at any point of the medium.

The steady diffusion of vapour is determined by the

$p=p_0$ at a great distance from the bulb,
$p=p_1$ at the surface of the bulb,
$\nabla^2 p=0$ at any point of the medium.

Now, if the bulb had been an electrified conductor, t with respect to the potential would have been

$V=0$ at a great distance,
$V=V_1$ at the surface,
$\nabla^2 V=0$ at any point outside the bulb.

Hence the solution of the electrical problem leads t other two. For if V is the potential at any point,

$$\theta=\theta_0+(\theta_1-\theta_0)\frac{V}{V_1}\qquad p=p_0+(p_1-p_0)$$

If E is the electric charge of the conductor,

$$4\pi E=-\iint\frac{dV}{d\nu}dS,$$

where the double integral is extended over the surfac and $d\nu$ is an element of a normal to the surface.

If H is the flow of heat in unit of time from the bul

$$H=-K\iint\frac{d\theta}{d\nu}dS,$$

and if Q is the flow of aqueous vapour from the bulb,

$$Q=-\frac{D}{k}\iint\frac{dp}{d\nu}dS,$$

where k is the ratio of the pressure of aqueous density.

If C is the electrical capacity of the bulb, $E=CV_1$,

$$H=4\pi CK(\theta_1-\theta_0),\quad Q=4\pi C\frac{D}{k}(p_1-p_0)$$

The heat which leaves the bulb by radiation to ext at temperature θ_0 may be written

$$\lambda=AR(\theta_1-\theta_0),$$

where A is the surface of the bulb and R the coefficie of unit of surface.

When the temperature becomes constant

$$LQ+H+\lambda=0,$$

$$p_0=-p_1\frac{PS}{L\sigma}\left\{\frac{K}{D}+\frac{AR}{4\pi C\rho SD}\right\}(\theta_0-\theta_1).$$

This formula gives the result of the theory of diffu tion, and radiation in a still atmosphere. It differs from the formula of the convection theory only by the factor in the last term.

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[1] Playfair's "Life of Hutton," *Edinburgh Transactions*, vol. v. p. 67, note.

[2] *Encyc. Brit.*, 8th ed vol. i., "Dissertation Fifth," p. 764.

[3] *Trans. Royal Irish Academy*, 1834.

The first part of this factor $\frac{K}{D}$ is certainly less than unity, and probably about ·77.

If the bulb is spherical and of radius r, $A = 4\pi r^2$ and $C = r$, so that the second part is $\frac{Rr}{\rho SD}$.

Hence, the larger the wet bulb, the greater will be the ratio of the effect of radiation to that of conduction. If, on the other hand, the air is in motion, this will increase both conduction and diffusion, so as to increase the ratio of the first part to the second. By comparing actual observations of the dew-point with Apjohn's formula, it has been found that the factor should be somewhat greater than unity. According to our theory it ought to be greater if the bulb is larger, and smaller if there is much wind.

Relation between Diffusion and Electrolytic Conduction.

Electrolysis (see separate article) is a molecular movement of the constituents of a compound liquid in which, under the action of electromotive force, one of the components travels in the positive and the other in the negative direction, the flow of each component, when reckoned in electro-chemical equivalents, being in all cases numerically equal to the flow of electricity.

Electrolysis resembles diffusion in being a molecular movement of two currents in opposite directions through the same liquid; but since the liquid is of the same composition throughout, we cannot ascribe the currents to the molecular agitation of a medium whose composition varies from one part to another as in ordinary diffusion, but we must ascribe it to the action of the electromotive force on particles having definite charges of electricity.

The force, therefore, urging an electro-chemical equivalent of either component, or *ion*, as it is called, in a given direction is numerically equal to the electromotive force at a given point of the electrolyte, and is therefore comparable with any ordinary force. The resistance which prevents the current from rising above a certain value is that arising from the encounters of the molecules of the ion with other molecules as they struggle forward through the liquid, and this depends on their relative velocity, and also on the nature of the ion, and of the liquid through which it has to flow.

The average velocity of the ions will therefore increase, till the resistance they meet with is equal to the force which urges them forward, and they will thus acquire a definite velocity proportional to the electric force at the point, but depending also on the nature of the liquid.

If the resistance of the liquid to the passage of the ion is the same for different strengths of solution, the velocity of the ion will be the same for different strengths, but the quantity of it, and therefore the quantity of electricity which passes in a given time, will be proportional to the strength of the solution.

Now, Kohlrausch has determined the conductivity of the solutions of many electrolytes in water, and he finds that for very weak solutions the conductivity is proportional to the strength. When the solution is strong the liquid through which the ions struggle can no longer be considered sensibly the same as pure water, and consequently this proportionality does not hold good for strong solutions.

Kohlrausch has determined the actual velocity in centimetres per second of various ions in weak solutions under an electro-motive force of unit value. From these velocities he has calculated the conductivities of weak solutions of electrolytes different from those of which he made use in calculating the velocity of the ions, and he finds the results consistent with direct experiments on those electrolytes.

It is manifest that we have here important information as to the resistance which the ion meets with in travelling through the liquid. It is not easy, however, to make a numerical comparison between this resistance and any results of ordinary diffusion, for, in the first place, we cannot make experiments on the diffusion of ions. Many electrolytes, indeed, are decomposed by the current into components, one or both of which are capable of diffusion, but these components, when once separated out of the electrolyte, are no longer ions—they are no longer acted on by electric force, or charged with definite quantities of electricity. Some of them, as the metals, are insoluble, and therefore incapable of diffusion; others, like the gases, though soluble in the liquid electrolyte, are not, when in solution, acted on by the current.

Besides this, if we accept the theory of electrolysis proposed by Clausius, the molecules acted on by the electromotive force are not the whole of the molecules which form the constituents of the electrolyte, but only those which at a given instant are in a state of dissociation from molecules of the other kind, being forced away from them temporarily by the violence of the molecular agitation. If these dissociated molecules form a small proportion of the whole, the velocity of their passage through the medium must be much greater than the mean velocity of the whole, which is the quantity calculated by Kohlrausch.

On Processes by which the Mixture and Separation of Fluids can be effected in a Reversible Manner.

A physical process is said to be reversible when the material system can be made to return from the final state to the original state under conditions which at every stage of the reverse process differ only infinitesimally from the conditions at the corresponding stage of the direct process.

All other processes are called irreversible.

Thus the passage of heat from one body to another is a reversible process if the temperature of the first body exceeds that of the second only by an infinitesimal quantity, because by changing the temperature of either of the the bodies by an infinitesimal quantity, the heat may be made to flow back again from the second body to first.

But if the temperature of the first body is higher than that of the second by a finite quantity, the passage of heat from the first body to the second is not a reversible process, for the temperature of one or both of the bodies must be altered by a finite quantity before the heat can be made to flow back again.

In like manner the interdiffusion of two gases is in general an irreversible process, for in order to separate the two gases the conditions must be very considerably changed. For instance, if carbonic acid is one of the gases, we can separate it from the other by means of quicklime; but the absorption of carbonic acid by quicklime at ordinary temperatures and pressures is an irreversible process, for in order to separate the carbonic acid from the lime it must be raised to a high temperature.

In all reversible processes the substances which are in contact must be in complete equilibrium throughout the process; and Professor Gibbs has shown the condition of equilibrium to be that not only the temperature and the pressure of the two substances must be the same, but also that the *potential* of each of the component substances must be the same in both compounds, and that there is an additional condition which we need not here specify.

Now, we may obtain complete equilibrium between quicklime and the mixture containing carbonic acid if we raise the whole to a temperature at which the pressure of dissociation of the carbonic acid in carbonate of lime is equal to the pressure of the carbonic acid in the mixed gases. By altering the temperature or the pressure very slowly we may cause carbonic acid to pass from the mixture to the lime, or from the lime to the mixture, in such a manner that the conditions of the system differ only by infinitesimal quantities at the corresponding stages of the direct and the inverse processes. The same thing may be done at lower temperatures by means of potash or soda.

If one of the gases can be condensed into a liquid, and if during the condensation the pressure is increased or the temperature diminished so slowly that the liquid and the mixed gases are always very nearly in equilibrium, the separation, and mixture of the gases can be effected in a reversible manner.

The same thing can be done by means of a liquid which absorbs the gases in different proportions, provided that we can maintain such conditions as to temperature and pressure as shall keep the system in equilibrium during the whole process.

If the densities of the two gases are different, we can effect their partial separation by a reversible process which does not involve any of the actions commonly called chemical. We place the mixed gases in a very long horizontal tube, and we raise one end of the tube till the tube is vertical. If this is done so slowly that at every stage of the process the distribution of the two gases is sensibly the same as it would be at the same stage of the reverse process, the process will be reversible, and if the tube is long enough the separation of the gases may be carried to any extent.

In the *Philosophical Magazine* for 1876, Lord Rayleigh has investigated the thermodynamics of diffusion, and has shown that if two portions of different gases are given at the same pressure and temperature, it is possible, by mixing them by a reversible process to obtain a certain quantity of work. At the end of the process the two gases are uniformly mixed, and occupy a volume equal to the sum of the volumes they occupied when separate, but the temperature and pressure of the mixture is lower than before.

The work which can be gained during the mixture is equal to that which would be gained by allowing first one gas and then the other to expand from its original volume to the sum of the volumes; and the fall of temperature and pressure is equal to that which would be produced in the mixture by taking away a quantity of heat equivalent to this work.

If the diffusion takes place by an irreversible process, such as goes on when the gases are placed together in a vessel, no external work is done, and there is no fall of temperature or of pressure during the process.

We may arrive at this result by a method which, if not so instructive as that of Lord Rayleigh, is more general, by the use of the physical quantity called by Clausius the Entropy of the system.

The entropy of a body in equilibrium is a quantity such that it remains constant if no heat enters or leaves the body, and such that in general the quantity of heat which enters the body is

$$\int\theta d\phi,$$

where ϕ is the entropy, and θ the absolute temperature.

The entropy of a material system is the sum of the entropy of its parts.

In reversible processes the entropy of the system remains unchanged, but in all irreversible processes the entropy of the system increases.

The increase of entropy involves a diminution of the available energy of the system, that is to say, the total quantity of work which can be obtained from the system. This is expressed by Sir W. Thomson by saying that a certain amount of energy is *dissipated*.

The quantity of energy which is dissipated in a given process is equal to

$$\theta_0(\phi_2-\phi_1),$$

where ϕ_1 is the entropy at the beginning, and ϕ_2 that at the end of the process, and θ_0 is the temperature of the system in its ultimate state, when no more work can be got out of it.

When we can determine the ultimate temperature we can calculate the amount of energy dissipated by any process; but it is sometimes difficult to do this, whereas the increase of entropy is determined by the known states of the system at the beginning and end of the process.

The entropy of a volume v_1 of a gas at pressure p_1 and temperature θ_1 exceeds its entropy where its volume is v_0 and its temperature θ_0 by the quantity

$$\frac{p_1v_1}{\theta_1}\left\{\frac{1}{\gamma-1}\log\frac{\theta_1}{\theta_0}+\log\frac{v_1}{v_0}\right\}.$$

Hence if volumes v_1 and v_2 of two gases at the same temperatu and pressure are mixed so as to occupy a volume v_1+v_2 at the sam temperature and pressure, the entropy of the system increas during the process by the quantity

$$\frac{p}{\theta}\left\{v_1\log\frac{v_1+v_2}{v_1}+v_2\log\frac{v_1+v_2}{v_2}\right\}$$

Since in this case the temperature does not change during the pr cess, we may calculate the quantity of energy dissipated by mult plying the gain of entropy by the temperature, and we thus fin for the dissipation

$$pv_1\log\frac{v_1+v_2}{v_1}+pv_2\log\frac{v_1+v_2}{v_2},$$

or the sum of the work which would be done by the two portio of gas if each expanded under constant temperature to the volum v_1+v_2.

It is greatest when the two volumes are equal, in which case it i

$$1{\cdot}386\,pv,$$

where p is the pressure and v the volume of one of the portions.

Let us now suppose that we have in a vessel tw separate portions of gas of equal volume, and at the sam pressure and temperature, with a movable partitio between them. If we remove the partition the agitatio of the molecules will carry them from one side of th partition to the other in an irregular manner, till ultimately the two portions of gas will be thoroughly an uniformly mixed together. This motion of the molecul will take place whether the two gases are the same o different, that is to say, whether we can distinguis between the properties of the two gases or not.

If the two gases are such that we can separate the by a reversible process, then, as we have just shown, w might gain a definite amount of work by allowing them t mix under certain conditions; and if we allow them t mix by ordinary diffusion, this amount of work is n longer available, but is dissipated for ever. If, on th other hand, the two portions of gas are the same, the no work can be gained by mixing them, and no work i dissipated by allowing them to diffuse into each other.

It appears, therefore, that the process of diffusion do not involve dissipation of energy if the two gases are th same, but that it does if they can be separated from eac other by a reversible process.

Now, when we say that two gases are the same, w mean that we cannot distinguish the one from the othe by any known reaction. It is not probable, but it is possible, that two gases derived from different sources, bu hitherto supposed to be the same, may hereafter be foun to be different, and that a method may be discovered o separating them by a reversible process. If this shoul happen, the process of interdiffusion which we had formerl supposed not to be an instance of dissipation of energ would now be recognized as such an instance.

It follows from this that the idea of dissipation o energy depends on the extent of our knowledge. Available energy is energy which we can direct into any desire channel. Dissipated energy is energy which we cannot la hold of and direct at pleasure, such as the energy of th confused agitation of molecules which we call heat. Now confusion, like the correlative term order, is not a propert of material things in themselves, but only in relatio to the mind which perceives them. A memorandum-boo does not, provided it is neatly written, appear confuse to an illiterate person, or to the owner who understands i thoroughly, but to any other person able to read it appear to be inextricably confused. Similarly the notion of di sipated energy could not occur to a being who could no turn any of the energies of nature to his own account, o to one who could trace the motion of every molecule an seize it at the right moment. It is only to a being in th intermediate stage, who can lay hold of some forms o energy while others elude his grasp, that energy appears to be passing inevitably from the available to the dissipated state. (J. C. M.)

DIGBY, SIR KENELM (1603–1665), an eminent English physical philosopher, born at Gothurst, Buckinghamshire, on the 11th July 1603, was descended from an ancient and illustrious family. His great-grandfather had distinguished himself at Bosworth on the side of Henry VII.; and his father, Sir Everard Digby, was one of the leading Roman Catholic gentry at the time of the Gunpowder Plot. Having risen in arms on that occasion, Sir Everard was executed at London, January 27, 1606. The young philosopher was educated by his guardians in the Protestant faith. Having finished his education at Oxford, he went abroad in 1621, and travelled in France, Spain, and Italy. On his return he was knighted, and received from Charles I. the appointments of gentleman of the bed-chamber, commissioner of the navy, and governor of Trinity House. At the head of a small squadron, which he equipped at his own expense, he sailed in 1628 against the Algerines, and afterwards defeated the Venetians near the port of Scanderoon. During a brief stay in Paris he joined the Church of Rome. Having returned to England in 1638, he espoused the cause of the king, and was imprisoned in Winchester House, by order of the Parliament. He was, however, liberated at the request of the French queen-dowager in 1643, and retired to France, where he was taken into the confidence of the court, and enjoyed the friendship of Descartes and other learned men. Here he wrote his *Treatise on the Nature of Bodies*, his *Treatise on the Soul*, *Peripatetick Institutions*, and other works. He visited England, after the defeat of the Royalist party, but the Parliament refused to allow him to remain. Banished from England upon pain of death if he returned, he resumed his residence in France, where he was treated with the highest respect, and was intrusted with an embassy to several of the courts of Italy. He returned again to his native country during the Protectorate of Cromwell, and seemed to be more zealous for the advancement of the interests of the Commonwealth than befitted a staunch royalist. He used his influence to reconcile the Catholics to the Protectorate on condition of their being secured the free exercise of their religion. With Cromwell he was on terms of intimate friendship, the bond of sympathy being probably not so much politics as a common interest in the new-born science of physics. At the Restoration he returned finally to London, where he died in 1665. He married Venetia Anastasia, the daughter of Sir Edward Stanley of Shropshire, "a lady of an extraordinary beauty and of as extraordinary a fame." His whimsical experiments to preserve her beauty by the invention of new cosmetics procured him as much notoriety as his sympathetic powder for the cure of wounds at a distance. He was appointed one of the council of the Royal Society at the time of its first establishment, and he took a very active part in its management. Besides the works already mentioned, Digby wrote *A Conference about a Choice of Religion*, Paris, 1638; *Letters* on the same subject, Lond. 1651; *Observations on Religio Medici*, Lond. 1643; *A Treatise of Adhering to God*, Lond. 1654; *On the Cure of Wounds by the Powder of Sympathy*, Lond. 1658; and a *Discourse on Vegetation*.

DIGESTIVE ORGANS. The organs of digestion, or alimentary apparatus, are for the purpose of receiving the food or aliment; of converting that portion of the food which is digestible into chyle, so that it may be absorbed and applied to the nourishment of the body; and of transmitting that which is indigestible onwards to be excreted.

In the Protozoa there is no special digestive apparatus, but the particles of food are introduced into the general substance of the body, where they undergo digestion and assimilation. But in animals generally there is a definite digestive cavity or stomach, which communicates with the surface by a distinct opening or mouth, through which the food is introduced into the stomach. As a rule a second opening, or anus, is also in communication with the stomach, at which the indigestible parts of the food are excreted. As animals increase in structural complexity the digestive apparatus has additional parts superadded to it. In man and all the more highly organized animals it consists of an elongated tube, the Alimentary Canal, divided into various compartments, into which numerous Glands pour their secretions to be used in the digestive process. In most vertebrates, the great class of birds being excepted, the compartment of the canal called the mouth, or oral cavity, contains a hard masticatory apparatus, the Teeth, which play an important part in breaking down the food.

As the digestive organs in the *human body* are so constructed as to illustrate one of the most perfect forms of an alimentary apparatus, they will form the special subject of description in this article.

ALIMENTARY CANAL.

The ALIMENTARY CANAL is a tube about 28 feet long, which traverses almost the entire length of the axial part of the body. In man and all other vertebrates, it lies in relation to the ventral surface of the bodies of the vertebræ. It commences on the face at the orifice of the mouth, and terminates on the surface of the lower part of the trunk at the orifice of the anus. It is divided into a series of segments, or compartments, which communicate with each other, from above downwards, in the longitudinal axis of the canal. These compartments are named mouth, pharynx, œsophagus, stomach, small intestine (subdivided into duodenum, jejunum, and ileum), and large intestine (subdivided into cæcum, colon, and rectum). The canal is lined by a mucous membrane, called the alimentary mucous membrane, which is continuous with the nasal mucous membrane, with the respiratory mucous membrane, and at the anal and oral orifices with the integument. Outside this mucous membrane is the submucous coat, and external to it is the muscular wall of the canal. By the contraction of the muscular wall the food is propelled along the canal from above downwards. Opening on the surface of the mucous membrane are the orifices of the ducts of numerous glands, the secretions of which, mingling with the food, act chemically on it, so as to render it soluble and capable of being absorbed.

Mouth.

The *Mouth*, *Oral Cavity*, or *Buccal Cavity*, is the dilated commencement of the alimentary canal, in which the food is masticated and mingled with the secretion of the salivary and mucous glands. It is situated in the face, and extends from the lips in front to the pharynx behind. It is bounded above by the hard and soft palate, with the uvula; below by the lower jaw, the mucous membrane of the floor of the mouth, and the tongue; on each side by the cheek; and in front by the lips, between which is the aperture of communication with the surface of the face. Behind it freely communicates with the pharynx through the isthmus faucium. The muscles situated in the lips, cheeks, floor of the mouth, tongue, and soft palate enter into the formation of the walls of the mouth.

The mouth is lined by a red-coloured mucous membrane, which becomes continuous posteriorly with that of the pharynx, and at the margins of the lips with the skin of the face. The mucous membrane covering the alveolar portions of the jaws, and surrounding the necks of the teeth, is called the *gum*. From the outer surface of each jaw it is reflected to the inner surface of the cheeks and lips. From the inner surface of the lower jaw the mucous membrane is reflected to the floor of the mouth, and a broad band, called *frænum linguæ*, is prolonged to the middle line of the under surface of the tongue.

In its structure the mucous lining of the mouth consists of a stratified pavement epithelium, and a sub-epithelial fibro-vascular corium, possessing numerous vascular papillæ. The mucous membrane of the gum is characterized by its density and toughness, due to the numerous strongly developed bundles of connective tissue in the corium, many of which are continued into the fibrous tissue of the periosteum, which covers the alveolar surface of the jaw. The free surface of the corium of the gum possesses numerous broad papillæ, and is covered by a stratified pavement epithelium similar to that in the lips and cheeks. The mucous membrane of the hard palate is also tense and tough, though not so much so as the gum; and the fibrous fasciculi of its corium blend with the connective tissue of the subjacent periosteum. The mucous lining of the mouth is a sensitive membrane, and receives its nervous supply from the fifth cranial nerve.

The mucous membrane of the mouth is specially modified on the dorsum of the tongue, in the interval between the circumvallate papillæ and the epiglottis, and in the substance of the tonsils, by the development of collections of lymphoid tissue in the sub-epithelial connective tissue.

ils. The *Tonsils* are two almond-shaped bodies, situated, one on each side of the posterior orifice of the mouth, in the fossa between the anterior and posterior pillars of the soft palate. Their normal size is not bigger than a hazel nut, but they are very apt to enlarge, grow inwards across the posterior aperture of the mouth, and diminish the size of that opening. The free surface is marked by several rounded holes, leading into shallow pits or crypts, which may be either simple or branched, in the substance of the tonsil. The pits are lined by the epithelial covering of the mucous membrane, into which minute papillæ project. In the sub-epithelial connective tissue of the walls of the crypts numerous follicles of lymphoid tissue are situated, and lymph cells are infiltrated in great numbers in the connective tissue between the follicles. Interspersed amidst the crypts are small racemose mucous glands. The tonsils are very vascular, and capillary blood-vessels are distributed in connection with the papillæ, the lymphoid tissue, and the racemose glands The tonsillar veins form a plexus in relation to the attached surface of the tonsil.

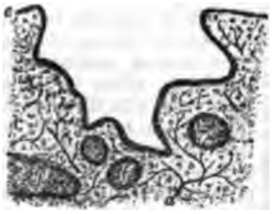


Fig. 1.—Vertical section through one of the tonsils, to show a pit vertically divided. *e*, its epithelial lining; *f*, *f*, lymph follicles; *l*, *l*, *l*, lymph cells diffused in the connective tissue. *a*, small artery ending in capillary blood-vessels. Slightly magnified.

nds of mouth. *Mucous and Salivary Glands of the Mouth.*—The ducts of numerous glands, engaged in secreting mucus and saliva, open on the free surface of the mucous membrane of the mouth. Their secretion not only keeps the mouth moist, and aids therefore in articulation, but by mingling with the food assists in mastication, deglutition, and the digestive process. Each gland is characterized by being divided into small lobules, and by possessing a duct or ducts, which branch off in an arborescent manner in the substance of the gland, and finally end in the minute lobules. They all belong to the compound racemose group of glands.

The mucous glands of the mouth are situated beneath its mucous lining in the following localities:—(*a*) *labial* glands, in the upper and lower lips, but absent at the angles of the mouth; (*b*) *buccal* glands, scattered on the inner surface of the cheek from the lips to the opening of the parotid duct; (*c*) *palatine* glands, on the oral surface of the hard palate, in the uvula, on both surfaces of the soft palate, and in the tonsils; (*d*) *molar* glands, close to the last lower molar tooth on each side; (*e*) *lingual* glands, extending backwards from the tip of the tongue along its margin, and also on its dorsum between the circumvallate papillæ and epiglottis. The ducts of these mucous glands consist of a delicate membrane lined by a single layer of columnar epithelial cells. The terminal branches of the ducts which enter the lobules end in a series of saccular dilatations, the *acini*, *alveoli*, or *gland-vesicles*, which contain rounded or polygonal secreting cells. A collection of such vesicles forms a lobule. The lobules are bound together by intermediate connective tissue, in which the blood-vessels divide into a capillary network, that ramifies on the outer surface of the delicate membrane forming the wall of the gland-vesicles.

The salivary glands of the mouth are the parotid, submaxillary, and sublingual glands. The *parotid gland* is the largest salivary gland, and occupies the parotid hollow between the lower jaw and the external ear. Its anterior border overlaps the masseter muscle, and the excretory duct emerges out of this border. A prolongation of gland substance, the *socia parotidis*, frequently accompanies the duct for a short distance. The excretory duct of the gland, called *Stenson's duct*, passes forwards superficial to the masseter muscle, then pierces the cheek, and opens on its inner surface opposite the second upper molar tooth. The duct is between 2 and 3 inches long, and about the thickness of a crow-quill. The *submaxillary gland* is situated immediately below the lower jaw. The excretory duct of the gland, called *Wharton's duct*, runs forwards and opens on the floor of the mouth by the side of the frænum linguæ. The *sublingual* is the smallest of the salivary glands, and lies under the mucous membrane of the floor of the mouth, close to the frænum linguæ. It possesses from ten to twenty small excretory ducts, the *ducts of Rivinus*, some of which join Wharton's duet, though the greater number open directly on the floor of the mouth near the frænum linguæ.

Structure.—The ducts of the salivary glands branch and terminate in the lobules,—each terminal duct ending in a series of saccular dilatations, the *acini*, *alveoli*, or *gland vesicles*, the wall of which, formed apparently of a membrana propria, is continuous with the simple membranous wall of the terminal duct. The terminal ducts are lined by a layer of squamous epithelium, and the gland-vesicles contain the secreting cells.

The blood-vessels are distributed in the interlobular connective tissue, and form a capillary network on the wall of the gland-ducts, and on the wall of the gland vesicles.

The *Pharynx* is an irregularly dilated canal, which forms a common passage, connecting the mouth with the œsophagus, and the nose with the larynx, so as to be subservient to the processes both of deglutition and respiration. Its position and connections have been described under the heading ANATOMY.

The wall of the pharynx consists of three coats—an external muscular and an internal mucous coat, and an intermediate fibrous membrane, which blends with the submucous coat. The *muscular coat* consists of three pairs of circularly arranged muscles, the constrictors of the pharynx and of two pairs of longitudinally-arranged muscles, the stylo-pharyngei and plato-pharyngei, with occasionally a third pair, the salpingo-pharyngei. The constrictor muscles extend from the lateral wall to the middle line of the posterior wall of the pharynx, and are named from below upwards the inferior, middle, and superior constrictors; they lie on three different planes, so that the inferior constrictor overlaps the middle, and the middle the superior.

The *mucous coat* of the pharynx lines the canal, and through the several openings with the mucous lining the Eustachian tubes, nose, mouth, l œsophagus.

thelium covering the mucous membrane of the of the pharynx is columnar and ciliated over a le surface, 'here the l epithe- elated and and in the lities, vas- ls project epithelial mall race- ds lie be-) mucous which is their ducts ı the sur- 2); they numerous al part of ıx. Col- lymphoid found in ithalial connective tissue, more especially in the of the pharynx, where it forms a mass, extending posterior and upper wall, between the openings Eustachian tubes, which Luschka has called the *tonsil.* The arteries of the pharynx are derived xternal carotid or some of its branches. The ıory, and sympathetic nerves unite to form the plexus situated behind the middle constrictor

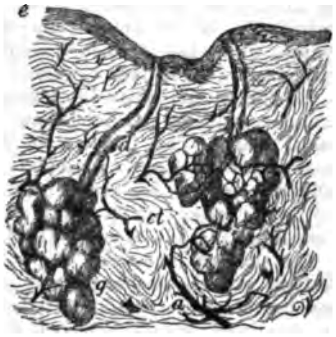


FIG. 2.—Vertical section through the mucous membrane of the pharynx, to show the racemose glands. *e*, the epithelium; *ct*, subjacent connective tissue; *g*, racemose gland; *d*, its duct; *a*, artery ending in a capillary plexus on the gland vesicles. × 40.

't Palate forms an inclined plane, which proıwards and backwards into the pharynx, from ıor border of the hard palate. It is less at the sides than in the mesial plane, where it longated body, the *uvula.* Its anterior or oral ımooth, and gives origin on each side to a fold, res downwards to the side of the root of the form the *anterior pillars of the palate or fauces.* or or pharyngeal surface, also smooth, gives each side to a fold, which, springing from the uvula, curves downwards and backwards to be side-walls of the pharynx; this pair of folds *osterior pillars of the palate or fauces.* The soft omplex in structure, and consists of muscles, embrane, glands, blood and lymph vessels, and he muscles of the soft palate are arranged in ı, those which elevate and make it tense, and ı constrict the fauces.

ous membrane of the soft palate is continuous of the mouth and pharynx. The epithelium e anterior or oral surface is a stratified pavement That on the posterior or pharyngeal surface ancy a laminated cylindrical and ciliated with isolated areas of pavement epithelium, alts it is a laminated pavement epithelium. racemose mucous glands lie beneath the mucous but much more abundantly on the oral than on geal aspect. Collections of lymphoid tissue, those found in the tonsils, are also met with. s are branches of the internal maxillary, facial, ing pharyngeal. The veins of the soft palate ıe a dilated character, and are continuous with geal veins. Lymphatics are also distributed) mucous membrane.

phagus, or *Gullet*, is an almost cylindrical tube, 10 inches long, which transmits the food from the pharynx to the stomach. It commences in the neck opposite the body of the sixth cervical vertebra, where it is continuous with the pharynx. It passes down the lower part of the neck, traverses the cavity of the thorax, pierces the diaphragm at the œsophageal opening, enters the abdomen, and becomes continuous with the cardiac end of the stomach close to that opening.

Structure.—The wall of the œsophagus consists of three coats, named, from without inwards, muscular, submucous, and mucous coats.

The *muscular* or *external coat* is divided into two layers, an external and an internal. The *external* layer is composed of fibres arranged longitudinally in the wall. The *internal* layer consists of fibres arranged in a series of rings around the tube, which lie sometimes horizontally, at others obliquely. The muscular coat in the upper fourth of the œsophagus is red, and its fibres are transversely striped; in the second fourth numerous non-striped fibres are mingled with the striped; whilst in the lower half the coat consists exclusively of non-striped fibres. By the contraction of the fibres of the muscular coat the food is propelled downwards into the stomach.

The *submucous coat* connects the muscular and mucous coats with each other. It consists of bundles of white fibrous tissue intermingled with elastic fibres, and the nerves and blood-vessels passing to the mucous coat ramify in it.

The *mucous* or *internal coat* lines the interior of the tube, and is continuous above with the mucous lining of the pharynx, and below with that of the stomach. When the œsophagus is empty it is thrown into longitudinal folds. Its free surface is covered by a thick layer of stratified squamous epithelium, which terminates abruptly at the cardiac orifice of the stomach in an irregular line. Projecting into the epithelium are multitudes of minute conical papillæ. Opening on the surface of the membrane are the ducts of numerous small racemose glands similar to those in the pharynx (fig. 2). Collections of lymphoid tissue, forming solitary follicles, are also found in the mucous membrane. The deep surface of the mucous membrane consists of a layer of non-striped muscular tissue, the bundles of which run longitudinally; it forms the muscular layer of the mucous coat, or *muscularis mucosæ.*

The œsophagus is supplied with blood by the inferior thyroid artery, the œsophageal branches of the thoracic aorta, and the ascending branch of the coronary artery of the stomach. The nerves are derived from the pneumogastrics, which form plexuses containing nerve-cells, not only in the muscular coat, but in the muscularis mucosæ. A network of lymphatic vessels also occurs in both the mucous and submucous coats.

ABDOMINAL CAVITY AND PERITONEUM.—As the remaining portions of the alimentary canal are situated in the abdominal cavity, it will be advisable, before describing their anatomy, to give an account of the form and boundaries of that cavity, of its division into regions, and of the general arrangement of the peritoneum, which constitutes its lining membrane.

The *Abdominal Cavity*, *Abdomen*, or *Belly*, is the largest of the three great cavities of the body. It occupies about the lower two-thirds of the trunk, and extends from the diaphragm above to the pelvic floor below. As its walls, except in the pelvic region, are chiefly formed of muscles and of fibrous membrane, they are much more distensible than those of the thorax, and permit considerable modifications to occur in the size of the viscera contained within the cavity. The abdomen is elongated in form; its vertical diameter is greater than either the transverse or the antero-posterior diameter. The superior boundary is formed by the concave vault of the diaphragm, and by the seven lower pairs of ribs and costal cartilages; in this boundary occur the opening through which the œsophagus passes into the abdomen, and also the apertures for the transmission of the great blood-vessels, the nerves, and the thoracic duct. The inferior boundary is formed by the levatores ani and coccygei muscles, and the pelvic fascia; in relation to this boundary are the termination of the rectum and anal orifice, the termination

Ab .men.

of the urethra, and in the female that of the vagina also. The anterior boundary is formed above by the muscles of the anterior abdominal wall and the fascia transversalis; the linea alba occupies its middle line, and about the middle of the linea alba is the umbilicus or navel; the anterior wall below is formed by the two pubic bones with the symphysis. The lateral walls, or flanks, are formed above by the flat muscles of the abdominal wall and the fascia transversalis, and below on each side by the ilium and ischium with the muscles attached to them. The posterior wall is formed by the lumbar spine, sacrum, and coccyx, and by the muscles attached to these bones with their accompanying fasciæ. The abdomen is primarily divided into the *pelvis* and *abdomen proper*. The *pelvis* is subdivided into the *false pelvis*, or the part above the pelvic brim, and *true pelvis*, or part below the pelvic brim.

i-
eum.

The *Peritoneum* is the largest and most complicated serous membrane in the body. Like the other serous membranes, it not only lines the walls of the cavity in which it is situated, but gives a more or less complete investment to the contained viscera. It is arranged, therefore, so as to form a *parietal* and a *visceral* part, which are continuous with each other in the various regions where the part lining the wall is reflected as a covering upon the viscera. A space or cavity, called the *peritoneal cavity*, is inclosed between the parietal and visceral layers. This cavity, as in other serous membranes, is a closed or shut sac, without any communication externally, except in the female, where the two Fallopian tubes open into it.

Through these openings the mucous membrane lining the tubes becomes continuous with the serous membrane, and a communication is established between the lumen of each tube and the peritoneal cavity. That surface of both the parietal and visceral portion of the peritoneum which lies next the cavity is free, smooth, covered by an endothelium, and lubricated by a little serous fluid, which under some pathological conditions may be greatly increased in quantity, so as to cause abdominal dropsy. The moistening of the two free surfaces by the serum permits them to glide smoothly on each other, during the movements of the viscera, and the changes which take place in their size and position. The opposite surface of the peritoneum is attached—that of the parietal part to the fasciæ situated internal to the abdominal muscles, that of the visceral part to the subjacent coat of the several organs.

Special names are applied to the folds or duplicatures of the peritoneum, which pass from the wall of the abdomen to the viscera. In the case of the liver, spleen, bladder, and uterus, these folds are named *ligaments*, whilst the corresponding folds which pass to the intestine have received the name of *mesenteries*. Folds of peritoneum also pass between certain of the viscera themselves, and these are called *omenta*.

mach.

The *Stomach* is the bag-like dilatation of the alimentary canal, connecting the œsophagus with the duodenum, in which the food is mingled with the gastric juice, and converted into a pulpy substance—the chyme. The stomach is situated in the costal zone of the abdominal cavity; three-fourths of its volume being contained in the left hypochondrium, whilst the remaining fourth extends into the epigastrium. About five-sixths of the organ lies to the left of the mesial plane, and one-sixth to the right. The stomach varies in size, shape, and somewhat in position, according as it is empty or full of food. When moderately full it is about 1 foot in length, whilst its greatest transverse diameter is 4 to 5 inches. Its general shape is pyriform, and it may be described as possessing two extremities, two surfaces, and two borders. The larger extremity, called the *fundus, cardiac extremity*, or *great cul-de-sac*, is directed upwards so as to be in contact with the under surface of the diaphragm, whilst the smaller end, the *pyloric* or *duodenal extremity*, is directed downwards, curves to the right, and becomes continuous with the duodenum. The *surfaces* form the *anterior* and *posterior walls* of the stomach. When the organ is empty, the walls are flattened, and in apposition with each other by their inner surfaces; but when it is distended they are convex. The *borders* of the stomach are curved and unequal in size; one is convex, about three times as long as the other, and is named the *greater curvature*; the other is concave, and forms the *lesser curvature*. The curvatures are so arranged that the greater has its convexity directed downwards and to the left, where it lies in relation to the transverse colon and the splenic flexure of the colon. The lesser curvature has its concavity directed upwards and to the right, and the œsophagus opens into the stomach at the upper end o the lesser curvature. Above this orifice the stomac expands into the fundus, which is situated in the highes part of the left hypochondrium, and occupies therefore th summit of the vault of the left half of the diaphragm. At the lower and right end the two curvatures lie almost horizontally in the epigastrium and terminate at th pylorus, where the stomach becomes continuous with th duodenum. The pylorus, or gate of the stomach, is situated in the epigastrium about three fingers' breadth below th ensiform cartilage, and immediately to the right of th mesial plane. The junction of the stomach with th duodenum is marked by a circular constriction externally called the *pyloric constriction*, and by a valve internally the *pyloric valve*. At its pyloric end the stomach present a small bulging, the *lesser cul-de-sac*, or *antrum pylori*.

The stomach is retained in position, partly by its con nections with the œsophagus and duodenum, partly by th pressure of the surrounding abdominal walls and viscer and partly by folds of peritoneum which pass from it t the adjacent structures. These folds are as follows:—Th *gastro-phrenic ligament* extends from the diaphragm to th stomach in the angle between the œsophagus and th cardiac extremity; the *gastro-hepatic* or *small omentu* passes from the lesser curvature of the stomach to the li of the transverse fissure of the liver; the *gastro-spl omentum* from the cardiac end of the stomach to the sple the *gastro-colic* or *great omentum* descends from the great curvature of the stomach in front of the coils of the sm intestine, and then ascends to inclose the transverse colo

Structure of the Stomach.—The wall of the stomac consists of four coats, named, from without inwards, serou muscular, submucous, and mucous coats.

The *external* or *serous coat* is that part of the peritone membrane which incloses the stomach,—one layer coveri the anterior, the other the posterior surface. It leaves t stomach at the curvatures, where it forms the great a small omenta, and along these borders the two lay inclose between them the blood-vessels and nerves whi supply the organ.

The *muscular coat* consists of non-striped fibres arrang in three layers from without inwards. The outer la consists of *longitudinal* fasciculi, which are continuous w the external longitudinal layer of the œsophagus. Th form scattered fasciculi extending longitudinally over t surface of the stomach from cardia to pylorus; but alo the two curvatures, more especially the lesser, they are c lected into stronger bundles, and at the pylorus they becom continuous with the longitudinal fibres of the duoden The middle layer consists of *circular* fasciculi, which fo a ring-like arrangement transversely to the long axis of t stomach. These fasciculi are comparatively thin a scattered at the cardiac end, but as they approach t pylorus they become more closely aggregated, so as to fo a thick layer, which at the pylorus extends into the pyl valve, and forms the *sphincter pylori* muscle. The circu fibres of the stomach are in the same morphological pla as the circular fibres of the œsophagus and duoden The inner layer consists of *oblique* fasciculi, which are n found over the entire organ; the greater number spri from the left side of the cardiac orifice, and radiate on t anterior and posterior surfaces towards the pylorus a greater curvature. These oblique fibres by their contracti approximate the cardia to the pylorus, the great curvatu to the smaller, and the anterior to the posterior wall; th are thus the true grinding muscles of the stomach, and ha been compared to the muscular gizzard of the bird. Fr the relation of the two groups of oblique fibres to t cardiac orifice they probably close that opening duri gastric digestion. The longitudinal and circular fib

longitudinal shortening and transverse constric-
stomach. By the action of the muscular coat
churned about in the stomach, so as to become
intermingled with the gastric juice. The con-
the sphincter pylori closes the pyloric orifice,
its the passage of the food into the duodenum,
converted into chyme.

mucous coat consists of the areolar variety of
tissue, and lies immediately subjacent to the
er of the muscular coat.

cous or *internal coat* lines the cavity of the
nd is continuous with the mucous membrane of
agus and duodenum. It is a soft, pulpy
of a pink colour, which becomes redder during
wing to turgescence of the blood-vessels. At
end it is often stained yellow or green with bile,
people it has a brown colour, from formation of
In the empty stomach it is thrown into folds or
ch have usually a longitudinal direction, but
nded the rugæ are obliterated, and the surface
ous membrane is smooth. This membrane is
said to be thicker at the pyloric end than in the
nt Brinton, who had opportunities of examining
h of healthy young adults immediately after
d the cardiac mucous membrane to be more
as thick as the pyloric. He ascribes the thinning
liac mucous membrane to the effects of post-
gestion, owing to the gravitation of the gastric
e recumbent position of the dead body, into the
the stomach.

ee surface of the gastric mucous membrane be
with a pocket lens it will be seen to be pitted
w depressions or alveoli, polygonal in form, and
om $\frac{1}{120}$th to $\frac{1}{300}$th inch in diameter. In the
ottom of each of these pits numerous rounded
y be seen, which are the mouths of the gastric
ands. If vertical sections be now made through
s membrane, these glands will be seen to be
form.

uman stomach the tubular glands are, for the
simple, almost straight cylinders, and possess an
gth of $\frac{1}{13}$th inch, and a breadth of about $\frac{1}{350}$th
y are somewhat dilated at their orifices, and at
d ends give rise to cæcal pouches. For about
fourth or fifth of their length the tubes are lined
layer of columnar epithelium, continuous with
ar epithelium covering the free surface of the
cous membrane. In the rest of the gland-tube
und two kinds of cells. The one, the so-called
about $\frac{1}{1500}$th inch in diameter, and of an ovoid
at polygonal form, lay next to the wall of the
e other kind, somewhat cubical in form, lined the
w central canal of the gland, and formed an
, which was continuous above with the columnar
lining the upper end of the tube.

the dog and cat, however, that the structure of
mucous membrane has especially been studied,
nds of glands have been described. The one,
pecially in the region of the pylorus, consists for
rt of simple tubes, which may, however, branch
eper end; they have been called the *mucus*
hey are lined by a columnar epithelium, the cells
the deeper end of the gland are more cubical in
ave a clouded granular appearance. The other
and is situated in the remaining part of the
cous membrane, and consists of tubes which
lly into four branches; they have been named
glands. The cellular lining of these peptic
ly corresponds with the dimorphous arrangement
an stomach already referred to. Heidenhain
states that in a fasting dog the glands are shrunken, and the axial cells are transparent, whilst during digestion the peptic glands are swollen out and the cells are clouded and granular.

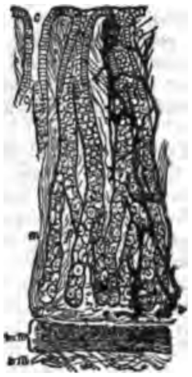


FIG. 8.—Vertical section through the gastric mucous membrane of a cat, to show the tubular peptic glands. *c*, columnar epithelium near the gland mouth; *p*, peptic cells; *m*, interglandular muscular band; *v*, vessels surrounding tubular gland; *mm*, muscularis mucosæ; *sm* submucous coat.

The gastric glands are separated from each other by slender prolongations of the muscularis mucosæ, and by the vascular interglandular connective tissue, which is soft and delicate, and contains a small proportion of lymphoid corpuscles diffused in it. In some localities the lymphoid tissue may be collected into solitary follicles, forming the *lenticular* glands of the stomach. Beneath the glands is a well-defined *muscularis mucosæ*, arranged in two layers, which gives off bundles that pass between the gastric glands.

The gastric mucous membrane is highly vascular; small arteries enter it from the submucous coat, and terminate in a capillary plexus, situated in the interglandular connective tissue surrounding the gastric glands; a vascular capillary ring surrounds the orifice of each gland.

The *pyloric valve* is the name given to the circular fold, situated at the junction of the stomach and duodenum, which surrounds the pyloric orifice. This fold is covered on its free surface by mucous membrane, which incloses the submucous coat and the circular layer of the muscular coat, but not the longitudinal layer, or the serous coat. That portion of the mucous membrane which covers the gastric surface of the valve possesses the structure of the mucous membrane of the stomach; whilst that which covers the duodenal surface is studded with villi, and possesses the structure of the intestinal mucous membrane.

The arteries of the stomach form arches along the greater and lesser curvatures, and anastomose in the anterior and posterior walls of the stomach. The veins of the stomach are rootlets of the portal vein. The lymphatics are numerous, and form a superficial and a deep set. The nerves of the stomach are derived from the epigastric plexus of the sympathetic and from the pneumogastric nerves.

Intestinal canal.

The *Intestinal Canal*, *Intestine*, *Gut*, or *Bowel*, is situated in the abdominal cavity, and extends from the pyloric opening, or gate, of the stomach to the orifice of the anus. In it the chyme becomes mingled with the bile, the pancreatic fluid, and the secretions of the intestinal glands, and is converted into chyle. In it also the absorption of the chyle takes place, and the insoluble part of the food is passed onwards to be excreted in the form of fæces. The intestine is the longest division of the alimentary canal, and measures on an average about 25 feet. It is primarily divided into two parts, called small intestine and large intestine; the length of the small is about 20 feet, that of the large about 5 feet.

Small intestine.

The *Small Intestine* is the upper of the two divisions of the canal, and consists of a convoluted, almost cylindrical tube, which reaches from the pylorus to the cæcum, or commencement of the large intestine. It is subdivided into three portions, named duodenum, jejunum, and ileum.

The *Duodenum* is the commencement of the small intestine, and has received its name from its length being regarded as about equal to the breadth of twelve fingers. It forms the shortest and widest of the three sub-divisions of the small bowel; it curves, in the form of a horse-shoe, from the pylorus to opposite the left side of the body of the second lumbar vertebra, where it becomes continuous with the jejunum. The duodenum is distinguished from the rest of the small intestine by having the ducts of the liver and pancreas opening into its canal, by containing in its wall a collection of compound racemose glands, named the glands of Brunner, and by being developed from the primitive fore-gut, and not, like the jejunum and ileum, from the primitive middle gut. Like the stomach, it should be regarded as a distinct segment of the alimentary canal.

The *Jejunum* and *Ileum* form by far the longest part of the small intestine, and are not separated from each other by any sharp line of demarcation —the upper two-fifths being called jejunum, on account of its being usually empty after death, the lower three-fifths being termed ileum, from its convoluted arrangement. They occupy the umbilical, hypogastric, right and left iliac regions of the abdomen, in which they are arranged in a series of coils or convolutions; one or two coils of the ileum sometimes lie in the cavity of the pelvis, between the bladder and rectum. The coils are attached to the posterior wall of the abdomen, along a line from the body of the first lumbar vertebra to the right sacro-iliac joint, by the fold of peritoneum called the *mesentery*. Owing to the extent of the mesentery, the coils of the jejunum and ileum can be freely moved about in the abdominal cavity, so that they are apt to be displaced from their natural position, and, when a rupture occurs, to become the most usual contents of the hernial sac. The lower end of the ileum passes into the right iliac fossa, where it becomes continuous with the large intestine, at the junction of the cœcum and ascending colon. Though the line of demarcation between jejunum and ileum is an arbitrary one, yet the upper end of the jejunum may be distinguished from the lower end of the ileum by being wider, and having a thicker mucous membrane, in which the folds called *valvulæ conniventes* are larger and more numerous.

Structure of the Small Intestine.—The wall of the small intestine consists in the greater part of its extent of four coats, named, from without inwards, serous, muscular, submucous, and mucous coats.

The *serous* or *external coat*, derived from the peritoneum, forms a complete investment for the jejunum and ileum, and is continuous with the mesentery along a line of attachment, named the mesenteric border of the intestine; but the serous covering of the duodenum is incomplete.

The *muscular coat* consists of non-striped fibres arranged in two layers from without inwards. The outer layer consists of *longitudinal* fasciculi, which form a thin layer parallel to the long axis of the intestine. The inner layer consists of *circular* fasciculi arranged around the gut transverse to its long axis; this layer is thicker, stronger, and more highly coloured than the longitudinal layer. By the contraction of the muscular coat, the peristaltic or vermicular movement is produced, which propels the ingested materials along the intestine.

The *submucous coat* lies immediately subjacent to the circular layer of the muscular coat, and consists of areolar connective tissue; in it the blood-vessels ramify before they pass into the mucous membrane.

The *mucous* or *internal coat* is a soft, velvety-looking membrane, which lines the wall of the small intestine, and possesses a complex appearance and structure. The inner surface is not smooth, but is thrown into strongly-marked, transverse folds, the valvulæ conniventes, which are not obliterated during distension of the gut. They are very numerous in the duodenum and jejunum, but then decrease in size and numbers, until at the lower end of the ileum they have disappeared. Each valvula consists of a fold of the mucous membrane with its submucous coat. Owing to their presence, the extent of the mucous surface is much greater than if it were a plane-surfaced membrane.

In its more minute structure the mucous coat may be regarded as composed of numerous projecting bodies, a glandular layer, and a muscular layer.

The projecting bodies are the intestinal *Villi*, which jut out into the lumen of the intestine from the free surface of the mucous membrane, not only of the valvulæ, but of the intermediate surface. They are delicate, minute processes, varying in length from a fourth to half a line, and in number amount to several millions.

They are best examined when the mucous surface is placed in water or spirit, when they may be seen with the naked eye, or, still better, with a pocket lens; when the chyle-vessels or blood-vessels are injected, they become erected, and stand out more prominently from the surface. They vary in form, being filiform, or cylindrical, or conical, or club-shaped, or leaf-shaped. They are more numerous in the duodenum and jejunum than in the ileum, and to their presence is due the velvety appearance of the mucous surface. They are not found elsewhere than in the small intestine.

As they are the parts of the mucous membrane directly concerned in the absorption of the chyle, their structure is interesting and important. Each villus is invested by a cap of epithelium continuous with the general epithelial covering of the mucous membrane. The epithelium consists of a single layer of *columnar cells*, compactly arranged side by side. Scattered amidst the columnar cells are cells which possess the form of microscopic goblets, and are named *goblet cells*. The free end of each goblet cell appears to have an open mouth on the surface of the villus, through which a mucus-like substance exudes. Various opinions have been expressed as to the nature of these goblet cells. Some regard them as special structures engaged either in the absorption of chyle, or the secretion of mucus; others look upon them as merely modifications of the columnar epithelium; whilst others again consider them to be *post-mortem* productions, due to the swelling out of the columnar epithelium by the imbibition of fluid. There can be no doubt, however, that they are not specially concerned in the absorption of chyle, as cells of the same character are found in the respiratory mucous membrane, and on other surfaces, where the absorption of chyle does not take place.

The sub-epithelial tissue of a villus forms its matrix or basis substance, and consists of the sub-epithelial connective tissue of the mucous membrane. When thin sections through a villus are examined, the matrix is seen to be composed of a delicate retiform tissue, which forms a network, in the meshes of which numbers of colourless lymphoid corpuscles are imbedded. These cells were described and figured by Goodsir, as the absorbing cells or vesicles of the villus. In the axis of the villus one, or perhaps two, minute lacteals or chyle vessels are situated, which serve as rootlets of origin of the lacteal division of the lymph vascular system. The lacteal is a capillary tube,

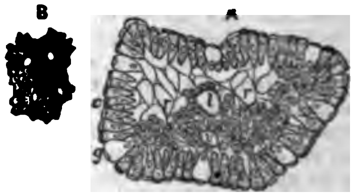


FIG. 4.—A. transverse section through an intestinal villus, showing its epithelial investment and the matrix of lymphoid tissue; *c*, columnar epithelium; *g*, goblet-shaped cell; *l*, lacteal; *r*, *r*, lymphoid retiform tissue; *v*, *v*, transversely divided blood-vessels. B, free ends of columnar epithelium, with mouths of four goblet-shaped cells. × 300.

ı near the apex of the villus, as a dilated *cul-de-sac*. By its opposite extremity it ontinuous with a plexu- of lacteals in the coat. In the matrix substance, around the ıl of the villus, is a layer of non-striped muscular vhich is continuous with the general muscular mucous coat, and extends as far as the apex of

By the contraction of this layer the chyle rption is propelled along the lacteal vessel. The ontains blood-vessels; a small artery enters at l base, and terminates in a capillary plexus, the peripheral part of the matrix, close to the helium; from the plexus a vein arises, which villus at its base, and joins the veins in the coat.

theories have been put forward to account for f passage of the chyle, during digestion, from of the intestine into the lacteal vessels of the he question cannot even yet be regarded as ttled. The appearance of a network of minute hin the matrix, extending from the epithelial to the lacteal, which Lotzerich supposed to be ls along which the chyle flowed, is doubtless r the arrangement of the strands of the retiform ere seems little doubt that both the cells of the ıvestment and those of the retiform tissue of become distended with the particles of chyle its passage into the lacteal. The view advanced that the corpuscles in the meshes of the retiform serve as carriers of the fatty particles of the he lacteals, is but another mode of expressing a of these cells advocated thirty years ago by

.cous membrane of the small intestine is provided with lands, named the Brunner and of

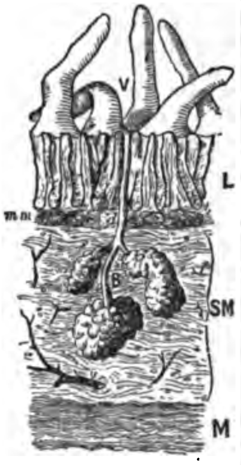


Fig. 5.—Vertical section through the wall of the duodenum, showing the glands of Brunner. V, intestinal villi; L, layer of glands of Lieberkühn; *m m*, muscularis mucosæ; B, a Brunner's gland, *d*, its excretory duct; SM, submucous coat; M, muscular coat; *v*, a small artery. × 40.

s *glands* are con- duodenum; they he compound race- of glands, and enerally in struc- ucous and salivary he minute lobules glands lie in the coat, and the excre- ierces the mucous o open on the sur- wall of the duct is connective tissue lumnar epithelium.

branches of the ontinuous with the gland-vesicles, and esicles contain the ells, which are col- orm. A plexus of ood-vessels is dis- tside the membrana the gland-vesicles, hatic vessels lie lobules. Into the duodenum, about the junction nding and horizontal portions, the duct of the nd the bile duct from the liver, open by a ifice. These glands may be regarded, therefore, r glands to this portion of the small intestine.

ds of Lieberkühn are distributed throughout the th of the mucous coat of the small intestine. imple tubular glands, in shape like test tubes, which lie vertically in the mucous membrane, and form its proper glandular layer (figs. 5 and 6). The tubes are microscopic in size, vary in length from $\frac{1}{10}$th to $\frac{1}{30}$th of a line, and are sometimes closely set together, but in the localities where the solitary and Peyer's glands occur they are more widely separated. The glands open on the surface of the mucous membrane between the villi; and the opposite end of the tubes is closed and rounded, and reaches close to the muscular layer of the mucous coat. They are lined by a layer of columnar epithelium cells, continuous with the epithelial investment of the villi. The glands are separated from each other by retiform connective tissue, in the meshes of which colourless lymphoid corpuscles exist in considerable numbers; the plexus of capillary blood-vessels, which is distributed outside the membrana propria of the gland tube, lies in this connective tissue.

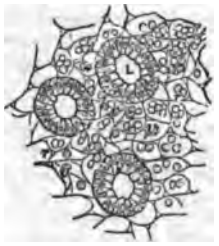


Fig. 6.—Horizontal section through the mucosa of the small intestine, to show the glands of Lieberkühn L, and the interglandular retiform lymphoid tissue *r*, *r*. *v*, *v*, transversely-divided blood-vessels. × 300.

The connective tissue of the mucous coat is characterized generally by its retiform character, and by the diffusion of colourless lymphoid corpuscles in the meshwork. But in some parts of the mucosa these corpuscles, with their supporting framework of retiform tissue, are collected into distinct masses or follicles, visible to the naked eye, and known as the solitary and Peyer's glands or follicles.

The *solitary glands* are scattered throughout the whole length of the intestinal mucous membrane. They are about the size of millet seeds, and vary in number and distinctness in different individuals. They are globular or ovoid in form, and occasion a slight elevation of the mucous membrane. One pole of the gland lies next the free surface of the mucous membrane, and is in relation to the columnar epithelium covering the mucosa, whilst the opposite pole rests on the submucous coat.

Peyer's glands, or the *agminated glands*, consist of an aggregation of solitary glands or follicles, which are crowded together, so as to form distinct elongated patches, which may vary in length from ½ inch to 3 or 4 inches. The long axis of each patch corresponds to the long axis of the intestine, and the patches are placed opposite to the mesenteric attachment of the bowel. Villi either may or may not be situated on the surface of the patch, in the intervals between the individual follicles, but Lieberkühnian glands are always found opening on the surface, and frequently forming a ring of orifices around each follicle. Peyer's patches are most abundant in the lower end of the

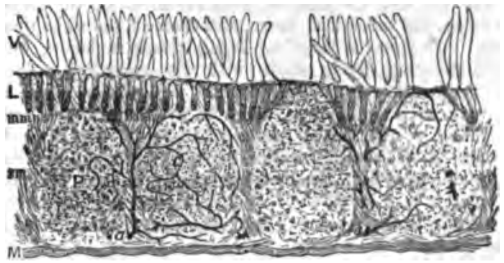


Fig. 7.—Vertical section through a Peyer's patch in the wall of the small intestine. V, the intestinal villi; L, the layer of Lieberkühn's glands; *mm*, the muscularis mucosæ; *sm*, the connective tissue of the submucous coat; P, the follicles of a Peyer's patch (the two to the right are completely divided from the cupola to the base; the two to the left are cut through to one side of the apex); *aa*, small arteries in the submucous coat, which enter the follicles of Peyer, and form *c*, a capillary network; M, muscular coat. Slightly magnified.

ileum, but diminish in size and numbers in its upper end and in the jejunum, and are absent in the duodenum.

These follicles are lymphoid organs, and are composed of lymphoid or adenoid tissue. The solitary and Peyer's glands, as is the case generally with the lymphoid organs, are more distinct and perfect in structure in infancy and childhood, than in adults or in advanced age.

The *muscular layer* of the mucous membrane lies next to the submucous coat, and consists of non-striped fibres which lie parallel to the surface of the membrane. It passes into the substance of the villi, and lies around the closed end of the glands of Lieberkühn.

Of the *blood-vessels* of the small intestine, the arteries enter the wall of the jejunum and ileum at its attached or mesenteric border, and are branches from the arcades of the superior mesenteric artery. They run in the sub-serous tissue around the wall of the intestine; then pierce the muscular coat and supply it; they then enter the submucous coat, and a form a network from which branches pass into the mucous coat. The veins accompany the arteries, and form rootlets of the superior mesenteric vein.

The *lymph-vessels*, or *lacteals*, may be traced into the wall of the intestine at the mesenteric border; they form a network in the muscular coat, and then enter the submucous coat, where they are very abundant; from this submucous layer offshoots pass through the retiform tissue, which lies between the Lieberkühnian glands, into the villi. Where the solitary and Peyer's glands are situated, the lacteals, as Frey has pointed out, form a system of anastomosing vessels around the base and mesial part of each follicle.

The *nerves* are derived from the plexuses of the sympathetic, which accompany the branches of the superior mesenteric artery. They form between the two layers of the muscular coat an important plexus, named, after its discoverer, Auerbach's plexus, in which large stellate nerve-cells are intermingled with nerve-fibres, and a similar nervous plexus is found in the muscular coat of the other divisions of the alimentary canal. It supplies and regulates the movements of the muscular coat.

rge
testine

The *Large Intestine*, though not nearly so long as the small intestine, is of much greater diameter. It reaches from the end of the ileum to the orifice of the anus, and is divided into the cæcum with the appendix vermiformis, the colon, and the rectum; whilst the colon is subdivided into the ascending colon, the hepatic flexure, the transverse colon, the splenic flexure, the descending colon, and the sigmoid flexure.

The *Cæcum*, the dilated commencement of the large intestine, lies below the ileum, and occupies the right iliac fossa. It forms a large *cul-de-sac*, closed in below, but communicating freely above with the ascending colon. Opening on the inner and posterior wall of the cæcum is the *appendix vermiformis*, which is a slender hollow prolongation of the bowel, varying in length from 3 to 6 inches. It has the calibre of the stem of a common tobacco pipe, and ends in a free closed extremity, so that, like the cæcum, it is a *cul-de-sac*. It is not generally found in mammals, but is present in man, the orang, certain lemurs, and the marsupial wombat.

The *Colon* extends from the cæcum to the rectum, and forms the longest part of the large intestine. The transverse part of the colon lies immediately below the great curvature of the stomach, but owing to the length of the *transverse meso-colon*, which forms its peritoneal attachment, it not unfrequently undergoes some change in its position, and may hang downwards towards the pelvis, or be elevated in front of the stomach, or thrown to the right or left side.

The sigmoid flexure of the colon is situated in the left iliac fossa, but as the *sigmoid meso-colon*, which forms its peritoneal attachment, is of some length, it is fre movable, and not unfrequently hangs into the pelvis, even extends across into the right iliac fossa.

The *Rectum* is the terminal segment of the la intestine, and extends from the sigmoid flexure to orifice of the anus. It lies in the cavity of the pelvis. commences opposite the left sacro-iliac joint, and passes first obliquely downwards and to the right until it reac the middle line of the sacrum; secondly, it closely follo the curvature of the sacrum and coccyx, lying in relation their anterior surface; thirdly, when it reaches the tip the coccyx its terminal or third part inclines downward and backwards for about 1½ inch to the anal orifice. The anus opens on the surface of the middle line of the perineum, midway between the two ischial tuberosities, and the skin surrounding the orifice is thin, and wrinkled when the opening is closed. Immediately beneath the skin is the *sphincter ani externus muscle*, which forms a thin layer of fasciculi, arranged in a series of ellipses around the orifice. The sphincter in its normal condition of contraction simply closes the opening, but, under the influence of the will, a more powerful contraction can be induced, so as to resist the entrance of foreign bodies into the rectum.

The large intestine is arranged in the abdominal cavity in the form of an arch, the summit of which is the transverse colon, whilst the cæcum and rectum are the right and left piers. Within the concavity of this arch the coils of the jejunum and ileum are situated. The large intestine is not, except in the rectum, a cylindriform tube, but is dilated into three parallel and longitudinal rows of sacculi, which rows are divided from each other by longitudinal muscular bands, whilst the sacculi in each row are separated externally by intermediate constrictions. In the rectum the sacculi have disappeared, and the intestine assumes a cylindrical form, but at its lower end it dilates into a reservoir, in which the fæces accumulate prior to being excreted.

At the junction of the large with the small intestine a valvular arrangement, termed the *ileo-cæcal* or *ileo-colic valve*, is found. This valve is due to the peculiar manner in which the ileum opens into the large intestine.

The opening is bounded by two semi-lunar folds, which project into the large bowel. These folds are the two segments of the valve; one situated above the opening is the *ileo-colic segment*, the other, below the opening, the *ileo-cæcal*. The two segments become continuous with each other at the ends of the elongated opening, and are prolonged for some distance around the inner wall of the large intestine as two prominent ridges, named the *fræna* of the valve. The use of the ileo-cæcal valve is to impede or prevent the reflux of the contents of the large into the small intestine. When the cæcum and colon are distended the fræna of the valve are put on the stretch, and the two segments are approximated, so that the opening is reduced to a mere slit, or even closed, if there is great distension of the bowel.

Structure of the Large Intestine.—The wall of the large intestine consists in the greater part of its extent of four coats, named, from without inwards, serous, muscular, submucous, and mucous coats.

The *serous* or *external coat*, derived from the peritoneum, forms a complete investment for the flexures of the colon, the transverse colon, and the first part of the rectum, but not for the cæcum, or the ascending and descending colon. The second part of the rectum has only a partial serous investment, and the third part has no serous coat. Numerous pedunculated processes invested by the serous membrane, and containing lobules of fat, named *appendices epiploicæ*, are attached to the large intestine.

The *muscular coat* consists of non-striped fibres arranged in two layers from without inwards. The outer layer consists of *longitudinal* fasciculi, which are not as a rule distributed uniformly in the wall, but in the cæcum and colon are collected into three longitudinal bands, which start from the cæcum, where it is joined by the appendix vermiformis, and extend along the colon to the rectum. As these bands are not so long as the colon itself, they occasion the puckerings which separate the sacculi, so that when the bands are cut through the sacculi disappear. The colon then becomes more elongated and cylindriform.

In the appendix vermiformis the longitudinal layer is not collected into bands, but arranged uniformly along the wall. In the rectum, also, the longitudinal layer is spread uniformly along the wall, and forms a well-defined red-coloured layer.

The inner layer of the muscular coat consists of *circular* fasciculi distributed around the wall of the large intestine. In the rectum this layer increases in thickness, and in proximity to the anus forms a circular muscle, the *sphincter ani internus*, which is a strong band, about half an inch broad, around the lower end of the rectum. In the large, as in the small intestine, the muscular coat occasions the peristaltic movements, and its increased thickness in the rectum is for the purpose of expelling the fæces.

The *submucous coat* has similar relations and structure to the corresponding coat in the small intestine.

The *mucous* or *internal coat* is not thrown into valvulæ conniventes, but presents a series of well-marked permanent ridges, lying transversely or somewhat obliquely to the long axis of the gut, and corresponding internally to the constrictions, which, on the outer surface of the colon, separate the sacculi from each other. The mucous membrane of the large intestine is covered by a layer of columnar epithelium. It is devoid of villi, and consists of a glandular and a muscular layer. The secreting glands of the glandular layer have the form and structure of the Lieberkühnian glands of the small intestine (fig. 7); they open on the free surface of the mucous coat, and, owing to the absence of villi, their mouths are more closely set together than is the case with the corresponding glands in the small intestine; the tubular glands are separated by a retiform tissue with lymphoid corpuscles. Solitary glands, similar to those in the small intestine, are also present, but no Peyer's patches. The muscularis mucosæ resembles generally that of the small intestine.

Of the *blood-vessels* of the large intestine, the arteries are principally derived from branches of the superior and inferior mesenteric arteries, but the lower end of the rectum receives the hæmorrhoidal branches of the internal iliac and the pudic. The veins which correspond to these arteries for the most part join the superior and inferior mesenteric veins, and are consequently rootlets of the portal. But the veins which belong to the middle and inferior hæmorrhoidal arteries form a plexus about the anal orifice, which partly joins the superior hæmorrhoidal vein, and through it the portal vein, and is partly connected through the middle and inferior hæmorrhoidal veins with the internal iliac vein, and through it with the inferior vena cava. The veins about the anus are very apt to become varicose, and to form the excrescences termed hæmorrhoids or piles. The *lymph vessels* are arranged as in the small intestine, except that they are not prolonged into villi. Nervous plexuses with ganglion cells are found in both the muscular and submucous coats. They proceed from the superior and inferior mesenteric plexuses, but the rectum receives branches from the hypogastric plexus, and from the third and fourth sacral spinal nerves.

The **Liver** is the biggest of the abdominal viscera, and the largest gland in the body. It is the organ in which the secretion of bile takes place, and is the chief seat in the body of the formation of glycogen, a substance like dextrin, which readily undergoes conversion into sugar. It lies in the costal zone of the abdomen, fills up the greater part of the right hypochondrium, and extends, through the epigastrium, into the left hypochondrium. In its long or transverse diameter it averages about 12 inches, in its antero-posterior diameter about 6 inches, in the vertical diameter of its thickest part about 3 inches. Relatively to the size of the body the liver is bigger and heavier in the fœtus than in the adult; soon after birth the relative weight declines, and that of the left lobe diminishes much more rapidly than the right lobe. Frerichs states that the relative weight of the healthy liver fluctuates in adults between $\frac{1}{24}$th and $\frac{1}{40}$th of that of the body, and the absolute weight varies from 1·8 to 4·6 pounds avoird. During the digestion of the food the liver increases both in size and weight, partly from the greater quantity of blood flowing through it, and partly from the new material in the secreting cells; whilst after a long fast it becomes smaller and lighter.

For descriptive purposes the liver may be regarded as having two surfaces, two borders, and two extremities.

The *superior* or *diaphragmatic surface* is smooth and convex, and attached to the diaphragm by the falciform ligament.

The *posterior* or *vertebral border* is comparatively thick, and attached by the coronary ligament to the diaphragm. The *anterior border* of the liver is unattached, thin, and attenuated, and is marked by a deep notch, opposite the anterior edge of the falciform ligament, which lodges the *round ligament* of the liver.

Of the two *extremities* of the liver the *right* is thick and massive, and lies deep in the right hypochondrium, in contact with the diaphragm; the *left* is thin and attenuated, and overlaps the œsophageal opening and fundus of the stomach.

The *inferior* or *visceral surface* of the liver is much more complex in form than the upper. The *longitudinal* or *umbilical fissure*, continuous with the notch in the anterior border of the liver, and much nearer to the left than the right extremity of the gland, divides it into a large right and a small left lobe. In the anterior part of the fissure the *round ligament*, formed by the obliteration of the *umbilical vein* of the fœtus, is lodged; whilst the posterior part contains a slender fibrous cord formed by the obliteration of a vein of the fœtus, named *ductus venosus*. The longitudinal fissure is often bridged across by a band of

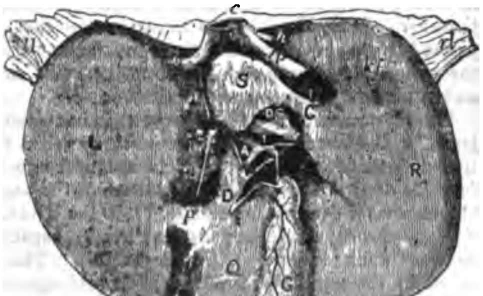


Fig. 8.—Under surface of the liver. R, right lobe; L, left lobe; Q, lobus quadratus; S, lobus Spigelii; C, lobus caudatus; *p*, pons hepatis; *lf*, longitudinal fissure; *t*, transverse fissure; *cf*, caudate fissure; *vf*, fossa for vena cava; *kf*, fossa for right kidney; G, gall bladder in its fossa; *u*, obliterated umbilical vein; *v*, obliterated ductus venosus; IV, inferior vena cava; *h*, *h*, hepatic veins; P, portal vein; A, hepatic artery; D, bile duct; *c*, coronary ligament; *ll* and *rl*, left and right lateral ligaments; *s*, suspensory ligament; *r*, round ligament.

liver substance called *pons hepatis*. The under surface of the left lobe is smooth, and overlaps the anterior surface of the stomach. The under surface of the right lobe is divided into smaller lobes by fissures and fossæ. Starting from about the middle of the longitudinal fissure is the *portal* or *transverse fissure*, which extends for from 3 to 4 inches across the under surface of the right lobe. It is the gate (*porta*) of the liver, the *hilus* or fissure of entrance into the organ of the portal vein, hepatic artery, hepatic duct, and hepatic nerves and lymphatics. A short distance to the right of that part of the longitudinal fissure in which the round ligament lies, is the *fossa for the gall bladder*, which is a depression on the under surface of the right lobe extending from the anterior border to the transverse fissure: in it the gall bladder lies. Extending somewhat obliquely from the posterior border of the liver, towards the transverse fissure, is a deep *fossa for the inferior vena cava*. Opening into the vena cava as it lies in this fossa are the trunks of the large hepatic veins from the substance of the liver. A portion of liver substance, which is bounded by the gall bladder, the longitudinal fissure, the transverse fissure, and the anterior border, forms a four-sided lobe called *lobus quadratus*. Another portion, bounded by the transverse fissure, the posterior border, the vena cava, and the longitudinal fissure, is the *lobus Spigelii*. A thin prolongation of liver substance continuous with the lobus Spigelii, and running obliquely between the fossa for the inferior cava and the transverse fissure, is the *lobus caudatus*.

Structure of the Liver.—The liver is a solid organ, of a brownish-red colour. It is composed of the ramifications of the portal vein, of the portal capillaries, the hepatic vein, the hepatic artery, the hepatic duct, of secreting cells, nerves, and lymphatics. These several structures are bound together by connective tissue, and the organ is invested by the peritoneum. The liver possesses two coats, a serous and a fibrous.

The *serous* or *external coat* is a part of the peritoneal membrane, and forms an almost complete investment for the liver. It is reflected from the transverse fissure as the gastro-hepatic omentum, and from the upper surface and the posterior border as the falciform, coronary, and right and left lateral ligaments of the liver.

The *fibrous coat*, or tunica propria, is immediately subjacent to the serous coat. When carefully raised from the liver delicate processes of areolar tissue may be seen to pass from its deep surface into the substance of the organ. At the transverse fissure it is prolonged into the liver as a very distinct sheath, enveloping the portal vein, hepatic artery, hepatic duct, nerves, and lymphatics. This sheath is named the *capsule of Glisson*, and is prolonged throughout the substance of the organ, along the ramifications of the portal vein and the structures that accompany it.

Lobules of the Liver.—To the naked eye the substance of the liver does not present a homogeneous aspect, but is mottled, and mapped out into multitudes of small areas or lobules,—the *hepatic lobules* or *leaflets*. The lobules of the liver are irregular polygons, and vary in size from $\frac{1}{20}$th to $\frac{1}{10}$ths of an inch. In man and the mammalia generally the lobules are imperfectly separated from each other by the interlobular vessels and duct, and a scarcely appreciable quantity of areolar connective tissue. In the pig, camel, and polar bear, each lobule is circumscribed by a definite capsule of connective tissue.

As a lobule of the liver is a liver in miniature, and as the structure of the entire liver is the sum of the structure of its lobules, it will be necessary to examine with care the constituent parts of a lobule, and the arrangement of the vessels, duct, and nerves which pass to and from it. An hepatic lobule is composed of blood-vessels, secreting cells,
and bile-ducts, with perhaps nerves and lymph
blood-vessels will first be considered.

The *portal vein* conveys to the liver the ve
from the stomach, spleen, pancreas, gall bl
small and large intestine. It ascends to the
fissure, and before it enters the liver divide
branches, one for the right and one for the le
its course within the liver, the portal vein
subdivides after the manner of an artery. I
accompanied by the hepatic artery and duct
with them, is invested by the fibrous sh
Glisson's capsule. The terminal branches of
vein run between the lobules, and are named
position, the *interlobular* branches. The
branches lie around the circumference of a
anastomose with each other. They partly
directly in a capillary network situated withi
and partly give off fine branches, which ent
before they end in the capillary network. The
capillaries form a close network, and conve
periphery of the lobule, where they sprin
interlobular branches of the portal vein, to
the lobule, where they terminate in the
or *central vein*, one of the rootlets of the
In man, where the lobules are not separated from each other by a distinct capsule, the capillaries of one lobule to some extent communicate with those of adjacent lobules.

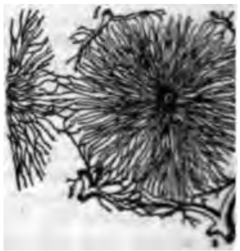


FIG. 9.—Transverse section thr
lobules. *i, i, i*, interlobular ve
intralobular capillaries; *c, c*, ce
by the intralobular capillarie
capillaries of one lobule co
those adjacent to it.

The *hepatic artery* closely accompanies the portal vein, and divides into two branches, for the right and left lobes.
It is the nutrient artery of the liver, and gi
series of branches:—(*a*) *vaginal branches*, w
tributed to the walls of the portal vein, the
and to Glisson's capsule, probably also to the
hepatic vein; they end in a capillary netw
structures, from which *vaginal veins* arise that
the portal vein; (*b*) *capsular branches*, wh
tributed to the fibrous coat of the liver, an
capillary network, from which arise *capsular*
the portal vein; (*c*) *interlobular branches* of
artery lie along with the interlobular branches
vein, and end in the capillary network within

The *hepatic vein* arises within the substanc
from the intralobular capillaries. In the centre of each lobule is the *intralobular* or *central vein*. It traverses the axis of the lobule, and leaves it to join a small vein running immediately under the bases of adjacent lobules, which, from its position, is named the *sublobular vein*. Adjacent sublobular veins then join together, and form
larger vessels, which are the *trunks* of the *he*

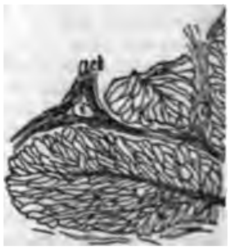


FIG. 10.—Vertical section thro
lobules of a pig. *c, c*, centr
the intralobular capillaries;
ct, interlobular connective ti
capsules of the lobules; *i, i*, in

enous canals. These trunks run towards the rder of the liver, and open into the inferior vena

is description of the vascular arrangements liver, it will be seen that the intralobular are continuous with three vascular trunks,—two blood to them, the portal vein and the hepatic one which conveys the blood away from them, vein. The communication in each case is so e capillaries can be artificially injected from any e vessels.

ting cells of the liver, *hepatic cells*, form the nchyma of the organ. They are situated within , and occupy the spaces of the capillary network. ary in diameter from $\frac{1}{500}$th to $\frac{1}{1000}$th inch; they rm of irregular polyhedrons, with from four to , and with the angles sometimes sharp, at other ded. They do not appear to possess definite ave a distinct nucleus. The cell protoplasm is d usually contains fat drops, and yellow particles, bile pigment. The angement of the rows or columns, sections are made bule, transverse to is of the central lumns of cells are nverge from the the centre of the l to form a net- observers the cells l as in contact with bular capillaries, e intervention of ediate membrane. By others, and more y Lionel Beale, the secreting cells are regarded in a tubular network, the wall of which is a basement membrane. Beale states that the the network is usually about $\frac{1}{1000}$th of an inch mmals. According to this view, the cells are t contact with the capillary blood-vessels, but om them by the basement membrane. In some lobule Beale has been able to demonstrate the embrane as distinct from the wall of the ut usually they are incorporated together. At ry of the lobule the membrane becomes with the wall of the interlobular duct.

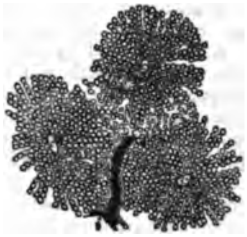


Fig. 11.—Transverse section through lobules of human liver to show the columns of secreting cells. *c*, *c*, central veins; *i*, interlobular vein with a fine sheath of connective tissue. × 10.

tic or *bile duct* is the tube that conveys the he liver. It leaves the transverse fissure as two ne from the right, another from the left lobe, st immediately unite at an acute angle. It npanies within the liver the ramifications of the and hepatic artery, and its terminal branches n the lobules to form the *interlobular branches*

If the hepatic duct be injected, not only does fill the interlobular ducts, but it flows into a ively minute passages within the lobules them- se passages are arranged so as to form a twork, which may appropriately be called the *biliary network*. This network has a most in- ion to the polyhedral hepatic cells, for the between the flattened sides of adjacent cells, so ll is inclosed in a mesh of the network. The servers, who first directed attention to these med them *bile-capillaries*, but it is probable e merely intercellular passages bounded by the of the hepatic cells.

lobular biliary network differs from the intra- d capillary network, not only in the character of the fluid conveyed, but in other important particulars. The bile passages have a tranverse diameter of about $\frac{1}{10}$th of that of the blood capillaries; the passages are in relation to the sides of the cells, the blood capillaries to their angles, so that the two systems of networks are not in contact with each other, but are separated by intervening hepatic cell substance; the passages have not, in all probability, an independent wall, such as is possessed by the blood capillaries. As these passages can be injected from the hepatic duct, and as they convey bile from the interior of the lobule into the duct, it is obvious that they must be continuous with the lumen of the interlobular branches of the duct, at the periphery of the lobules.

The wall of the larger bile ducts is formed of a fibro-elastic tissue, with a proportion of non-striped muscular fibre; it is lined by a columnar epithelium. Opening into the larger ducts are numerous orifices, which communicate with branched cæcal tubes and follicles, situated within and clustered around the walls of the larger ducts, often in considerable numbers. Some of these appendages to the duct doubtless serve as glands for the secretion of mucus, but others are probably, as Beale supposed, mere diverticula of the duct, in which the bile may be temporarily retained, as in the gall bladder.

The *lymphatics* of the liver form a superficial and a deep set. The superficial set ramifies beneath the serous coat, where they form a network. The deep lymphatics accompany the portal vein and hepatic artery as far as the intervals between the lobules, where they form *interlobular lymphatics*, which, like the corresponding branches of the portal vein, run around the lobule.

The *nerves* of the liver arise from the cœliac plexus of the sympathetic and from the left pneumogastric. They accompany the portal vessels in their distribution, and supply the muscular coats of the vessels.

Gall bladder. The *Gall Bladder* is a reservoir for the bile, situated in a fossa on the under surface of the right lobe of the liver, and in a notch in its anterior border (fig. 8). It is pyriform in shape; its larger end, or fundus, projects beyond the anterior border; its opposite end, or neck, gives origin to the *cystic duct*, which is directed towards the transverse fissure; after a course of 1½ inch it joins the hepatic duct, and forms the common bile duct, *ductus communis choledochus*. At its neck, the gall bladder bends on itself in a sigmoid curve. The gall bladder is 3 or 4 inches long, and can hold from one to two ounces of bile. It is attached to the liver partly by areolar tissue, and partly by the peritoneum, which is reflected over its free surface.

Structure.—In addition to its partial *serous coat*, the gall bladder has a fibrous and mucous coat. The *fibrous coat* consists of interlacing bands of connective tissue, with which non-striped muscular fibres are sparingly intermingled. The *mucous membrane* lining the gall bladder is deeply bile-stained, and presents on its free surface an alveolar appearance, due to the presence of multitudes of minute folds, which form a reticulum with intermediate depressions. The surface is covered by columnar epithelium. The mucous lining of both the neck of the gall-bladder and cystic duct is thrown into folds, which in the duct have an oblique direction, and form the spiral valve. Racemose glands, for the secretion of mucus, occur in the wall of the gall bladder, cystic duct, and common bile duct. The gall bladder is supplied with blood by the cystic branch of the hepatic artery. It receives lymphatics and nerves continuous with those which belong to the liver.

The *common bile duct*, formed by the junction of the cystic and hepatic ducts, is about 3 inches long, and conveys the bile into the duodenum. It lies in the gastro-hepatic omentum between its two layers, having the hepatic artery to its left, and the portal vein behind it. It then inclines behind the duodenum to the inner side of its descending part, where it comes into relation with the pancreatic duct. The two ducts then run together in an oblique direction through the wall of the duodenum, and open on the summit of a papilla, by a common orifice, about the junction of the descending and transverse portions of the duodenum.

NCREAS.

The **Pancreas** is an elongated gland which lies in relation to the posterior wall of the abdomen, in front of the first lumbar vertebra, and extends obliquely from the right lumbar region through the epigastrium into the left hypochondriac region. It is from 6 to 8 inches long, and whilst its dilated right extremity, or *head*, occupies the horse-shoe curve of the duodenum, and is attached by areolar tissue to the descending and transverse portions, its attenuated left extremity, or *tail*, is in relation to the spleen. A prolongation of the gland, named the *accessory*, or *lesser pancreas*, usually surrounds the superior mesenteric artery at its origin.

Structure.—The pancreas is one of the compound racemose glands, and resembles generally in structure the mucous and salivary glands of the mouth and the glands of Brunner (fig. 5). It is sometimes called the abdominal salivary gland, and its secretion flows into the duodenum, and assists in the process of chylification. It has a yellowish creamy colour, and is divided into distant lobules by septa of connective tissue. The excretory duct, or *duct of Wirsung*, is completely surrounded by the lobules, and extends from the tail to the head of the gland, receiving in its passage the numerous secondary ducts, and increasing gradually in size. It leaves the head of the gland, comes into relation with the common bile duct, and with it pierces obliquely the posterior wall of the descending part of the duodenum, to open by a common orifice about the junction of the descending and transverse portions. Sometimes the duct from the accessory part of the pancreas opens independently into the duodenum, a little above the common hepatico-pancreatic orifice. The finest ducts within the gland terminate in the *acini*, or *gland-vesicles*, of the lobules. These acini contain the secreting cells, which have a somewhat cubical form. The ducts are lined by a columnar epithelium, and mucous glands are situated in the mucous membrane lining the duct of Wirsung. The pancreas receives its supply of blood from the splenic, superior mesenteric, and hepatic arteries. Its veins join the splenic and superior mesenteric veins, and through them contribute to the formation of the portal vein. Its blood capillaries are abundantly distributed on the walls of the gland vesicles. Lymph vessels are found in the connective tissue between the lobules. The nerves are derived from the solar plexus, and accompany the arteries.

EETH.

The Teeth.—The teeth are calcified organs developed in connection with the mucous membrane of the mouth. Their primary use is that of biting and grinding the food; but in man they serve as aids to speech, and in many animals act as instruments of offence and defence.

Arrangement and Form of the Teeth.—Teeth are present in the greater number of the Mammalia, in which class they are implanted in sockets in the alveolar arches of the bones of the upper and lower jaws, and form only a single row in each arch. In a few mammals, as the toothed whales and the sloths, only one generation of teeth is produced, and when these drop out they are not replaced by successors; these animals are called Monophyodont. In the majority of the Mammalia, however, there are two generations of teeth,—a temporary or milk set, which are deciduous, and are replaced by a permanent or adult set; these animals are called Diphyodont. But m
two generations of teeth it is not to be supp
the teeth in the adult jaw have had temporary
for the molar or back teeth have only a singl
A few mammals, as the toothed whales, ha
uniform in size, shape, and structure, and
Homodont; but, in the majority of the M
teeth in the same jaw vary in size, form, and s
they are therefore called Heterodont. In every
mammal, possessing a complete dentition, fo
teeth are found, which are named incisor, cani
and molar teeth. Each of these teeth possesses a *crown*, which projects into the cavity of the mouth, and a *fang* lodged in the socket in the jaw; at the junction of the crown and fang there is usually a constriction named the *neck* of the tooth.

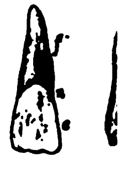


Fig. 12.—1. A hum
tooth. c, the cr
the fang. 2, a s
molar tooth; a, c
cement; d, dentin

In man the dentition is Diphyodont and Heterodont. The single row of teeth in each alveolar arch of the human jaw is characterized by the crowns of the
of almost equal length, and by the absence c
interspace, or *diastema*, between the different
irregularities in the size of the interspaces, so t
form an unbroken series in each jaw. The
upper dental arch is slightly bigger than that
so that the lower incisors fit within the up
lower molars, being inclined obliquely upwards
are somewhat overlapped by the upper molars.
and lower dental arches terminate behind in li
other, and the teeth are equal in number in th

Man possesses 32 teeth in his permanen
arranged in four groups, viz.—8 incisors, 4 ca
molars or bicuspids, and 12 molars. The
arrangement of the permanent teeth in the
expressed in the following formula:—

$$\overset{m.}{\frac{3}{3}}\quad\overset{pm.}{\frac{2}{2}}\quad\overset{c.}{\frac{1}{1}}\quad\overset{in.}{\frac{2}{2}}\quad\Big|\quad\overset{in.}{\frac{2}{2}}\quad\overset{c.}{\frac{1}{1}}$$

Man possesses only 20 teeth in his milk c
dentition, and their arrangement is expressed i
ing formula:—

$$\overset{m.}{\frac{2}{2}}\quad\overset{c.}{\frac{1}{1}}\quad\overset{in.}{\frac{2}{2}}\quad\Big|\quad\overset{in.}{\frac{2}{2}}\quad\overset{c.}{\frac{1}{1}}$$

If the temporary and permanent formulæ
with each other, it will be seen that, while the
canine teeth correspond in numbers in both d
the temporary dentition there is an absence
and the molar teeth are only eight, instead
number. The characters of the permanent te
be considered.

The *incisor teeth*, eight in number, are lodged
of the jaws, two on each side of the mesial
upper incisors project downwards and forward
are directed almost vertically upwards.
direction of the upper incisors in the Negroes,
Australians adds to the prognathic form
possessed by these races. The central pa
incisors are larger than the lateral; whilst th
of lower incisors are larger than the central pa
the smallest incisor teeth. The crowns of the
are chisel-shaped, and adapted for biting and
food. When the crown is first erupted the cu
minutely serrated, but the serrations soon w
use. The fangs are long and simple,—being

incisors round and fusiform, in the lower laterally compressed, and sometimes marked by a longitudinal groove. Although the human incisors are, as the name implies, cutting, chisel-shaped teeth, in many mammals the incisors are greatly modified in form, as for example in the tusks of the elephant. The determination of the incisor teeth does not depend, therefore, on their form, but on their position in the jaws. The name incisor is given to all the teeth situated in the pre-maxillary portion of the upper jaw, and in the anterior end of the lower jaw, whatever their shape may be.

The *canine* or *unicuspid teeth*, four in number, one on each side of the mesial plane of each jaw, are placed next the lateral incisors. They are bigger than the incisor teeth, and the upper canines, which are sometimes called the eye-teeth, are larger than the lower; the fangs of the upper canines are lodged in deep sockets in the superior maxillæ, which extend towards the floor of each orbit. The crowns of these teeth are thick and conical; the fangs are long, single, conical, compressed on the sides where they are marked by a shallow groove. In many mammals these teeth are developed into large projecting tusks.

The *premolar* or *bicuspid teeth*, eight in number, two on each side of the mesial plane of each jaw, lie immediately behind the canines, and the upper bicuspids are somewhat larger than the lower. The crown is quadrilateral in form, and convex both on the inner and outer surfaces. It possesses two cusps, of which the outer or labial is larger and more projecting than the inner, palatal, or lingual cusp. The fangs of the upper bicuspids are single and laterally compressed, often bifid at the point into an outer and inner segment; in the lower bicuspids the fangs are rounded, and taper to a single point.

The *molar* or *multicuspid teeth*, twelve in number, are placed three on each side of the mesial plane of each jaw. They are the most posterior teeth, are the largest of the series, and as a rule decrease in size from the first to the last; the crowns of the lower molars are somewhat bigger than those of the upper molars. The last molar tooth does not erupt until the end of puberty, and is called *dens sapientiæ*, or *wisdom tooth*. The crowns are broad, quadrilateral, and convex both on the inner and outer surfaces. The first and second upper molars have four cusps projecting from the angles of the grinding or masticating surface, and an oblique ridge often connects the large anterior internal cusp with the posterior external cusp; in the upper wisdom teeth, the two inner or palatal cusps are frequently conjoined. The first lower molar has five cusps, the fifth being interposed between the two posterior cusps; in the second lower molar the fifth cusp is usually absent, or only rudimentary in size, but in the lower wisdom tooth it is often present. The fangs of the first and second upper molars are three in number, and divergent; two on the outer or buccal side, one on the inner or palatal side; in the upper wisdom the fangs are frequently partially conjoined, though trifid at the point. The fangs of the first and second lower molars are two in number, an anterior and a posterior, of which the anterior is the larger; they usually curve backwards in the jaw; in the lower wisdom the fangs are usually conjoined, but bifid at the point.

The crowns of all the teeth become more or less flattened by use, so that the incisors lose their sharp cutting edge, and the cusps of the premolars and molars are worn away.

The temporary or milk teeth are smaller than the permanent teeth. They are more constricted at the neck, where the crown joins the fang, especially in the milk molars, the fangs of which also diverge more widely than in the permanent set. The second temporary molar is bigger than the first. The crown of the first upper molar has three cusps, two buccal, one palatal; that of the second four cusps. The crown of the first lower molar has four cusps; that of the second five, three of which are buccal, two lingual. The temporary teeth lie more vertically in the jaws than the permanent.

The *alveolus*, or socket for the lodgment of the single fanged teeth, is a single socket; in the multi-fanged teeth, the socket is divided into two or three compartments, according to the number of the fangs. The socket is lined by the *alveolo-dental periosteum*, which is continuous at the mouth of the socket with the periosteal covering of the jaw, and with the deeper fibrous tissue of the gum, where it embraces the neck of the tooth. The alveolo-dental periosteum is formed of retiform connective tissue, on the one hand connected with the surface of the cement, on the other with the more fibrous periosteum lining the bony wall of the socket (fig. 15). It is vascular, its vessels being continuous with those of the gum, the pulp-vessels, and the bone. It receives nerves from those going to the pulp. The fang fits accurately in the socket, and through a hole at the tip of the fang the blood-vessels and nerves of the tooth pass into the pulp-cavity of the tooth.

Structure of the Teeth.—Each tooth is composed of the following hard structures—dentine, enamel, and cement or crusta petrosa; occasionally other substances, named osteodentine or vasodentine, are present. In a tooth which has been macerated, an empty space exists in its interior, called the pulp-cavity, which opens externally through the hole at the tip of the fang; but in a living tooth this cavity contains a soft, sensitive substance named the pulp.

Dentine.

The *Dentine*, or *Ivory*, makes up the greater part of each tooth; it is situated both in the crown, where it is covered by the enamel, and in the fang, where it is invested by the crusta petrosa; whilst the pulp cavity in the centre of the tooth is a cavity in the dentine. The dentine is composed of an intimate admixture of earthy and animal matter in the proportion of 28 of the animal to 72 of the earthy. The animal matter is resolved on boiling into gelatine; the earthy matter consists mostly of salts of lime.

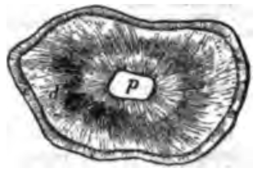


FIG. 12.—Transverse section through the crown of a tooth. *p*, pulp cavity; *d*, dentine; *e*, enamel.

If thin slices through the dentine of a macerated tooth be examined microscopically, it will be seen to consist of a hard, dense, yellowish-white, translucent *matrix*, penetrated by minute canals, called *dentine tubes*. The dentine tubes commence at the pulp cavity, on the wall of which they open with distinct orifices. They radiate in a sinuous manner from the pulp cavity through the thickness of the dentine, and terminate by dividing into several minute branches; this division takes place in the crown of the tooth immediately under the enamel, and in the fang of the tooth immediately under the crusta petrosa. In their course the dentine tubes branch more than once in a dichotomous manner, and give off numbers of extremely minute collateral branches. The transverse diameter of the dentine tubes near the pulp cavity is $\frac{1}{4500}$th inch, but that of their terminal branches is much more minute.

If the dentine be examined in a fresh tooth, the tubes will be seen to be occupied by soft, delicate, thread-like prolongations of the pulp. The passage of processes of the pulp into the dentine tubes was first seen by Owen in the examination of the tusk of an elephant; but the soft contents of the dentine tubes have been made the subject of special investigation by J. Tomes in the human and other mammalian teeth, and have been named the *dentinal fibrils*.

In sections through the dentine of dried teeth, it is not uncommon to find, near its periphery, irregular, black spaces containing air. These spaces freely communicate with each other. As the dentine which forms their boundary has not unfrequently the appearance of globular contours, they were named by Czermak the *interglobular spaces*. In a fresh tooth they are not empty, but are occupied by a soft part of the matrix, which is traversed in the usual manner by the dentine tubes. This matrix is apparently imperfectly calcified dentine, which shrinks up in a dried tooth, and occasions an air-containing space. A layer of small irregular spaces situated in the peripheral part of the dentine in the fang, immediately under the crusta petrosa, and sometimes named the *granular layer*, is apparently of the same nature as the interglobular spaces.

Enamel. The *Enamel* is the brilliant white layer which forms a cap on the surface of the crown of a tooth. It is thickest on the cutting edge or grinding surface of the crown, and thins away towards the neck, where it disappears. It is not only the hardest part of a tooth, but the hardest tissue in the body, and consists of 96·5 per cent. of earthy and of 3·5 per cent. of animal matter. The earthy matter consists almost entirely of salts of lime. The great hardness of the enamel admirably adapts it as a covering for the cutting edge, or grinding surfaces, of the crowns of the teeth.

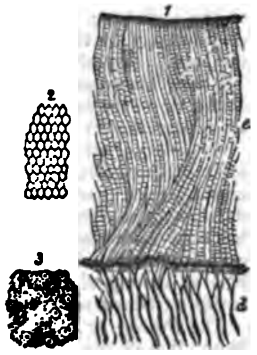


FIG. 14.—1, Vertical section through the enamel and immediately subjacent dentine; e, enamel rods; d, branched termination of dentine tubes. 2, transverse section through the enamel rods. 3. transverse section through dentine tubes and matrix. × 300.

The enamel is composed of microscopic rods,—the *enamel fibres*, or *enamel prisms*. These rods are set side by side in close contact with each other; one end of each rod rests on the surface of the dentine, the other reaches the free surface of the crown. The rods do not all lie parallel to each other, for whilst some are straight, others are sinuous, and the latter seem to decussate with each other. The rods are marked by faint transverse lines, and are solid structures in the fully formed enamel. When cut across transversely, they are seen to be hexagonal or pentagonal, and about $\frac{1}{5000}$th inch in diameter.

The free surface of the enamel of an unworn tooth is covered by a thin membrane, named the *cuticle of the enamel*, or *Nasmyth's membrane*. This membrane can be demonstrated by digesting an unworn tooth in a dilute mineral acid, when it separates as a thin flake from the free surface of the crown. It is a horny membrane, which resists the action of acids. Its deep surface is pitted for the ends of the enamel rods. As the crown of the tooth comes into use, Nasmyth's membrane is worn off, and the enamel itself by prolonged use is thinned and worn down. In persons who live on hard food, that requires much mastication, it is not uncommon to find the grinding surface of the crowns of the molar teeth worn down quite flat, and the dentine exposed.

Cement. The *Cement*, *Crusta Petrosa*, or *Tooth Bone*, forms a thin covering for the surface of the fang of a tooth, and extends upwards to the neck. It is of a yellowish colour, and is usually thickest at the point of the fang; though in the multifanged teeth it sometimes forms a thickish mass at the point of convergence of the fangs. It possesses the structure of bone, and consists of a lamellated matrix with perforating fibres, lacunæ, and canaliculi. The lacunæ are irregular in size and mode of arrangement, and vary also in the number of the canaliculi proceeding from them. Sometimes the canaliculi anastomose with the branched terminations of the dentine tubes. In the thin cement situated near the neck of the tooth the lacunæ are usually absent. If the jaw with its contained teeth be softened in acid, and sections be made so as to show the teeth *in situ*, there is no difficulty in recognising the cellular masses of nucleated protoplasm within the lacunæ, which resemble in appearance the corresponding structures in the adjacent bone. Haversian canals are only found in the cement when it acquires unusual thickness. In old teeth the cement thickens at the tip of the fang, and often closes up the orifice into the pulp cavity; the passage of the nerves and vessels into the pulp is thus cut off, and the nutrition of the tooth being at an end, it loosens in its socket and drops out.

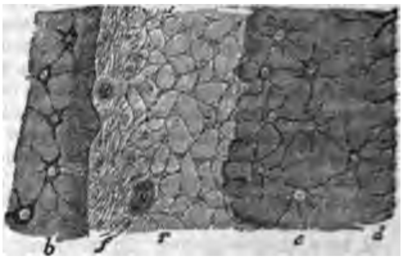


FIG. 15.—Section through the socket and fang of a tooth. b, the bony wall of the socket, its lacunæ containing the bone corpuscles; f, the fibrous, and r, the reticulated portion of the alveolo-dental periosteum, in which transversely divided vessels, v, v, may be seen; c, the cement, the lacunæ of which contain the bone corpuscles; d, the dentine. × 450.

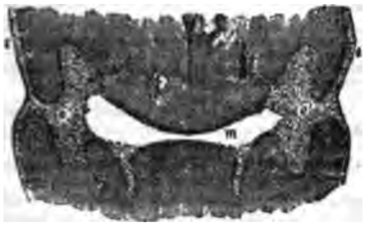
Osteo-dentine and *Vaso-dentine* do not exist as normal structures in human teeth, though they occur in various animals. They may appear, however, as abnormalities in the human teeth, and are found on the inner wall of the pulp cavity. Osteo-dentine consists of dentine structure, intermingled with lacunæ and canaliculi. If vascular canals, like the Haversian canals of bone, are formed in it, then the name vaso-dentine is applied.

The *Pulp* of the tooth is one of its most important constituents. It is a soft substance occupying the cavity in the dentine, or the pulp cavity, and is destroyed in a macerated and dried tooth. It consists of a very delicate gelatinous connective tissue, in which numerous cells are imbedded. Those which lie at the periphery of the pulp are in contact with the dentine wall, and form a layer, named by Kölliker the *membrana eboris*. As the cells of this layer play a part in the formation of the dentine similar to that performed by the osteoblast cells in the formation of bone, Waldeyer has named them *odontoblasts*. The odontoblasts are elongated in form, and their protoplasm gives off several slender processes; some enter dentine tubes to form the soft dentinal fibres already described; one passes towards the centre of the pulp, to become connected with more deeply-placed pulp cells; whilst others are given off laterally to join contiguous cells of the odontoblast layer. The pulp contains the nerves and blood-vessels of the tooth, which pass into the pulp, through the foramen at the point of the fang. The vessels form a beautiful plexus of capillaries. The nerves are sensory branches of the fifth cranial nerve. They enter the pulp as medullated fibres, which divide into very fine non-medullated fibres, that form a network in the peripheral portions of the pulp. The pulp of the tooth is the remains of the formative papilla, out of which the dentine or ivory has been produced. In adult teeth changes that lead to the production of osteo-dentine and vaso-dentine may take place in it. Through the dentinal fibres an organic connection is preserved between the dentine and the pulp, and nsitiveness exhibited by the dentine in some states of h is not necessarily due to the passage of nerves into ; to its connection with the sensitive dentine pulp.

lopment of the Teeth.—In studying the development of the not only has the mode of formation of the individual teeth xamined, but the order of succession of the different teeth the temporary and permanent series.

teeth are developed in the mucous membrane or gum, covers the edges of the jaws of the young embryo, and their ion is due to a special differentiation in the arrangement and ure of portions of the epithelial and sub-epithelial tissues of embrane. The enamel is produced from the epithelium, and ntine, pulp, and cement from the sub-epithelial connective

development of the *temporary teeth* will first be considered. rtical section be made through the mouth of a young human



—Vertical transverse section through the mouth of a young human em- up, naso-palatine region; *t*, tongue; *m*, mouth; *l*, *l*, *l*, *l*, lips; *d*, *d*, tive dental grooves with epithelial contents in upper gum; *d'*, *d'*, similar ures in lower jaws; *c*, *c*, cuticular epiblast; *h*, *h*, hair follicles; *e'*, epiblast ged into the mouth.

about the sixth or seventh week, its cavity may be be lined by a stratified epithelium, continuous with the stratified epiblast forming the cuticle of the face. Along e of the gum, corresponding in position to that of the future he epithelium is of thickness, and an ion of the epithelium e subjacent connec- sue has taken place. to this involution w furrow or groove connective tissue is d, which consti- he *primitive dental* of Goodsir. This is not, however, an furrow, but is occu- y the involuted epi- . The sub-epithelial tive tissue is soft and ous, and abounds in les, which are espe- abundant in the tive tissue at the of the groove, where *tal papillæ* are pro- These papillæ are at the bottom of the by an increased development and growth of the corpuscles abjacent connective tissue. The base of each papilla is con- with the subjacent connective tissue, and the apex projects e deeper parts of the involuted epithelium. As a papilla

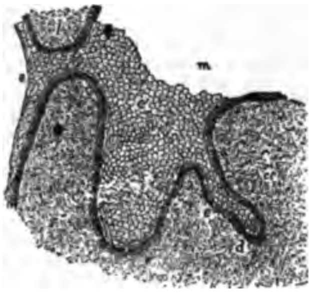


FIG. 17.—A more highly magnified view of a section through the same jaw as fig. 16; *ct*, sub-epithelial connective tissue of the gum; *d*, primitive dental groove; *e''*, its epithelium; *e'*, epithelium lining *m*, the cavity of the mouth; *l*, *l*, lips; *e*, the epiblast cuticle. The deepest layer of the epithelium consists of columnar cells.

s in breadth and the groove widens epens, and the in- epithelium, in- g in quantity, ex- over the apex and f the papilla, so as a hood-like cover- cap for it. The epithelium consti- he *enamel organ*, the papilla is the *e pulp* for the den- d permanent pulp. these changes are place in the epi- and the connective at the bottom of ove, no commensurate widening occurs at its upper part, remains for a time relatively narrow, but retains within it a narrow string of epithelial cells, continuous on the one hand with the epithelial lining of the mouth, and on the other with the enamel organ. This epithelial string forms the *neck of the enamel organ*. After a time, however, the growth of the connective tissue forming the lips of the primitive groove causes the neck of the enamel organ to atrophy, so that all communication between the enamel organ and the superficial epithelium is cut off; and the embryo tooth, being now completely inclosed in a cavity or sac, formed by the gelatinous connective tissue of the gum, has entered on what Goodsir termed its *saccular* stage of development.

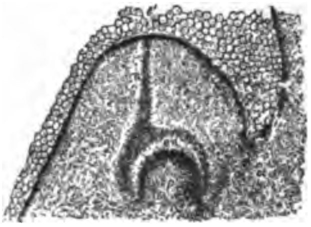


FIG. 18.—Vertical section through the gum to show the formation of the dental papilla. *e'*, the epithelium covering the gum; *n*, the neck of *en*, the enamel organ; *p*, the dental papilla; *ct*, sub-epithelial connective tissue. Magnified.

When inclosed in its sac the embryo tooth, though perfectly soft, acquires a shape which enables one to recognise to what group of teeth it belongs. After a time it begins to harden and to exhibit the characteristic tooth structure.

The dental papilla is more vascular than the surrounding connective tissue, from the blood-vessels of which its vessels are derived. The papilla abounds in cells, which are, in the first instance, rounded and ovoid in shape. Changes then take place in the cells situated at its periphery, which become elongated and branched, and form layers of cells (odontoblasts). Calcification of the protoplasm of these odontoblasts then occurs, and the peripheral layer of the dentine is produced. In contact with the inner surface of the thin film of dentine, a second layer of odontoblast cells is then arranged, which in their turn calcify, and as the process goes on in successive layers of odontoblasts, the entire thickness of the matrix of the dentine and the dentinal sheaths are produced. But the process of calcification does not apparently take place throughout the whole thickness of the protoplasm of the odontoblasts, for, as Waldeyer pointed out, the axial part of the cells remains undifferentiated as the soft dentinal fibrils of the dentine tubes. As these changes are going on in the peripheral layers of the odontoblasts, the central part of the dental papilla increases in quantity, apparently by a proliferation of its cells; nerve fibres are developed in it, and it persists as the soft pulp of the tooth. The papilla of the tooth has essentially, therefore, the same relation to the formation of dentine that the cellulo-vascular contents of the medullary spaces, in intra-cartilaginous ossification, have to the formation of bone. In both instances the hard matrix is due to a special differentiation of the protoplasm of the formative cells; the dentinal fibrils are the equivalent structures to the soft contents of the lacunæ and canaliculi, and the persistent pulp is equivalent to the cellulo-vascular contents of the Haversian canals.

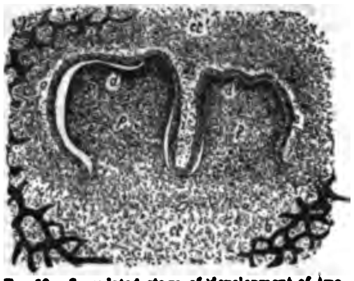


FIG. 19.—Sacculated stage of development of two molar teeth in the cat. *ct*, *ct*, connective tissue forming the sacs for the teeth; *p*, *p*, dental papillæ; the opaque bands, *d*, *d*, mark the commencement of calcification of the dentine; *e*, *e*, internal enamel epithelium; the outer enamel epithelium was not recognisable; *b*, *b*, the bony walls of the alveoli are beginning to form. Magnified.

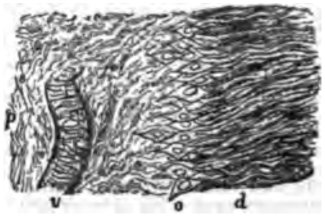


FIG. 20.—Section through the dentine and pulp cavity of a young tooth. *p*, the pulp, with *v*, one of its vessels, and *o*, layers of odontoblast cells giving off processes into *d*, the dentine. × 450.

Prior to the embryo tooth becoming sacculated, changes had taken place in the enamel organ. Those cells of the enamel organ which lie next the dental papilla are continuous, through the neck of the enamel organ, with the deepest layer of cells of the oral epithelium, which cells are elongated columns set perpendicularly to the surface on which they rest. Similarly the cells of the deepest layer of the enamel organ are columns set perpendicularly to the surface of the dental papilla. They undergo a greater elongation, and form six-sided prismatic cells, which Kölliker has named the *internal* or *enamel epithelium*. The cells of the most superficial layer of the enamel organ lie in contact with the vascular connective tissue which encloses the embryo tooth. They form the *external epithelium* of the enamel organ, and slender papillary prolongations of the connective tissue frequently project into this epithelial layer. The cells of the enamel organ, situated between its external and its internal epithelium, become stellate, and form with each other an anastomosing network of cells like those sometimes seen in the gelatinous connective tissue.

After the tooth has become sacculated, and coincident with the transformation of the odontoblast cells of the dental papilla into dentine, calcification begins in the elongated prismatic cells of the internal or enamel epithelium; their protoplasm becomes calcified,

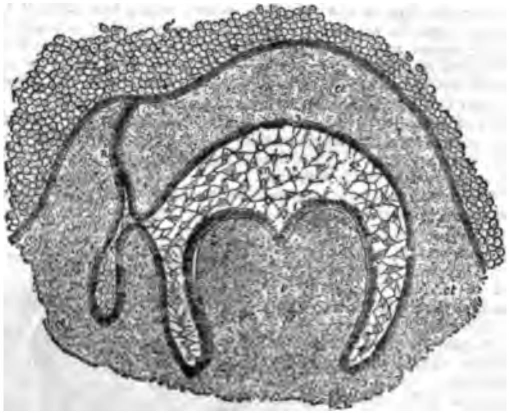


Fig. 21.—Vertical section through the gum in the region of the molar teeth. p, the papilla of a milk molar; 1, the inner, 2, the middle, and 3, the outer layers of the enamel organ; n, the neck of the enamel organ; e', the superficial epithelium; ct, ct, ct, the sub-epithelial connective tissue which subsequently forms the sac of the tooth; r, the cavity of reserve occupied by epithelium, in connection with which the permanent successional tooth is formed. × 300.

and they become the rods or prisms of the enamel. As the hardening takes place from the periphery to the centre of each cell, the axial portion may, as Tomes pointed out, remain soft for some time in the axis of the enamel rod. With the increase in length, and with the calcification of the cells of the enamel epithelium, the stellate gelatinous cells disappear, and the outer ends of the enamel rods come in contact with the cells of the external enamel epithelium. By some observers the external epithelium is supposed to disappear without undergoing any special differentiation, but by others it is believed to undergo conversion into Nasmyth's membrane.

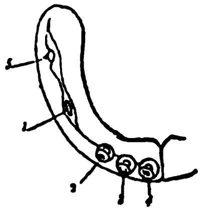
In this manner the crown of a tooth is formed, and it is lodged in a membranous sac formed by the differentiation into a fibro-vascular membrane of the surrounding connective tissue. Whilst within its sac, the crown of the tooth possesses the characteristic form of the group of teeth to which it belongs. After the calcification of the enamel rods is completed, it can undergo no further change either in shape or in increase of size.

Whilst the crown of the tooth is being formed, ossification of the jaws has been going on, and the tooth, with its membranous sac, has become lodged in an alveolus or socket in the jaw, which alveolus is closed in by the gum.

In order that the crown of the tooth may come into use as a masticatory organ, it has to be elevated to the level of the gum, which is absorbed by the pressure, and the crown then erupts into the cavity of the mouth. The process of eruption is due to the development of the fang, which, as it grows in length, elevates the crown of the tooth and forces it outward. The dentine of the fang is developed from the odontoblast cells of the pulp in a manner similar to that already described for the development of the dentine of the crown. The cement or crusta petrosa is developed from the connective tissue lining the alveolus, which forms the alveolo-dental periosteum. It is therefore an ossification in membrane.

As the temporary or milk teeth precede the permanent teeth, their papillæ are naturally the first to form. The series of milk-papillæ are not, however, simultaneously produced. From the observations of Goodsir, it has been shown that the milk-papilla of the anterior molar in the upper jaw appears about the seventh week; then the canine papilla, the two incisor papillæ, and the posterior molar papilla are sucessively formed, the last making its appearance about the end of the tenth week. The dental papillæ in the upper jaw immediately precede the papillæ of the corresponding teeth in the lower jaw.

The eruption of the milk teeth into the mouth does not begin to take place until the latter half of the first year of extra-uterine life, and is not completed until betweeen the second and third year. Though variations occur in the date of eruption of each tooth in different children, it may be stated that the incisors usually appear from the seventh to the ninth month, the anterior molars from the twelth to the sixteenth month, the canines during the seventeenth or eighteenth month, the posterior milk molars from two to two and a half years. The milk teeth begin to be shed about the sixth year by the dropping out of the incisors. The last are the canines, which do not fall out till the tenth or year. The shedding of the milk teeth is preceded by the a of the fangs. This is effected as was satisfactorily sho



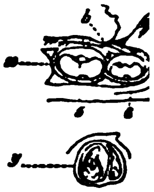


Fig. 22.—One-half the lower jaw of a fœtus about the 11th or 12th we the dental papillæ in the order of their appearance. 1, the first mil the canine; 3 and 4, the two incisors; 5, the second milk m Goodsir.

Fig. 23.—Posterior part of the lower jaw of a child at birth. a, the sac of the posterior milk molar; 6, the crown and sac of the first molar; b, the cavity in connection with which the papilla of the manent molar ultimately forms. y, shows a temporary and perma from the same fœtus.—From Goodsir.

Tomes, by the agency of a group of cells situated at the b the sockets. As these cells occasion absorption of the too similar to that occurring in the bone tissue from the actic large multi-nucleated osteo-klast cells, they may appropr called *odonto-klasts*.

The development of the *permanent teeth* will now be co In the description of the arrangement of the teeth it has bee out that the number of teeth in the permanent set exceed the temporary set. The permanent incisors and canines c the place of the temporary incisors and canines, and the p bicuspids succeed the temporary molars, but the permanen have no milk predecessors, and are superadded at the bac dental series.

The development of the *successional permanent teet* are the ten anterior teeth in each jaw, will first be c Prior to the period when the lips of the primitive dent meet, to produce the saccular stage of dentition of the temporary teeth, an indentation, or furrow, takes place in th tive tissue adjoining the string of epithelial cells which form of the enamel organ. This furrow constitutes what Goods the *cavity of reserve*, and it is filled up by epithelial cells co with the epithelium of the neck of the enamel orga cavity of reserve is formed immediately behind (*i.e.*, on th side of) each milk tooth, they are ten in number in each j except that for the anterior molar, are formed successiv before backwards.

The cavities of reserve are concerned in the production o manent successional teeth, and each temporary tooth is by the permanent tooth formed in connection with the cav serve situated immediately behind it (fig 21). The caviti serve become elongated, and widened, and pass above porary teeth in the upper jaw, and below those in the lo At the bottom of each a dental papilla forms, the apex indentates and becomes covered by the epithelium contain cavity, which forms a cap for the papilla, and constitutes th organ for the permanent tooth. The cavity becomes complet by the growth of the surrounding connective tissue, and th permanent tooth becomes sacculated. The process of cal then goes on, in both the enamel organ and dental papilla, i ner similar to that already described in the temporary teet permanent teeth then become lodged in sockets in the jaw dist those of the temporary teeth. The sac of each permanent mains connected with the fibrous tissue of the gum by fibrous band, or *gubernaculum*, which passes through a ho jaw immediately behind the corresponding milk tooth. B successional permanent tooth erupts, not only should the te tooth be shed, but the bony partition between their respectiv must be absorbed.

The *superadded permanent teeth*, or permanent molars, number on each side, lie behind the successional teeth mode of origin is similar to that of the temporary teet primitive groove, occupied by an involution of the epitheli ing of the gum, is prolonged backwards. Three dental successively appear at the bottom of this groove, and the ep covering each papilla forms its enamel organ. Legros and however, state that the second permanent molar arises in co with a diverticulum (cavity of reserve) proceeding from the string of the enamel organ of the first permanent molar, the wisdom tooth is formed in connection with a similar dive from the second permanent molar. The embryo tooth sacculated, and goes through the process of calcification what has been described in the other teeth

The germ of the first permanent molar appears about the sixteenth week of embryo life; that of the second permanent molar not until about the seventh month after birth; whilst that of the wisdom tooth is not formed until about the sixth year The crown of the first molar is the first of the permanent teeth to erupt into the mouth, which it usually does in the sixth year. The incisors appear when the child is seven or eight; the bicuspids when it is nine or ten; the canines about twelve; the second molars about thirteen; and the wisdom teeth from seventeen to twenty five.

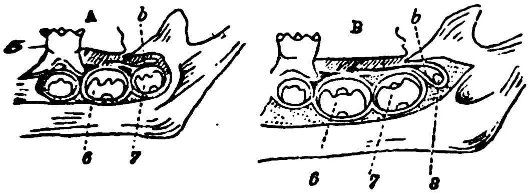


Fig. 24.—A, the lower jaw of a child between four and five years old. 5, the last milk molar, with the successional bicuspid tooth in the cavity of reserve immediately below it; 6 and 7, the first and second permanent molars in their sacs; b, the cavity in connection with which the wisdom tooth is formed. B, the lower jaw of a child about six years old; 6 and 7, the first and second permanent molars; 8, the papilla of the wisdom tooth developed in connection with its cavity b.—From Goodsir

In his dentition man is diphyodont as regards his incisor, canine, and premolar teeth, but monophyodont in the molar series.

From the description of the development of the teeth, it will have been seen that a tooth is made up of three hard tissues—enamel, dentine, and cement—and of the soft vascular and nervous pulp. These tissues are not developed from one layer only of the blastoderm. The enamel is of epiblast origin, whilst the dentine, cement, and pulp are derived from the mesoblast. A tooth in its fundamental development, as was long ago pointed out by Goodsir, must be referred to the same class of organs as the hairs and feathers. The enamel of the tooth, like the hair, is produced by a differentiation of the involuted epithelium of the epiblast, whilst the dentine and pulp resemble the papilla of the hair, in proceeding from the mesoblast. The tooth-sac, like the hair-follicle, is also of mesoblast origin. Whether the cement, as Robin and Magitot have described, be developed by means of a special *cement organ*, in the interior of the tooth-sac, or be formed, as has been stated in this description, by the alveolo-dental periosteum, it is on either view derived from the mesoblast. As to the origin of Nasmyth's membrane, there is a difference of opinion; some regard it as a special cornification of the external cells of the enamel organ, in which case it would be from the epiblast; whilst others consider it to be continuous with though structurally different from, the cement—homologous, therefore, with the layer of cement, which in the horse, ruminants, and some other mammals covers the surface of the crowns of the teeth.

The tissues of a tooth have not all the same importance in the structure of a tooth. The dentine is apparently always present, but the enamel, or the enamel and cement, may be absent in the teeth of some animals. For example, the tusks of the elephant and narwhal, and the teeth of the Edentata, are without enamel, and in the Rodentia enamel is present on only the anterior surface of the incisors. But though the enamel is not developed, or forms only an imperfect covering for the crowns of these teeth, yet an enamel organ is formed in the embryo jaws. In 1872 W. Turner described a structure homologous with the enamel organ in relation with each of the dental papillæ in the lower jaw of a fœtal narwhal; but this organ did not exhibit a differentiation into the three epithelial layers, such as occurs in those teeth in which enamel is developed. Since then C. S. Tomes has seen an enamel organ in the embryo armadillo, and has also pointed out that, in teeth generally, enamel organs exist, quite irrespective of whether enamel subsequently does or does not form.

But further, the involution of the oral epithelium, and the coincident formation of a primitive groove, take place not only where the teeth subsequently arise, but along the whole curvature of the future jaws; whilst the production of dental papillæ is restricted to the spots where the teeth are formed. Hence it would seem that the inflection of the oral epithelium is not so essential to the development of a tooth as the formation of a papilla. The inflected epithelium marks only a preliminary stage, and it may or may not be transformed into tooth structure. But that which is essential to the formation of a tooth is the production of the papilla which appears at the bottom of the primitive groove. (W. T.)

DIGITALIS, or **Foxglove**, a genus of biennial and perennial plants of the natural order *Scrophulariaceæ*. The common or purple foxglove, *D. purpurea*, is common in dry hilly pastures and rocky places and by road sides in various parts of Europe; it ranges in Great Britain from Cornwall and Kent to Orkney, but it does not occur in Shetland or in some of the eastern counties of England. It flourishes best in siliceous soils, and is not found in the Jura and Swiss Alps. The characters of the plant are as follows:—stem erect, roundish, downy, leafy below, and from 18 inches to 6 feet or more in height; leaves alternate, crenate, rugose, ovate or elliptic-oblong, and of a dull green, with the under surface downy and paler than the upper; radical leaves together with their petioles often a foot in length; root of numerous, slender, whitish fibres; flowers 1¾–2½ inches long, pendulous, on one side of the stem, purplish crimson, and hairy and marked with eye-like spots within; segments of calyx ovate, acute, cleft to the base; corolla obtuse, with the upper lobe entire or obscurely divided; stamens four and didynamous (see vol. iv. p. 138, fig. 226); anthers yellow and bilobed; capsule bivalved, ovate, and pointed; and seeds numerous, small, oblong, pitted, and of a pale brown. As Parkinson remarks of the plant, "It flowreth seldome before July, and the seed is ripe in August;" but it may occasionally be found in blossom as late as September. In one variety, common in gardens, the flowers are white; in another their purple is of a coppery or metallic hue; and not unfrequently in cultivated plants several of the uppermost blossoms may be united together so as to form a cup-shaped compound flower, through the centre of which the upper part of the stem passes. A figure of *D. purpurea* will be found in vol. iv. plate xi. Many species of foxglove with variously-coloured flowers have been introduced into Britain from the Continent. The plants may be propagated by off-sets from the roots, but are best raised from seed.

The foxglove (Ang.-Sax., *foxes-clife*, *foxes-glofa*) is known by a great variety of popular names in Britain. In the south of Scotland it is called bloody fingers; further north, dead-men's-bells; and on the eastern borders, ladies' thimbles, wild mercury, and Scotch mercury. Among its Welsh synonyms are *menyg-ellyllon* (elves' gloves), *menyg y llwynog* (fox's gloves), *bysedd cochion* (red fingers), and *bysedd y cwn* (dog's fingers). In France its designations are *gants de notre dame*, and *doigts de la Vierge*. The German name *fingerhut* (thimble) suggested to Fuchs, in 1542, the employment of the Latin adjective *digitalis* as a designation for the plant.

The leaves, gathered from wild plants when about two-thirds of their flowers are expanded, deprived usually of the petiole and the thicker part of the midrib, and dried, constitute the drug *digitalis* or *digitalis folia* of the pharmacopœia. The prepared leaves have a faint odour and bitter taste; to preserve their properties they must be kept excluded from light in stoppered bottles. They are occasionally adulterated with the leaves of *Inula Conyza*, Ploughman's Spikenard, which may be distinguished by their greater roughness, their less divided margins, and their odour when rubbed; also with the leaves of *Symphytum officinale*, Comfrey, and of *Verbascum Thapsus*, Great Mullein, which unlike those of the foxglove have woolly upper and under surfaces. The powder, infusion, and tincture of digitalis are employed both externally and internally; and its active principle, *digitalin*, may further be used for subcutaneous injection. Digitalin, according to Nativelle, is a crystallizable, neutral, inodorous, bitter substance, of the formula $C_{25}H_{40}O_{15}$, insoluble in water and ether, but soluble in alcohol and chloroform. The earliest known descriptions of the foxglove are those given by Fuchs and Tragus about the middle of the 16th century, but its virtues were doubtless known to herbalists at a much remoter period. Gerarde, in his *Herbal* (1597), advocates the use of foxglove for a variety of complaints; and John Parkinson, in the *Theatrum Botanicum*, or *Theater of Plants* (1640), tells us that

"The Italians have an usuall proverbe with them concerning this herb, called by them *Aralda*, which is *Aralda tutte piaghe salda: Aralda* salveth all sores . . . . . It hath been found by late experience to be availeable for the King's Evill . . . . also to be effectuall against the Falling Sicknesse, that divers have been cured thereby."

Later, Salmon, in *The New London Dispensatory*, praises the remedy foxglove in no measured terms.

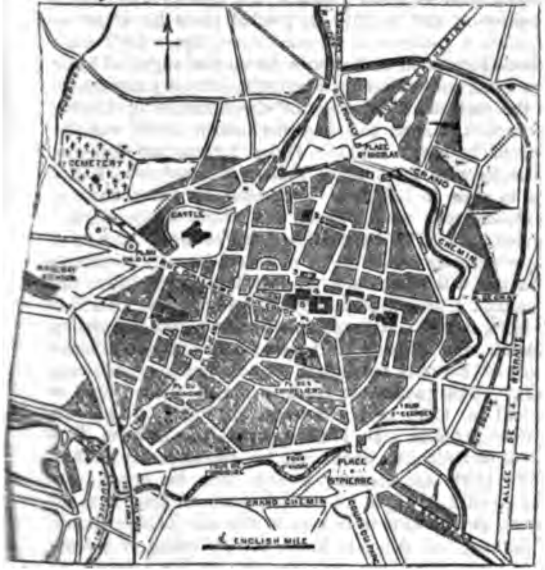
Digitalis was first brought prominently under the notice of the medical profession by Dr W. Withering, who, in his *Account of the Foxglove* (1785), gave details of upwards of 200 cases, chiefly dropsical, in which it was used. Having become acquainted with the drug in 1775 as an ingredient in a Shropshire family receipt for the cure of dropsy, he began to administer it as a diuretic, but at first in doses too large; for, "misled by reasoning from the effect of the squills, which generally acts best upon the kidneys when it excites nausea," he sought to produce the same effect by foxglove. Further experience, however, convinced him "that its diuretic effects do not at all depend upon its exciting nausea or vomiting;" and that often the urinary discharge may be checked when the dose is imprudently urged so as to occasion sickness. He moreover observed that in cases where the drug produced purging it was inefficacious unless combined with small doses of opium, so as to restrain its action on the bowels. Withering seldom found it to succeed in men of great natural strength, tense fibre, warm skin, and florid complexion, or in those with a tight and cordy pulse. He recommended digitalis "in every species of dropsy, except the encysted;" and he was of opinion that it might be made subservient to the cure of diseases unconnected with dropsy, and that its power over the motion of the heart, to a degree unobserved by him in any other medicine, might be turned to good account by the physician.

The experiments of Marcet and Brunton show that the infusion of digitalis has a poisonous effect on various plants, and, even in very small quantity, kills fishes,—their auricles after death being found distended, their ventricles strongly contracted. On birds the effect of the infusion is to cause firm contraction of the left ventricle, and consequent excessive congestion of the lungs. A large turkey, according to M. Salerne (*Hist. de l'Académie*. 1748, p. 120, 12mo, and p. 84, 4to ed.), walked as if intoxicated, in consequence of partaking once of foxglove leaves. Another turkey, weighing 7 ℔, ate during 4 days about half a handful of the leaves, after which it refused nourishment, and in a couple of weeks died, its weight being reduced to 3 ℔. Handfield Jones and Fuller have proved that the infusion produces upon the hearts of frogs and mammals effects similar to those observed in birds. The usual results of small and repeated doses of digitalis are contraction of the capillaries, and augmented arterial blood-pressure, with slower and more powerful cardiac systole, and an increase in the urinary secretions; large or long-continued doses, besides causing nausea or vomiting, often accompanied by purging, occasion a slow or irregular pulse, dilatation of the capillaries, decrease in the rate of respiration, cold sweats, disordered vision, chilliness of the extremities, giddiness, and great weakness, followed by convulsions and insensibility. Syncope is apt to occur on sudden changes of posture by patients fully under the influence of the drug. Its cumulative action, or unexpected production of alarmingly acute symptoms, may arise either from an increase in the dose, the elimination of the drug being constant, or from a check in the elimination, the dose remaining unaltered, hence the caution with which digitalis should be administered in cases where the renal functions are disturbed. The experiments of various physiologists have shown that digitalis, by stimulating the sympathetic ganglia of the heart, causes the contraction of its musculo-motor fibres, this effect being at first masked by a similar action on the pneumogastric nerves. By effecting more complete emptying of the ventricles in cases of cardiac disturbance, digitalis improves the circulation, bringing about in the lungs a more thorough oxidation of the blood. The consequent increased nutrition of the heart is promotive of hypertrophy in that organ; small doses of digitalis are therefore an assistance in hypertrophy following upon cardiac injury. In cases of dilatation of the heart, on the other hand, large doses are required. The continued use of the drug when the heart has become sufficiently hypertrophied may render ventricular action excessive. Digitalis calms excitement of the heart not by acting as a narcotic or sedative but by stimulating its nerves, and enabling it to contract without laboured effort. In feeble conditions of the circulation it acts diuretically by increasing arterial tension, but its influence as a diuretic is not constant. Its efficacy in epilepsy appears to be limited by its action on the circulation. In enteric fever, erysipelas, and acute rheumatism, it has been employed to reduce temperature. Its use as a sedative in pneumonia, delirium tremens, and some other diseases has been objected to on the ground that it cuts off the irritating blood supply only by an extreme degree of ventricular contraction. In arachnitis in children, in inflammation tending towards serous effusion, in dropsy, hæmorrhage, cerebral anæmia, and occasionally in angina pectoris and nervous palpitation, it is a valuable remedy. Upon the uterus digitalis acts by stimulating the ganglia in which its motor power resides (W. Howship Dickenson, in *Med. Chir. Trans.* vol. xxxix. Lond. 1856). In poisoning by digitalis, aconite and probably also Calabar bean may be resorted to.

A. L. J. Bayle, *Bibliothèque de Thérapeutique*, tom. iii. pp. 1–372; Christison, *A Treatise on Poisons*, p. 886, 4th ed. 1855; Sir H. Holland, *Medical Notes and Reflections*, chap. xxix. 3d ed., 1855; Trousseau et Pidoux, *Traité de Thérapeutique*, vol. ii. p. 754, 1862; T. L. Brunton, *On Digitalis*, 1868; J. Milner Fothergill, *Digitalis, its Mode of Action, and its Use*, 1871; Pereira, *Materia Medica*, 1874; Garrod, *Materia Medica*, 1814; G. W. Balfour, *Clinical Lectures on the Diseases of the Heart and Aorta*, pp. 97 and 304, 1876. (F. H. B.)

DIGNE, the chief town of the department of Basses-Alpes, in France, about 70 miles north-east of Marseilles, in 44° 5′ 32″ N. lat. and 6° 14′ 6″ E. long. It is built on a spur of the mountains jutting out into a gorge traversed by the Bléonne, which in winter is a formidable torrent, but in summer is almost dry; and the neighbourhood is rich in orchards, which have long made the town famous in France for its preserved fruits and confections. The streets are narrow and tortuous, with the exception of the Boulevard Gassendi, at the upper end of which is a public garden, with a statue of the philosopher, who was born in the neighbouring village of Chantercier. The cathedral within the town is a building of very hybrid architecture, and is of less importance than the cathedral of Notre Dame, in the vicinity, which dates from the 12th century, and is numbered among the historic monuments of France. The thermal springs are not in much repute, and the bathing establishment is in a state of decay. Digne is identified with Dinia, the capital of the Avantici and Bodiontici. It early became an ecclesiastical see, and its bishops acquired the secular rank of barons of Lauzières. In the 16th century it suffered on four separate occasions from the Huguenot soldiery; and in modern history it is known as the place from which Napoleon issued his proclamation of March 1815. Population in 1872, 5300 in the town and 6877 in the commune.

DIJON (*Divio*, *Dibio*, or *Divionense Castrum*), the chief town of the department of Côte-d'Or in France, and formerly capital of the province of Burgundy, is situated at the foot of Mount Affrique, in a fertile plain, on the Burgundy canal, and at the confluence of the Ouche and Suzon, in 47° 19′ 19″ N lat., and 5° 2′ 5″ E. long. The streets are broad and well built of freestone, and there are fifteen squares; an abundant supply of water is obtained from the vale of Suzon by means of a subterranean aqueduct nearly eight miles in length. Among the more noteworthy of the public edifices are the cathedral of St Bénigne, in the Gothic style of the 13th century, with a spire erected in 1742; the church of Notre Dame built in 1331–1445, containing a group in stone, the Assumption of the Virgin, by Dubois, and a statue of the Black Virgin, celebrated in the Middle Ages; the church of St Michel, of the 16th century; the general hospital, founded by Otho III. in 1206; the castle, commenced in 1478 by Louis XI., and finished in 1512 by Louis XII., once a state prison, in which the duchess of Maine, Mirabeau, the Chevalier d'Eon, and Toussaint Louverture were confined, and since then a barrack for gendarmes; and the old palace of the dukes of Burgundy, or hôtel de ville, rebuilt between the end of the 17th and the end of the 18th century, in which are an art collection, the archives, a museum of natural history, a school of arts, and the salle des gardes, containing the tombs of Philippe le Hardi and Jean sans Peur. Important structures also are the lunatic asylum, the ancient court-house, the theatre, and the hospice Saint-Anne, and numerous other educational establishments. Dijon possesses a library of 70,000 volumes and 900 manuscripts, a picture gallery, a collection of coins and of 40,000 engravings, a jardin des plantes and herbarium, and a fine park, commenced in 1670, after the designs of Le Nôtre, by the Great Condé, and finished by his son. It is the seat of a bishop, and of tribunals of primary instance and commerce, and has faculties of law, science, and literature. The ramparts that formerly surrounded the town have been replaced by broad avenues. The principal industries are the manufacture of hosiery, woollen and cotton cloth, Paris lace, leather, candles, earthenware, mustard, confections, vinegar, and chemicals; iron and type-founding, printing and binding, brewing, saltpetre-refining, and nursery-gardening. Dijon does an important trade in cereals, and is the chief emporium for Burgundy wines. The population of the commune in 1872 was 42,573; that of the town, 40,116.



Plan of Dijon.

1. Statue of St Bernard.
2. Prefecture.
3. Notre Dame.
4. Post Office.
5. Hôtel de Ville.
6. St Michel.
7. Theatre.
8. Cathedral of St Bénigne.
9. Palace of Justice.

Dijon was a fortified camp of the Romans, and about 274 was enlarged by Aurelian. In 731 it was taken and burnt by the Saracens. Councils were held there in 1077, 1116, and 1199 or 1200. Early in the 12th century the town was almost entirely destroyed by fire, but it was soon rebuilt. Till 1107 it was held by the counts of Dijon, and from 1179 to the death of Charles the Bold in 1477 it was the residence of the dukes of Burgundy; it then came into the possession of Louis XI., who established there the Burgundian "*Parlement*." In 1513 Dijon was besieged by 20,000 Swiss, with whom a humiliating treaty was concluded. On October 31, 1870, the town capitulated to General Werder; it was evacuated by the Germans on the 27th of December, and early in January 1871 became the head-quarters of the French eastern army under Bourbaki. On the 1st of the following February it was re-occupied by the Germans. Dijon is the birthplace of Bossuet, Jacques Cazotte, the elder Crébillon, Daubenton, Jouffroy, Longepierre, Bernard de la Monnoie, Guyton de Morveau, Piron, Rameau, and Saumaise.

DILAPIDATIONS, in English law, is the name given to the waste committed by the incumbent of an ecclesiastical living. By the general law a tenant for life has no power to cut down timber, destroy buildings, &c. (voluntary waste), or to let buildings fall into disrepair (permissive waste). In the eye of the law an incumbent is a tenant for life of his benefice, and any waste, voluntary or permissive, on his part must be made good by his administrators to his successor in office. The principles on which such dilapidations are to be ascertained, and the application of the money payable in respect thereof, depend partly on old ecclesiastical law and partly on recent Acts of Parliament. Questions as to dilapidations usually arise in respect of the residence house and other buildings belonging to the living. Inclosures, hedges, ditches, and the like are included in things "of which the beneficed person hath the burden and charge of reparation." In a leading case (Ross *v.* Adcock, 37 *Law Journal*, C.P. 290) it was said that the court was acquainted with no precedent or decision extending the liability of the executors of a deceased incumbent to any species of waste beyond dilapidation of the house, chancel, or other buildings or fences of the benefice. And it has been held that the mere mismanagement or misculti-vation of the ecclesiastical lands will not give rise to an action for dilapidations. To place the law relating to dilapidations on a more satisfactory footing, the Act 34 and 35 Vict. c. 43 was passed. The buildings to which the Act applies are defined to be such houses of residence, chancels, walls, fences, and other buildings and things as the incumbent of the benefice is by law and custom bound to maintain in repair. In each diocese a surveyor is to be appointed by the archdeacons and rural deans subject to the approval of the bishop; and such surveyor shall by the direction of the bishop examine the buildings on the following occasions—viz., 1, when the benefice is sequestrated; 2, when it is vacant; 3, at the request of the incumbent or on complaint by the archdeacon, rural dean, or patron. The surveyor is to specify the works required, and to give an estimate of their probable cost. In the case of a vacant benefice, the new incumbent and the old incumbent or his representatives may lodge objections to the surveyor's report on any grounds of fact or law, and the bishop, after consideration, may make an order for the repairs and their cost, for which the late incumbent or his representatives are liable. The sum so stated shall be a debt due from the late incumbent or his representatives to the new incumbent, who shall pay over the money when recovered to the governors of Queen Anne's Bounty. The governors pay for the works on execution on receipt of a certificate from the surveyor; and the surveyor, when the works have been completed to his satisfaction, shall give a certificate to that effect, the effect of which, so far as regards the incumbent, will be to protect him from liability for dilapidations for the next five years. Unnecessary buildings belonging to a residence house may, by the authority of the bishop and with the consent of the patron, be removed. An amending statute (35 and 36 Vict. c. 96) relates chiefly to advances by the governors of Queen Anne's Bounty for the purposes of the Act.

DILIGENCE, in law, is the care which a person is bound to exercise in his relations with others. The possible degrees of diligence are of course numerous, and the same degree is not required in all cases. Thus a mere depositary would not be held bound to the same degree of diligence as a person borrowing an article for his own use and benefit. Jurists, following the divisions of the civil law, have concurred in fixing three approximate standards of diligence—viz., ordinary, less than ordinary, and more than ordinary. Ordinary or common diligence is defined by Story (*On Bailments*) as "that degree of diligence which men in general exert in respect of their own concerns." So Sir William Jones:—"This care, which every person of common prudence and capable of governing a family takes of his own concerns, is a proper measure of that which would uniformly be required in performing every contract, if there were not strong reasons for exacting in some of them a greater and permitting in others a less degree of attention" (*Essay on Bailments*). The highest degree of diligence would be that which only very prudent persons bestow on their own concerns; the lowest, that which even careless persons bestow on their own concerns. The want of these various degrees of diligence is negligence in corresponding degrees. These approximations indicate roughly the greater or less severity with which the law will judge the performance of different classes of contracts; but English judges have been inclined to repudiate the distinction as a useless refinement of the jurists. Thus Baron Rolfe could see no difference between negligence and gross negligence; it was the same thing with the addition of a vituperative epithet. See NEGLIGENCE.

Diligence, in Scots law, is a general term for the process by which persons, lands, or effects are attached on execution, or in security for debt.

DILKE, SIR CHARLES WENTWORTH (1810–1869), Baronet, born in London, February 18, 1810, was the only son of Charles Wentworth Dilke, proprietor and editor of the *Athenæum*, and was educated at Westminster school and Trinity Hall, Cambridge. He studied law, and in 1834 took his degree of LL.B.; but he did not enter upon the practice of his profession. He assisted his father in his literary work, and afterwards gave up much of his time to several of the learned societies. He was for some years chairman of the council of the Society of Arts, and took a prominent part in the affairs of the Royal Horticultural Society. He was one of the most zealous promoters of the Great Exhibition (1851), and a member of the executive committee. At the close of the exhibition he was honoured by foreign sovereigns, and the Queen offered him knighthood, which, however, he did not accept; he also declined a large remuneration offered by the royal commission. In 1853 Dilke was one of the English commissioners at the New York Industrial Exhibition, and prepared a report on it. He again declined to receive any money reward for his services. He was appointed one of the five royal commissioners for the Great Exhibition of 1862; and soon after the death of the Prince Consort he was created baronet by the Queen. In 1865 he entered parliament as member for Wallingford. In 1869 he was sent to Russia as representative of England at the Horticultural Exhibition held at St Petersburg. His health, however, had been for some time failing, and he died suddenly in that city, May 10, 1869. He was a fellow of the Society of Antiquaries, and a member of other learned bodies.

DILL (*Anethum*), a genus of umbelliferous plants having decompound leaves; umbels without involucre; yellow flowers, with calices incomplete above; and lenticular fruit, compressed from back to front, flattened at the margin, and presenting on each side three ridges. The common species, *A. graveolens*, is indigenous to the south of Europe, Egypt, and the Cape of Good Hope. It resembles fennel in appearance. Its root is long and fusiform; the stem is round, jointed, and about a yard high; the leaves have fragrant folioles; and the fruits are brown, oval, and concavo-convex. The plant flowers from June till August in England. The seeds are sown, preferably as soon as ripe, either broadcast or in drills between 6 and 12 inches asunder. The young plants should be thinned when three or four weeks old, so as to be at distances of about 10 inches. A sheltered spot and dry soil are needed for the production of the seed in the climate of England. The leaves of the dill are used in soups and sauces, and, as well as the umbels, for flavouring pickles. The seeds are employed for the preparation of dill-water and oil of dill (valued for their carminative properties), are largely consumed in the manufacture of gin, and, when ground, are eaten as a condiment in the East. See BOTANY, vol. iv. p. 123.

DILLEN [DILLENIUS], JOHANN JAKOB (1687–1747), a distinguished botanist, was born at Darmstadt. He was educated at the university of Giessen, where he received his doctor's diploma, but he early turned his attention from medicine to the study of plants. Whilst at Giessen he wrote several botanical papers for the *Ephemerides Naturæ Curiosorum*, and in 1719 he printed there his *Catalogus Plantarum sponte circa Gissam nascentium*, a little octavo volume illustrated with figures drawn and engraved by his own hand, and containing descriptions of many new genera. In the preface he discusses the classifications of Rivinus, Tournefort, Knaut, and Ray, the last of which was that adopted by him. In 1718 Dillen became acquainted in Germany with the botanist William Sherard, who invited him to come to England. Soon after his arrival there, in 1721, he took up his abode at Oxford, where Sherard resided. In 1724 he published an enlarged edition of Ray's *Synopsis Stirpium Britannicarum*. In accordance with the will of Sherard, who died in 1728, Dillen was appointed professor of botany at Oxford. He published in 1732, in two volumes folio, with 324 plates executed by himself, the *Hortus Elthamensis*, of which Linnæus wrote—"Est opus botanicum quo absolutius mundus non vidit". That naturalist spent a month with Dillen at Oxford in 1736, and afterwards dedicated to him his *Critica Botanica*. In 1741 appeared the *Historia Muscorum* of Dillen, to whom and his contemporary Micheli (1679–1731) cryptogamic botany owes its origin. He died April 2, 1747, in his sixtieth year. A print from his picture at Oxford is to be seen in Sim and König's *Annals of Botany*, vol. ii. His books and collection of mosses, with many drawings, were bought by his successor at Oxford, Dr Humphrey Sibthorp, and added to the Sherardian Museum.

DILLINGEN, a town of Bavaria, in the circle of Schwaben-Neuburg, on the left bank of the Danube, 24 miles north-west of Augsburg. Its principal structures are the royal palace, formerly the residence of the bishops of Augsburg, the royal gymnasium and Latin school, with a library of 75,000 volumes, five churches, two episcopal seminaries, a Capuchin monastery, a Franciscan nunnery, and a deaf and dumb asylum. The university, founded in 1549, was abolished in 1804, being converted into a lyceum. The inhabitants, who in 1875 numbered 5029, are engaged in cattle-rearing, the cultivation of corn, hops, and fruit, ship-building and the shipping trade, and the manufacture of cloth, paper, and cutlery. Dillingen was taken by the Swedes in 1632 and 1648, by the Austrians in 1702, and on the 18th July 1800 by the French.

DIMENSIONS. In geometry a line is said to be of one dimension, a surface of two, and a solid of three dimensions. The use of the word is extended to algebraical terms, which are said to be of n dimensions with respect to any quantity when that quantity enters to the nth power.

If the term contains several variables, x, y, z, &c., and if the sum of the indices of these variables is n, the term is said to be of n dimensions with respect to the system of variables x, y, z.

If all the terms of an equation are of n dimensions with respect to the system of variables x, y, z, the equation is said to be homogeneous of n dimensions with respect to that system of variables.

The equation may or may not be homogeneous with respect to another system of variables which occur in it, as p, q, r.

If all the variables of a system with respect to which the equation is homogeneous are increased in the same ratio, the equation will still be true.

The general equations occurring in the application of mathematics to natural phenomena are equally true whatever units we employ for the measurement of the different quantities which enter into them, provided we employ the same units throughout the equation. Hence such equations must be homogeneous with respect to any system of variables which is referred to the same unit, and all quantities essentially numerical, such as exponents and exponentials, logarithms, angles, and circular and elliptic functions, must be of zero dimensions.

There are two methods of interpreting the equations relating to geometry and other concrete sciences.

We may regard the symbols which occur in the equation as of themselves denoting lines, masses, times, &c.; or we may consider each symbol as denoting only the numerical value of the corresponding quantity, the concrete unit to which it is referred being tacitly understood.

If we adopt the first method we shall often have difficulty in interpreting terms which make their appearance during the calculations. We shall therefore consider all the written symbols as mere numerical quantities, and therefore subject to all the operations of arithmetic during the process of calculation. But in the original equations and the final equations, in which every term has to be interpreted in a physical sense, we must convert every numerical expression into a concrete quantity by multiplying it by the unit of that kind of quantity.

Thus if we write [L] for the unit of length, that is to say, the actual concrete centimetre or foot, and if x denotes the numerical value of a certain line, then the complete expression for the line is $x\,[L]$; and if y, z, &c, are the numerical values of other lines, then the complete expression for the quantity whose numerical value is $x^{\alpha}y^{\beta}z^{\gamma}$ is

$$x^{\alpha}y^{\beta}z^{\gamma}\left[L^{\alpha+\beta+\gamma}\right],$$

and this quantity is said to be of $\alpha+\beta+\gamma$ dimensions with respect to [L], the unit of length.

There must be as many different units as there are different kinds of quantities to be measured, but in all dynamical sciences it is possible to define these units in terms of the three fundamental units of length, time, and mass. We therefore suppose these three fundamental units to be given, and deduce all the others from these by the simplest attainable definitions.

The equations at which we arrive must be such that a person of any nation, by substituting for the different symbols the numerical values of the quantities as measured by his own national units, would obtain a true result.

This can only be the case if the equation is homogeneous with respect to each of the fundamental units. To ascertain if it is so we must count the dimensions of every term, and for this purpose we must know the dimensions of any derived units which enter into the equation. The theory of the dimensions of physical quantities were first stated by Fourier, *Théorie de Chaleur*, sec. 160.

By knowing the dimensions of any quantity we are able at once to deduce its numerical value as expressed in terms of one system of units from its numerical value as given in terms of another system.

Thus magnetic measurements have been made according to the British system, in which the foot, the grain, and the second of mean time are the fundamental units. Other magnetic measurements have been made according to systems derived from the French metric system, using the metre, centimetre, or millimetre as unit of length, the kilogramme, gramme, or milligramme as unit of mass, and the second as unit of time. In recent times an effort has been made to procure the adoption for all scientific measurements of a system in which the centimetre, gramme, and second are the units. This is sometimes referred to as the C. G. S. system, and a copious list of examples of the measurement of physical quantities on this system, of its comparison with other systems, and of the dimensions of quantities occurring in all branches of physics, has been prepared by Dr Everett, and published by the Physical Society of London and by Taylor and Francis, under the title *Illustrations of the C. G. S. System of Units.*

The three fundamental units may be selected each independently of the others, in an entirely arbitrary manner. It is possible, however, by taking advantage of the permanence of the properties of natural substances, so to define the units that one or more of them may be reproduced without reference to any material standard at present existing.

Thus, if the density of a standard substance in a standard state, such as water when at its maximum density under the pressure of its own vapour, is defined as the unit of density, then the unit of mass may be derived from the unit of length, or *vice versa.* In this system, therefore, the dimensions of mass in terms of length are L^3, or of length in terms of mass, $M^{\frac{1}{3}}$.

We may define the three fundamental units without reference to any actual body, but by means of a natural substance such as water. For if the solid, liquid, and gaseous states of pure water are in equilibrium in a vessel containing no other fluid, the pressure and temperature of the system are determinate. We may therefore define the unit of density in terms of the density of the liquid water under these conditions, and the unit of pressure in terms of the pressure in the vessel. We may deduce the third unit from the law of gravitation, and define the unit of time in terms of the time of revolution of a satellite about a sphere having the unit density at a distance equal to the radius. This time must be calculated from the results of experiments on attraction. Having thus obtained a density, a pressure, and a time, the magnitudes of which are the same under all circumstances, we can derive from them standards of length and mass. For the dimensions of the unit of density [D] are $[ML^{-3}]$, and those of the unit of pressure [P] are $[ML^{-1}T^{-2}]$, so that the dimensions of [L] are $[P^{\frac{1}{2}}D^{-\frac{1}{2}}T]$, and those of [M] are $[P^{\frac{3}{2}}D^{-\frac{1}{2}}T^{3}]$.

This method of defining the three fundamental units is suggested, not as being at all comparable in point of accuracy with the usual methods, but as being an example of a method independent of the preservation of any material standards, whether artificial, as those kept by Government, or natural, as the earth, and its time of revolution. (J. C. M.)

DINÁJPUR, a district of British India, within the Rájsháhí Kuch-Behar division or commissionership under the lieutenant-governor of Bengal, is situated between 24° 43′ 40″ and 26° 22′ 50″ N. lat., and between 88° 4′ 0″ and 89° 21′ 5″ E. long. The district, which occupies an area of 4126 square miles, is a triangular tract of country with the acute angle towards the north, lying between the districts of Jalpáigurí and Rangpur on the E., and Purniah on the W.; on the S. it is bounded by the districts of Bográ, Rájsháhí, and Maldah. The country is generally flat, but towards the south becomes undulating, some of the elevations being about 100 feet in height. The district is traversed in every direction by a network of channels and water courses. Along the banks of the Kulik river, the undulating ridges and long lines of mango-trees give the landscape an aspect of beauty which is not found elsewhere.

[illegible] lying between [illegible] the Himálayas. [illegible] does not possess [illegible] boats of 4 tons [illegible] product. It [illegible] winter rice (the [illegible] autumn rice, and [illegible] aus rice are each [illegible] The other crops are [illegible] pulses, jute, sugar-cane, [illegible] The imperial road [illegible] through the district for [illegible] and the new Northern [illegible] the district for about 30 [illegible] although cooler than [illegible] and the people have a [illegible] part of the year is at the [illegible] September and October, during which [illegible] escape fever. The average [illegible] and the minimum 74·8°. [illegible] inches. The population in [illegible] souls, equal to 364 persons [illegible] Hindus forming 46·8 per cent., and [illegible] per cent.

[illegible] the principal town and administrative head-[illegible] the above district, is situated on the east bank [illegible] river, in 25° 38′ 0″ N. lat. and 88° 40′ [illegible] The town seems to have declined in import-[illegible] years. In 1808 it was estimated to contain [illegible] the census of 1872 returned only 3031. [illegible] in 1872:—Hindus, 8847; Mahometans, 7016; [illegible] others, 80:—total (7700 males and [illegible] 18,042. The disparity in the propor-[illegible] the sexes arises from the fact that many of the [illegible] and traders have houses in the country where [illegible] their wives and children.

[illegible] a town of France, in the department of Côtes [illegible] about fifteen miles inland, on the left bank of the [illegible] The river is navigable for vessels of 150 tons up [illegible] foot of the great granite viaduct which was com-[illegible] in 1852 across the ravine between the town and the [illegible] of Lanvallay. The town has a highly picturesque [illegible] not only from the position which it occupies on [illegible] heights above the river, but also from the numerous [illegible] which it still preserves of the architecture of earlier [illegible] There are considerable portions of the ancient ram-[illegible] and towers, the castle of the 14th century still looks [illegible] its height; and many of the houses in the Rue [illegible] and the Rue de la Lainerie can boast of [illegible] equal antiquity. Of the public buildings may be [illegible] the church of St Sauveur, dating from the 12th [illegible] the church of St Malo, the town-[illegible] 15th century, [illegible] which was formerly a hospital, and the monastery [illegible] Capuchins, now used as a benevolent institution. [illegible] a good general trade, the inhabitants carry on the [illegible] of linen, sailcloth, cotton, thread, [illegible] About half a mile from the town are the [illegible] and salt [illegible] and the Benedictine abbey at Lehon, of [illegible] the latter is called in the country the Chapelle des [illegible] village of St Esprit [illegible] near the [illegible] of Les Bas Foins, founded [illegible] large lunatic asylum [illegible] the now dismantled [illegible] of the great [illegible] so famous in [illegible] of the count [illegible] Mrs Norton's well-[illegible] the principal event in the [illegible] the English under the [illegible] which Duguesclin and [illegible] engaged [illegible] is preserved by the name of the *Place Duguesclin*, [illegible] marks the [illegible] Population in 1872, 7469.

DINANT, [illegible] of Belgium, at the head of [illegible] in the province of Namur, about [illegible] on the railway between that city and [illegible] It occupies a narrow site between the River Meuse and a rocky limestone hill which is crowned by a castle; its streets are consequently short and crowded, and a considerable number of its houses are built on terraces cut out on the declivity. A cathedral of the 13th century, richly decorated in the interior, two hospitals, and a Latin school are its principal buildings; and among its industrial establishments are paper-mills, glass-factories, salt-refineries, oil-mills, flour-mills, and works for the cutting and polishing of the black marble which is quarried in the neighbourhood. Population in [illegible]

Dinant is a place of great antiquity. A church was consecrated there in [illegible], and a second in [illegible]. It did not, however, rise to any importance till the [illegible] century. In the 12th century it was reckoned a place of great strength, and had attained considerable wealth by means of its industry, especially in the manufacture of copper wares, which were familiarly known as *Dinanderie*. In 1466 Philip the Good, duke of Burgundy, took and destroyed the town and its fortifications; but, three years later, his successor, Charles, allowed it to be rebuilt. It was taken and pillaged by the French in 1554, and again in 1675. By the treaty of Ryswick in 1697 it was restored to the Bishop of Liege, but it was again taken by the French in [illegible], and became the capital of an arrondissement in the department of Sambre-et-Meuse.

DINAPUR, a town and military station of British India, is situated on the right or south bank of the Ganges, and on the East Indian Railway, in the district of Patna, province of Behar, about ten miles west of Patna. The town, which stretches along the river bank for about a mile, consists mostly of thatched cottages, one story high, and is not laid out with regard to order or symmetry. Several handsome villas, however, surround the place—the residences of the European officers and the richer natives. Barracks sufficiently large to accommodate 1200 men are situated in Dinapur. In 1857 the sepoy garrison of the place took part in the mutiny of that year, but after a conflict with the European troops were forced to retire from the town. Population about 18,000.

DINARCHUS (Δείναρχος), the orator, son of Sostratus, was born at Corinth about 361 B.C. (Ol. 104, 4). Thus, like at least one greater member of the decade, Lysias, the last of the ten Attic orators was not an Athenian citizen. But his career at Athens, as a resident alien, was at least commenced early in life. When not more than twenty-five, he was already active as a writer of speeches for the law courts. He had been the pupil both of Theophrastus and of Demetrius Phalereus, and had early gained a certain fluent force, and a versatile command of style, which gave him some oratorical repute. His first important contact with public life was in 324 B.C. The Areopagus, after inquiry, reported that nine men had taken bribes from Harpalus, the fugitive treasurer of Alexander. Ten public prosecutors were appointed. Dinarchus wrote, for one or more of these prosecutors, the three speeches which are still extant—one "Against Demosthenes," one "Against Aristogiton," one "Against Philocles." The authenticity of the speech against Demosthenes was indeed denied by Demetrius of Magnesia, chiefly on the ground that it is largely composed of matter taken from Æschines. Westermann went further, and doubted the genuineness of all three speeches. But Schafer—who justly remarks that the absence of originality and of character is itself characteristic of Dinarchus—is probably right in accepting the general opinion that they are authentic.

It must always be borne in mind that Dinarchus was a Corinthian, a mere resident alien at Athens, whose sympathies were in favour of an Athenian oligarchy under acedonian control. Little as the man's life, so far as we ow of it, engages our respect or esteem, his position must least be broadly distinguished from that of such a man Æschines, an Athenian citizen who, while his city could ll be saved, abetted its enemies—or from that of such a reling as Demades. In the Harpalus affair, Demosthenes as, beyond all reasonable doubt, innocent, and so, probly, were others of the accused. Yet Hyperides, the most ry of the patriots, was on the same side as Dinarchus.

Under the regency—for such it really was—of his old aster, Demetrius Phalereus, Dinarchus had much political fluence. The years 317–306 B.C. were the most prosper s of his life. On the fall of Demetrius Phalereus, inarchus withdrew into exile at Chalcis in Eubœa. bout 292 B.C. he ventured to return to Attica, and took p his abode with a former associate, Proxenus, in the untry, against whom he afterwards brought an action, on e ground that Proxenus had robbed him of some money nd plate which he had brought with him. He died at thens, at the age of about seventy, *i.e.*, about 291 B.C.

Dionysius held that, out of 85 extant speeches bearing he name of Dinarchus, 58 were genuine,—28 in public auses, 30 in private causes. In addition to the three peeches above mentioned, we have scanty fragments of 8 more which passed, with at least some authors, under is name. The number need not surprise us, when we emember that Suidas speaks of 160 speeches of Dinarchus, and (following Cæcilius probably) allows 60 as genuine. No orator of the Attic decade had so little of an individual style, and to no other, consequently, was alien work so largely ascribed by the Alexandrian critics. Dinarchus imitated by turns the style of Lysias, of Hyperides, of Demosthenes. As Dionysius says of him, *οὐδὲν οὔτε κοινὸν οὔτ' ἴδιον ἔσχεν*, he had no general stamp of his own, no distinctive trait. He was neither an inventor, like Lysias, Isocrates, and Isæus, nor a perfecter like Æschines, Hyperides, and Demosthenes. He is called by Hermogenes ὁ *κρίθινος* Δημοσθένης,—a metaphor taken either from barley compared with wheat, or, better perhaps, from beer compared with wine,—a Demosthenes whose strength is rougher, and who has neither the flavour nor the sparkle.

Our best MSS. are the *Codex Crippsianus* and the *Codex Oxoniensis* (containing also Antiphon, Andocides, Isæus, Lycurgus.) The three extant orations, with the fragment ascribed to Demades, ed. F. Blass, Lips. 1871. The fragments in Baiter and Sauppe's *Oratores Attici*, vol. ii.

DINGWALL, a royal burgh of Scotland, the county town of Ross-shire, 15 miles north-west of Inverness, at the junction of the Sutherland and Dingwall and Skye railways. It occupies a low situation at the upper end of Cromarty Firth, where the valley of Strathpeffer unites with the alluvial lands at the mouth of the Conan. Though a neatly built and thriving place, it has nothing special to show except the curious old town-house, a few remains of the ancient mansion-house of the powerful family of Ross, and an obelisk 57 feet in height, erected to the memory of George, first earl of Cromarty. Dingwall, like so many towns on the same coast, is of Norse origin, and its name in Scandinavian signifies the Court Hill. In Gaelic it is known as Inbhir-pheoran, or the mouth of the Peffer. Its charter, granted by Alexander II., was renewed by James IV. It unites with Tain, Dornoch, Wick, Kirkwall, and Cromarty in returning one member to Parliament. Population in 1871, 2125.

DINKELSBÜHL, a town of Bavaria, in the department of Mittelfranken, or Middle Franconia, on the Wörnitz, about 40 miles by rail from Donauwörth, where the river joins the Danube. It is an important centre both of civil and ecclesiastical administration, and has a Roman catholic and a Protestant church, a Latin and industrial school, and several benevolent institutions. The inhabitants carry on the manufacture of gloves, stockings, and other articles, and deal largely in cattle. Fortified by Henry I., Dinkelsbühl received in 1305 the same municipal rights as Ulm, and obtained in 1351 the position of a free imperial city, which it retained till 1803. Its municipal code, the *Dinkelsbühler Recht*, printed in 1536, and republished in a revised form in 1738, contained a very extensive collection of laws on matters both of public and private interest. Population in 1875, 5238.

DINOCRATES (called by Pliny Dinochares), a Greek architect, who lived in the reign of Alexander the Great. He applied to that king's courtiers for an introduction to the Macedonian king, but was put off from time to time with vain promises. Impatient at the delay, he is said to have laid aside his usual dress, besmeared his body with oil in the manner of an athlete, thrown a lion's skin over his shoulders, and, with his head adorned with a wreath of palm branches, and a club in his hand, made his way through a dense crowd which surrounded the royal tribunal to the place where the king was dispensing justice. Amazed at the strange sight, Alexander asked him who he was. He replied that he had come into the royal presence to make known a scheme which would be worthy of the consideration of the greatest monarch in the world. Out of Mount Athos, a mountain rising like a pyramid to a height of 6780 feet topped with a cone of white limestone, he proposed to construct the gigantic figure of a man, holding a large city in his right hand, while in his left he held a gigantic tank large enough to contain all the water from the brooks in the peninsula. The story goes that the king was not displeased with the idea; but, as he thought it chimerical, it came to nothing. Alexander, however, was so delighted with the man, and with his bold and daring conceptions, that he carried Dinocrates with him when he went on his campaigns against Darius. He was employed by the king to design and lay out the city of Alexandria. This city was founded in 332 B.C., but the untimely death of Dinocrates prevented it from assuming the proportions intended by its designer. The Ephesians, whose temple of Diana had just been burnt down, employed him in its reconstruction. But perhaps the most original of all his conceptions was his design for a temple to Arsinoë, wife of Ptolemy II., king of Egypt. The roof of the building was to have been composed of a mass of loadstones, strong enough to hold floating in the air, and suspended within it, an iron statue of the queen.

DINORNIS (*δεινός*, terrible, and *ὄρνις*, bird), a genus of gigantic Struthious birds, believed to be extinct, which in post-Pliocene times must have formed a principal feature in the fauna of New Zealand. Their remains are found in greatest abundance in the provinces of Otago and Canterbury, often strewn in great profusion over the surface of the ground, but more usually met with buried in alluvial deposits, and in swamps; and they indicate that many of the species attained a huge size—thus the tibia of *Dinornis giganteus* measures about a yard in length, and the bird itself must have stood 10 or 11 feet high. Another species, *Dinornis elephantopus*, although less in height, possessed, according to Professor Owen, the most massive skeleton in the entire order of birds, its toe bones almost rivalling those of the elephant. Wing bones are believed to have been entirely wanting in those species which now constitute the genus Dinornis, as also the fourth toe, which is present along with rudimentary wing bones in the species which have been placed in the new genus Palapteryx. Among living birds Dinornis agrees most closely with the Apteryx, the diminutive living representative in New Zealand of this gigantic race of bipeds, while somewhat resembling the emeu and cassowary in the formation of the feathers. Judging from their general structure, and from the habits of their nearest living allies, these great wingless birds may be supposed to have inhabited the plains and hill-sides rather than the forests of New Zealand, and to have been omnivorous, feeding indiscriminately on seeds and roots, lizards and insects. Crop-stones are often found in little heaps beside their skeletons, and as these are generally such stones as occur in the neighbourhood, it has been inferred that the Dinornis was comparatively stationary in its habits. New Zealand has been so thoroughly explored in recent years as to render it highly improbable that the moa, as the Dinornis is called by the Maoris, will yet be found alive, but there seems sufficient reason for believing that its final extinction may have taken place since the arrival of the Maori race in New Zealand. The Maoris have only been settled there for about five centuries, yet they have traditions regarding moa hunting, its bones are found in ancient cooking ovens, and many specimens have been obtained in which portions of the skin with feathers attached are still preserved. An egg has also been recently found containing the bones of the chick, and another measuring 10 inches long and 7 inches broad was taken from a grave, where it rested in the hands of a human skeleton. There is evidence of the coexistence in New Zealand of about 20 species of moas during post-Pliocene times, and this, as A. R. Wallace remarks, points to the conclusion that New Zealand was at one time a much more extensive land than it now is; while the fact, that recently remains of the Dinornis have been found in a post-Pliocene deposit in Queensland strengthens the supposition that when the moa flourished Australia and New Zealand formed portions of one continent.

DINOTHERIUM, an extinct mammal, fossil remains of which occur in the Miocene beds of France, Germany, Greece, and Northern India. These until lately consisted exclusively of teeth and the bones of the head. An entire skull, obtained from the Epplesheim beds of Hesse Darmstadt in 1836, measured 4½ feet in length and 3 feet in breadth, and thus indicated an animal exceeding the elephant in size. Its upper jaw was destitute of incisor and canine teeth, but possessed 5 molars on each side, with a corresponding number in the jaw beneath. Its most remarkable feature, however, consisted in the front part of the lower jaw being bent downwards and bearing two tusk-like incisors also directed downwards and backwards. Judging from these remains Professor Owen placed the Dinotherium among the proboscidean mammals; De Blainville, on the other hand, regarded it as an aquatic animal, destitute of legs, and somewhat resembling the manatee,—its reversed tusks having probably been used to moor the creature to the bank of the streams it frequented, or to assist it in leaving the water. The recent discovery, however, of limb bones, decidedly proboscidean in type, and supposed to belong to the Dinotherium, supports the view that these creatures were more akin to the [illegible] than to the manatee.

DIOCESE, from the Greek *διοίκησις*—primarily meaning [illegible] then the territorial circumscription in [illegible] was exercised—was first used to [illegible] provinces of the Roman empire, or more [illegible] of a province ruled by a proprætor. [illegible] besides Cicero, the "dioceses" in Asia. [illegible] says that the division of the empire [illegible] was in the time of Constantine, [illegible] provinces was much anterior. [illegible] that the primitive church followed [illegible] her territorial arrangements [illegible] metropolis of each province there was [illegible] authority over the magistrates of each [illegible] every metropolis there was a bishop, whose authority extended over the entire province, who was therefore called "metropolitan," or "primate," as being the first or principal bishop of the province. And everywhere the episcopal sees were under the authority of the bishop of the civil metropolis, except in Africa, where the primate was usually the senior bishop of the province. The term "diocese," however, was sometimes used in the more comprehensive, and the term province in the less comprehensive sense, as appears from the *Notitia dignitatum Imperii*, drawn up, as it would seem, in the time of the emperors Arcadius and Honorius (see Bingham, *loc. cit.*) The territorial division, however, as given in the *Notitia*, was purely civil. But Bingham tells us that, though we have no equally ancient account of the ecclesiastical division of the empire, yet if we compare the fragmentary bits of information which may be picked out of the acts of and subscriptions to the earlier councils with later notices, it will be seen that the ecclesiastical very exactly followed the civil distribution.

It may be mentioned that, before the 4th century, the term "parish"—*παροικία*—was often used indiscriminately with the word "diocese," a circumstance which has caused ecclesiastical antiquarians to expend much erudition in showing that, despite the confusion of terms, the thing intended corresponded to our idea of a diocese, and not to our idea of a parish.

The uncertainty with regard to the number and circumscription of the English ecclesiastical dioceses under the Romans is great, and the information attainable fragmentary. At the council of Arles, held in the year 314, the bishop of York, the bishop of London, and the bishop "de colonia Lindi," probably Lincoln, are recorded to have been present. But the changes in the number and territorial circumscription following the Saxon invasion—and not yet finally completed—were so great that volumes of minute antiquarian investigation would be needed to trace—in so far as it may be still possible to trace—the progress of nomenclature and delimitation of the various dioceses of Britain from the first establishment of them to the present day.

The division of dioceses found to be too large to be conveniently administered by one bishop was practised from very early times, as may be seen by the decrees of a council held in Portugal about the middle of the 6th century. Another reason for dividing a diocese, and establishing a new see, has been recognized by the church as duly existing "if the sovereign should think fit to endow some principal village or town with the rank and privileges of a city" (Bingham, lib. xvii. c. 5). But there are canons for the punishment of such as might induce the sovereign so to erect any town into a city, solely with the view of becoming bishop thereof. Nor could any diocese be divided without the consent of the primate.

In the countries more immediately subjected to the Roman pontiff the multiplication of dioceses has been excessive, the number of them in the apostolic dominions being no less than 68, while the Roman Church reckons in the whole of Europe (exclusive of the English, but inclusive of the Irish sees) 578 sees.

DIOCLETIAN. VALERIUS DIOCLETIANUS (245–313), Roman emperor, was born of obscure parents near Salona, in Dalmatia, and reigned from 284 to 305 A.D. He entered the army and served with high distinction, held important commands under the emperors Probus and Aurelian, and accompanied Carus to the Persian war. After the death of Numerianus he was chosen emperor by the troops at Chalcedon, and slew with his own hands Arrius Aper, the prefect of the prætorians. His advent to the throne marks the commencement of the era of Diocletian, August 29, 284. Having been installed at

Nicomedia, he received general acknowledgment after the murder of Carinus. He appointed Maximian Augustus in 286, and Constantius Chlorus and Galerius, Cæsars in 292. Each of the four rules was placed at a separate capital—Treves, Sirmium, Milan, Nicomedia. This amounted to an entirely new organization of the empire, on a plan commensurate with the work of government which it now had to effect. At the age of fifty-nine, exhausted with labour, he abdicated his sovereignty on May 1, 305, and retired to Salona, the place of his birth, where he died eight years afterwards. His reign was memorable for the persecution of the Christians.

DIODATI, Giovanni (1576–1649), a Swiss theologian of the Reformed Church, was born at Geneva on the 6th June 1576 of a noble family originally belonging to Lucca, which had been expatriated for the profession of Protestantism. In his youth he distinguished himself as a biblical scholar, and at the age of twenty-one he was nominated Professor of Hebrew at Geneva on the recommendation of Beza. In 1608 he became a pastor, or parish minister, at Geneva, and in the following year he succeeded Beza as professor of theology. As a preacher he was eloquent, bold, and fearless, with his full share of the intolerance that prevailed among his party at Geneva. He held a high place among the reformers of Geneva, by whom he was sent on a mission to France in 1614. He had previously visited Italy, and made the acquaintance of Sarpi and Fulgenzio, whom he endeavoured unsuccessfully to engage in a reformation movement. In 1618–19 he attended the Synod of Dort, and took a prominent part in its deliberations, being one of the six divines appointed to draw up the account of its proceedings. He was a thorough Calvinist, and entirely sympathized with the condemnation of the Arminians. In 1645 he resigned his professorship, and he died at Geneva on the 3d October 1649. Diodati is chiefly celebrated as the author of the translation of the Bible into Italian which appeared in 1603. Another edition with notes was issued in 1607. As a translator he possessed the primary qualification of a competent knowledge of the original, but his work was rather a paraphrase than a translation, and his notes were those of a theologian rather than of a critic. He also undertook a translation of the Bible into French, which appeared with notes in 1644. Among his other works were his *Annotationes in Biblia* (1607), of which an English translation was published in London in 1648, and various polemical treatises, such as *De fictitio Pontificiorum Purgatorio*, 1619; *De justa Secessione Reformatorum ab Ecclesia Romana*, 1628; *De Antichristo*, &c. He also published French translations of Sarpi's *History of the Council of Trent*, and of Edwin Sandys's *Account of the State of Religion in the West*.

DIODORUS, named **Siculus**, a Greek historian, born at Agyrium in Sicily. Of his life we know nothing except what he himself has narrated, that, in prosecution of his historical researches, he undertook frequent and dangerous journeys, and studied Latin at Rome. His history occupied thirty years in writing, and was at last completed in forty books. From internal evidence it is certain that it was written after the death of Julius Cæsar; but the passages which show him to have survived the alteration of the calendar by Augustus are generally regarded as spurious. His history, to which, from its comprehensive plan, he has given the title of *Bibliotheca*, is divided into three parts. The first treats of the mythic history of the non-Hellenic, and afterwards of the Hellenic tribes; the second section ends with Alexander's death; and the third continues the history as far as the beginning of Cæsar's Gallic war. Of this extensive work there are still extant only the first five books, treating of the mythic history of the Egyptians, Assyrians, Æthiopians, and Greeks; and also from the 11th to the 20th book inclusive, beginning with the second Persian war, and ending with the history of the successors of Alexander, previously to the partition of the Macedonian empire. The rest exists only in fragments which have been collected by Photius. The faults of Diodorus arise principally from the gigantic nature of the undertaking, the cumbrous nature of the materials, and the awkward form of annals into which he has thrown his narrative. He has been at little pains to sift his materials, and hence frequent repetitions and contradictions may be found in the body of the work. As a critic, he seems to have been altogether ignorant of the ethical advantages of history, and shrinks from administering praise or blame to the persons whose history he writes. In the chronology of the strictly historical period he is occasionally inaccurate; and the poetical myths which take the place of the early history are related with all the gravity of historical detail. His narrative is without colouring, and monotonous; and his simple and clear diction, which stands intermediate between pure Attic and the colloquial Greek of his time, enables us to detect in the narrative the undigested fragments of the materials which he employed. The particulars, however, which he has handed down are valuable, as enabling us in several points to rectify the errors of Livy.

The best editions of Diodorus are Wesseling's, 2 vols., Amstel. 1745; that printed at Deux-Ponts, 11 vols., 1795–1801; Eichstadt's (to book xiv.) 2 vols., Halle, 1809–4; and Dindorf's, 5 vols., Leips. 1828-31.

DIOGENES, of Apollonia in Crete, a celebrated natural philosopher who flourished at Athens about 460 B.C. He was a pupil of Anaximenes and a contemporary of Anaxagoras. The fragments of his writings have been collected together by Panzerbieter. He believed air to be the source of all being, and all other substances to be derived from it by condensation and rarefaction. His chief advance upon the doctrines of his master is that he asserted air, the primal force, to be intelligence—"the air which stirred within him not only prompted but instructed. The air as the origin of all things is necessarily an eternal, imperishable substance, but as soul it is also necessarily endowed with consciousness." Mr Lewes and Mr Grote assign to him a higher place in the evolution of philosophy than either Hegel or Schwegler.

DIOGENES (about 412–223 B.C.), the famous Cynic philosopher, was the son of Icesias, a money-changer of Sinope in Pontus. Having been detected in adulterating coin, his father and he were compelled to leave their native city. According to another account, however, Icesias died in prison, and Diogenes fled to Athens with a single attendant. On his arrival in that city he dismissed his attendant with the piquant question, "If Manes could live without Diogenes, why not Diogenes without him?" and on the same principle he denuded himself of all superfluous dress, furniture, and even ideas. A wooden bowl, which, with his cloak and wallet, formed his only movables, is said to have been immediately discarded when he saw a boy drinking water from the hollow of his hand. The fame of Antisthenes soon attracted him to Cynosarges, and the pertinacity with which, for the sake of wisdom, he not only endured the scoffs but volunteered to submit to the blows of the great teacher, soon procured him a favourable reception from the whole Cynical school. The favourite pupil, however, soon outstripped his master in the extravagancies of his life, and the pungent keenness of his sarcasms. That he took up his abode in a cask belonging to the temple of Cybele is a circumstance liable to suspicion, from being more frequently alluded to by the satirists than by the biographers of Diogenes. That he used to inure himself to the vicissitudes of the weather by rolling himself in hot sand in summer, and in winter by embracing statues covered with snow, are facts resting on the authority of all the ancient historians. His numerous witty apophthegms are preserved by Diogenes Laertius. After his voyage to Ægina, during which he fell into the hands of pirates, who sold him as a slave in Crete, the conduct of Diogenes appears in a much less ridiculous light. With characteristic boldness he proclaimed to his captors that he knew no trade except "to govern men," and wished to be sold "to a man that wanted a master." Such a purchaser he seems to have found in Xeniades, who took him to Corinth to superintend the education of his children. There he spent the rest of his life; and he is said to have reached an extreme old age. There at the Isthmian games he taught the assembled concourse in the Kraneion; and thither he attracted a crowd of disciples when Antisthenes had ceased to tickle their ears in Cynosarges. There, too, in all probability, his famous interview with Alexander took place, in which the only favour he had to beg of the prince was that he would not stand between him and the sun,—when Alexander is said to have exclaimed, "If I were not Alexander, I would be Diogenes." To Athens Diogenes seems never to have returned. Of his death, which is said to have taken place on the same day with that of Alexander the Great, there are various conflicting accounts. That he perished by the bite of a dog, or from the immoderate use of raw flesh, or by his own hand, is now generally disbelieved. It is more probable that his death was calm and peaceful; and in spite of his desire to be thrown to the beasts of the field, he received from Xeniades an honourable interment. In the days of Pausanias the Corinthians pointed with pride to his grave; and on the isthmus there was a pillar erected to his memory, on which, as the self-chosen symbol of his life, there rested a dog of Parian marble. His alleged connection with Lais, and the open indecencies of which he is said to have been guilty, have thrown a shade upon his character. The former is, however, it must be confessed, exceedingly improbable; and the latter charge was undoubtedly exaggerated, if it was not originated by the shameless excesses of the later Cynics. The Cynics answered arguments by facts. When some one was arguing in support of Zeno of Elea's notion respecting the impossibility of movement, Diogenes rose and walked. Definitions might prove that there was no motion, but definitions were only verbal, and could be answered by facts. This appeal to common sense, the *argumentum ad bacillum*, was of more value and importance in ethical than in speculative philosophy.

DIOGENES LAERTIUS, the biographer of the Greek philosophers, is supposed by some to have received his surname from the town of Laerte in Cilicia, and by others from the Roman family of the Laertii. Of the circumstances of his life we know nothing. The date at which he wrote—probably the reign of Septimius Severus (193–211)—is known only from conjecture. His own opinions are equally uncertain. By some he was regarded as a Christian; but it seems more probable that he was an Epicurean. The work by which he is known professes to give an account of the lives and sayings of the Greek philosophers. Although it is at best an uncritical and unphilosophical compilation, its value, as giving us an insight into the private life of the Greek sages, justly led Montaigne to exclaim that he wished that instead of one Laertius there had been a dozen. In the commencement of the work he divides philosophers into the Ionic and Italic schools. The biographies of the former begin with Anaximander, and end with Clitomachus, Theophrastus, and Chrysippus; the latter begins with Pythagoras, and ends with Epicurus. The Socratic school, with its various branches, is classed with the Ionic; while the Eleatics and sceptics are treated under the Italic. The whole of the last book is devoted to Epicurus. From the statements of Burlæus, the text of Laertius seems to have been much fuller than that which we now possess; and hopes have been entertained of obtaining a more complete copy.

The best modern edition is that of Hübner, Leipsic, 2 vols. 8vo, 1828–31.

DIOMEDES, son of the impetuous Tydeus, is a hero of the Ætolian and Argo-Theban legends. He is in the *Iliad* the leader of the tribes which belong to the government of the Amythonidæ. A favourite of Athene, from whom he received the gift of immortality, he does not spare even gods if she is standing by his side. He carried off the Trojan Palladium and brought it to Argos, where it was preserved by his descendants. He was known in many other places as a devotee of Athene and a supporter of her worship. In Argos his shield was carried through the town as a relic on the festival of Athene. A temple of Athene Anemotis (the storm ruler) was said to have been founded by him. He was worshipped in several parts of Italy, and in Salamis in Cyprus. Indeed he may be said generally to belong to the worship of Athene in so far as she is the goddess of storm and war.

DION, of Syracuse (408–353 B.C.), was the son of Hipparinus, and brother-in-law of Dionysius the Elder. In his youth he was an ardent admirer and diligent pupil of Plato, whom Dionysius had invited to Syracuse; and he used every effort to promote the carrying out of his master's maxims in the administration of the kingdom. His near relationship to the despot gave him great influence at court, and also enabled him to amass considerable wealth. Accordingly, on the accession of the younger Dionysius, the stern morality of the philosopher stood in marked contrast to the dissolute character of the prince. An antagonism thus silently sprung up between the two; and the proposal of Dion to invite Plato again to Syracuse was made the occasion of an open rupture. To counteract the influence of that distinguished philosopher, the enemies of Dion obtained the recall of the historian Philistus, who had already signalized himself as a faithful supporter of despotic power. This artful courtier quickly regained his ascendency over the mind of Dionysius, and was at length successful in procuring the banishment of Dion. The exiled philosopher retired to Athens, where he was at first permitted to enjoy his revenues in peace; but the intercessions of Plato served to exasperate the tyrant, and at length provoked him to confiscate the property of Dion, and give his wife to another. This last outrage roused Dion to seek the liberation of his country by force of arms. Assembling a small force at Zacynthus, he sailed to Sicily, and, in the absence of Dionysius, was received with demonstrations of joy. He succeeded in defeating the forces of the tyrant, but was himself soon after supplanted by the intrigues of Heraclides. Again he was banished; but the incompetency of the new leader soon led to his recall. He had, however, scarcely made himself master of Sicily when the people began to express their discontent with his tyrannical conduct, and he was assassinated by Caliphus, an Athenian who had accompanied him in his expedition.

DION CASSIUS COCCEIANUS, the celebrated historian of Rome, was born at Nicæa in Bithynia, 155 A.D. His father's name was Cassius Apronianus, and by his mother's side he was the grandson of Dion Chrysostom, who also obtained the surname of Cocceianus. When a young man he accompanied his father to Cilicia, of which he had the administration; and on his father's death he went to Rome, where in the last year of the reign of Marcus Aurelius, or immediately after the death of that emperor, he was received into the senate. During the reign of Commodus, I [illegible] c [illegible] ed to practise as an advocate at the Roman [illegible] held the offices of ædile and quæstor. He was [illegible] prætorship by Pertinax, but did not assume office till the reign of Septimius Severus, with whom he was for a long time on the most intimate footing. By Macrinus he was intrusted with the administration of Pergamus and Smyrna; and on his return to Rome he was raised to the consulship about 220. After this he obtained the proconsulship of Africa, and again on his return was sent as legate successively to Dalmatia and Pannonia. He was raised a second time to the consulship by Alexander Severus, in 229; but under pretext of suffering from a diseased foot, he soon after retired to Nicæa, where he died. The date of his death is unknown. Previous to writing his history Dion Cassius had inscribed to the Emperor Severus an account of various dreams and prodigies which had presaged his elevation to the throne, and had also written a biography of the Emperor Commodus, which was afterwards incorporated into his larger work. The history of Rome, which consisted of 80 books,—and, after the example of Livy, was divided into decades,—began with the landing of Æneas in Italy, and was continued as far as the opening of the reign of Alexander Severus. The first 24 books exist only in fragments; from the 36th to the 54th, the work is extant complete; from the 55th to the 60th, it is probably an abridgment, and besides these, parts of the 71st and 75th books have also been recovered. The diligence of Dion as an historian is undoubted, and the various important offices which he held under the emperors gave him valuable opportunities for historical investigation. Although more philosophical than the compilations of the mere annalist, his work is not remarkable for vigour of judgment or critical acumen. His style is far clearer than that of Thucydides, whom he took as his model; but his diction is full of Latinisms.

His history was first published in a Latin translation by N. Leonicenus, Venice, 1526. The best modern edition is that of Sturz, Leipsic, 1824–43, which contains the *Excerpta Vaticana*. Various other writings, such as a *History of Persia*, *Enodia or Itineraria*, a *Life of Arrian*, *Getica*, and a work on the Emperor Trajan, are attributed to Dion Cassius, but in all probability without foundation. The substance of his history is reproduced in the annals of Zonaras.

DION CHRYSOSTOM (*i.e.*, *golden mouthed*), (*c.* 50–117), was born at Prusa, in Bithynia, about the middle of the 1st century. He visited Egypt with his father at an early period of his life, and went to Rome during the reign of Domitian. Being implicated in a plot against the tyrant, Dion fled from the capital, and wandered about in Thrace, Mysia, Scythia, and the other countries of the Getæ, with only Plato's *Phædo* and Demosthenes *On the Embassy* in his possession, till the accession of Nerva, when he was allowed to return. With Nerva and Trajan he continued on the most friendly footing. He retired to Prusa for a short time; but having been accused of peculation and treason, he returned to Rome, where he remained till his death. Eighty orations of his are extant entire, and there are fragments of about fifteen others. They are written in a lucid and elegant style, and treat mostly of political, ethical, and mythological subjects.

DIONYSIA, or BACCHANALIA, were festivals in honour of DIONYSUS (*q.v.*) generally, but in particular the term refers to the festivals celebrated in Attica and by the branches of the Attic-Ionic race in the islands and in Asia Minor. In Attica there were two festivals annually. (1) The *lesser* Dionysia, or τὰ κατ' ἀγρούς, were held in the country places where the vine was grown in the month of December. This was a vintage festival, and was accompanied by songs, dances, phallus processions, and the impromptu performances of itinerant players, who with others from the city thronged to take part in the excitement of the rustic sports. (2) The *greater* Dionysia, or τὰ ἐν ἄστει, were held in the city of Athens in the month of March. This was a festival of joy at the departure of winter and the promise of summer, Dionysus being regarded as having delivered the people from the wants and troubles of winter. The religious act of the festival was the conveying of the ancient image of the god, which had been brought from Eleutheræ to Athens, from the ancient sanctuary of the Lenæon to another sanctuary, with a chorus of boys and a procession carrying masks and singing the *dithyrambus*. The culmination of the festival was in the production of tragedies, comedies, and satiric dramas in the great theatre of Dionysus. Besides the Dionysia strictly so called, there were also the *Lenæa* and *Anthesteria*, both held in honour of this god, the former in January and the latter in February.

DIONYSIUS, the Elder (*c.* 430–367 B.C.), tyrant of Syracuse, was born about 430 B.C. He began life as a clerk in a public office, and first took part in political affairs during the dissensions that followed the destruction of the Athenian expedition. He was wounded in the attempt of Hermocrates to seize upon Syracuse; and, during the disasters inflicted by the Carthaginians who had invaded the island, he succeeded, along with Philistus and Hipparinus, in procuring the deposition of the Sicilian generals, and was himself included in the number appointed in their stead. By intriguing with the inhabitants of Gela, which he had been sent to relieve, and spreading insinuations of treachery in regard to his colleagues, he was ultimately invested with the supreme command; and by the help of a large body-guard he soon made himself independent of the popular opinion. Pestilence having thinned the Carthaginian army, Dionysius, in spite of his ill success, found no difficulty in procuring peace (405 B.C.). In the stronghold of Ortygia he defied the machinations of his enemies, until, partly from defeats and partly from dissensions, the opposition died away. After a successful expedition against Naxos, Catana, and Leontini, his efforts were directed against Carthage. (See CARTHAGE). He also carried an expedition against Rhegium and its allied cities in Magna Græcia. In one campaign, in which he was joined by the Lucanians, he devastated the territories of Thurii, Croton, and Locri. After a protracted siege he took Rhegium, 387 B.C., and sold the inhabitants as slaves. He joined the Illyrians in an unsuccessful attempt to plunder the temple of Delphi, and also pillaged the temple of Cære on the Etruscan coast. In the Peloponnesian war he espoused the side of the Spartans. Not content with his military renown, Dionysius aspired also to poetical glory. His poems were hissed at the Olympic games; but having gained a prize for tragic poetry at Athens, he was so elated that he engaged in a debauch which proved fatal (367 B.C.) His life was written by Philistus, but the work has unfortunately perished.

DIONYSIUS, the Younger, ascended the throne of Syracuse at his father's death, in 367 B.C. He was driven from the kingdom by Dion, and fled to Locri; but during the commotions which followed the assassination of that leader, he managed to make himself master of Syracuse. On the arrival of Timoleon he was compelled to surrender and retire to Corinth (343 B.C.), where he spent the rest of his days in poverty.

DIONYSIUS, of Halicarnassus, was born about the middle of the first century B.C. His father's name was Alexander. From the introduction to his great work we learn that he went to Italy after the termination of the civil wars, and spent twenty-two years in preparing materials for his history, which is entitled *Archæologia*, and embraced the history of Rome from the mythical period to the beginning of the first Punic war. It was divided into twenty books,—of which the first nine remain entire, the tenth and eleventh are nearly complete, and the remaining books only exist in fragments. In the first three books of Appian, and in the Camillus of Plutarch, much of Dionysius has undoubtedly been embodied. As an historian he is minute and painstaking; but his attempts to Grecianize the early history of Rome, that the Greeks might in some measure be reconciled to a foreign yoke, render his accuracy more than suspicious. Dionysius was also the author of a treatise on rhetoric, which, with his criticisms on Thucydides, Lysias, Isocrates, Isæus, Dinarchus, Plato, and Demosthenes, have been preserved. The best editions of his works are those of Hudson and Reiske. The rhetorical works have been edited separately, by Gros and by Westermann.

DIONYSIUS, the Areopagite, according to Suidas, was an Athenian by birth, and eminent for his literary attainments. He studied first at Athens, and afterwards at Heliopolis in Egypt. While in the latter city, he beheld that remarkable eclipse of the sun, as he terms it, which took place at the death of Christ, and exclaimed to his friend Apollophanes, ἢ τὸ θείον πάσχει, ἢ τῷ πασχόντι συμπάσχει, "Either the Divinity suffers, or sympathizes with some sufferer." He further details that, after Dionysius returned to Athens, he was admitted into the Areopagus, and, having embraced Christianity about 50 A.D., was constituted bishop of Athens by the apostle Paul (Acts xvii. 34). Aristides, an Athenian philosopher, asserts that he suffered martyrdom—a fact generally admitted by historians; but the precise period of his death, whether under Domitian, Trajan, or Adrian, is not certain. A writer in later times attempted to personate the Areopagite, and contrived to pass his productions on the Christian world as of the apostolic age, thereby greatly influencing the spirit of both the Eastern and Western Churches. These writings consist of a book called *The Celestial Hierarchy; another Of the Ecclesiastical Hierarchy; A Treatise on the Divine Names;* another *Of Mystical Divinity;* and *Ten Epistles.* Different opinions have been held as to the real author of these productions. They were ascribed, at an early period, to Apollinaris, bishop of Laodicea, in the 4th century. The resemblance between the *Areopagitica* and the writings of Proclus and Plotinus is so great that it is probable the Pseudo-Dionysius did not write much earlier than the 5th century. The first uncontroverted occasion on which these supposititious writings are referred to, is in the conference between the Severians (a sect of Eutychians) and the Catholics, held in the emperor Justinian's palace, 532 A.D., in which they are quoted by the heretical party.

DIONYSIUS, surnamed Periegotes, from his being the author of a περιήγησις τῆς γῆς, containing a description of the whole earth in hexameter verse, and written in a terse and elegant style. This work enjoyed a high degree of popularity in ancient times, and two translations or paraphrases of it were made by the Romans, one by Rufus Festus Avienus, and the other by the grammarian Priscian. The best edition of the original is that by Bernhardy (Leipsic, 1828). Great differences of opinion have been entertained as to the age and country of this Dionysius. All, however, are agreed in placing him in the time of the Roman emperors, and it seems highly probable that he flourished in the latter part of the 3d or the beginning of the 4th century. Eustathius says that he was by descent a Libyan.

DIONYSIUS EXIGUUS, one of the most learned men of the 6th century, and especially distinguished as a chronologist, was, according to the statement of his friend Cassiodorus, a Scythian by birth. "*Scytha natione.*" This may mean only that he was a native of the region bordering on the Black Sea, and does not necessarily imply that he was not of Greek origin. Such origin is indicated by his name and by his thorough familiarity with the Greek language. His surname "Exiguus" is usually translated "the Little," and is supposed to refer to his stature; but it appears to be at least as probable that his known humility led him to assume the designation. He was living at Rome in the first half of the 6th century, and is usually spoken of as abbot of a Roman monastery. Cassiodorus, however, calls him simply "monk," while Bede calls him "abbot." But as it was not unusual to apply the latter term to distinguished monks who were not heads of their houses, it is uncertain whether Dionysius was abbot in fact or only by courtesy. He was in high repute as a learned theologian, was profoundly versed in the Holy Scriptures and in canon law, and was also an accomplished mathematician and astronomer. We owe to him a collection of ecclesiastical canons, comprising the apostolical canons and the decrees of the councils of Nicæa, Constantinople, Chalcedon, and Sardis, and also a collection of the decretals of the Roman pontiffs from Siricius to Anastasius II. These collections were published by Justel in 1628. Dionysius did good service to his contemporaries by his translations of many Greek works into Latin; and by these translations some works, the originals of which have perished, have been handed down to us. His name, however, is now perhaps chiefly remembered for his chronological labours. It was Dionysius who introduced the method of reckoning the Christian era which we now use. (See CHRONOLOGY.) His friend Cassiodorus depicts in glowing terms the character of Dionysius as a saintly ascetic, and praises his wisdom and simplicity, his accomplishments and his lowly-mindedness, his power of eloquent speech and his capacity of silence. He died at Rome, probably about the year 545.

DIONYSUS, in Greek Mythology, is principally the god of the vine; and in the myths concerning him it is clear that the effects of wine and the spread of vine growing have both been kept in view. No sooner had the god grown up than he started on distant expeditions to teach men to cultivate the vine, and on these occasions his followers were known for their ecstatic ceremonies. It would seem also as if the story of his birth was only a mythical representation of the growth and ripening of the grape. Thebes in Bœotia was originally the local centre of his worship in Greece; and he was a son of Semele, a daughter of Cadmus, the king of Thebes, his father being Zeus, who among other divine functions exercised also that of god of the fertilizing spring showers. Before the child was mature, Zeus appeared to Semele at her request in his majesty as god of lightning, by which she was killed, but the infant was saved from the same fate by cool ivy which grew up suddenly around him. Zeus took him up, inclosed him within his own thigh till he came to maturity, and then brought him to the light, so that he was twice born; and it was to celebrate this double birth that the *dithyrambus* was sung. He was now conveyed by Hermes to be brought up by the nymphs of Nysa, from which place it is probable his name Dio-nysus, or "god of Nysa," is derived; but among the many places of this name claiming to have been the true one it is impossible to decide. In his journeys to teach the cultivation of the vine he met with opposition in some cases, as in that of Lycurgus, a Thracian king, from whose attack Dionysus saved himself by leaping into the sea, where he was kindly received by Thetis. Lycurgus was blinded by Zeus and soon died, or, according to another story, became frantic and hewed down his own son, mistaking him for a vine; while in a third story Ambrosia, who was changed a vine, clung so closely round him that, failing to ape, he died. A similar incident is that of Pentheus, g of Thebes, who opposed the orgiastic ceremonies roduced by Dionysus among the women of Thebes, and, ving been present watching one of these ceremonies, s mistaken for some animal of the chase, pursued, and n by his own mother. At Orchomenus, the three ghters of Minyas refused to join the other women in ir nocturnal orgies, and for this were transformed into ts. It was in accordance with this tradition that in r times, at the festival of the *Agrionia*, the priests of nysus pursued the women of the race of Minyas with wn swords, and if they captured them, killed them, ich incident, it will be seen, also justifies the title of ηστής applied to Dionysus. On the other hand, when god was received hospitably he repaid the kindness by gift of the vine, and of this the chief instance is that Icarius of Attica, who lived in the time of King Pandion. t Icarius, instead of keeping secret the use of the vine, read it among the herdsman and labourers, who, becoming toxicated with the wine, slew him and threw him into a ll or buried him under a tree, where his daughter rigone found his grave, and in her despair hanged herself n the tree. In recollection of this it was the custom to ng small figures and masks on trees at the ceremony in r honour. The district of Icaria, though in Attica, was n the borders of Bœotia, which latter was the earliest and hief seat of the worship of Dionysus in Greece, with its amous festival on Mount Cithæron. Festivals of the same cstatic kind spread to Attica, to Mount Parnassus, and orth to Thrace. But in Bœotia Dionysus was personally sociated with so many festivals and incidents that he has ore the appearance of a hero or demigod than of a god, nd it may have been from a sense of this that Herodotus (ii. 52) calls him the most recent of the gods. In Homer lso he has a secondary character. To what extent the idea of his functions may have been derived from the Vedic god Soma cannot be determined, but the similarity between the two deities becomes the more striking when we member how actively the worship of Dionysus was conducted in Asia Minor, particularly in Phrygia and Lydia, where he was styled Sabazius, with the epithet also of Βακχαῖος, from which it is supposed his Greek name of Bacchos was derived. As Sabazius he was associated with the Phrygian goddess Cybele, and was followed in his peditions by a *thiasos* of Centaurs, Pan, Satyrs, and lenus. In Lydia his triumphant return from India was lebrated by an annual festival on Mount Tmolus, and it s in Lydia that he assumed the long beard and long robe hich were afterwards given him in his character as the Indian Bacchus." The other incidents in which he pears in a purely triumphal character are his transforming e Tyrrhene pirates who attacked him into dolphins, as ld in the Homeric hymn to Dionysus, and as represented the monument of Lysicrates at Athens, and his part in e war of the gods against the giants. The adventure ith the pirates occurred on his voyage to Naxos, where he und Ariadne when she had been abandoned by Theseus. t Naxos Ariadne was associated with Dionysus as his fe, and their marriage was annually celebrated by a stival. (See ARIADNE.) Another phase in the myth of ionysus originated in observing the decay of vegetation winter, to suit which he was supposed to be slain and join the deities of the lower world, in which connection figured in the mysteries of Eleusis. This phase of his aracter was developed by the Orphic poets, he having e the name of Zagreus, and being no longer the Theban d, but a son of Zeus and Persephone. The child was ought up secretly, watched over by Kuretes; but the lous Hera discovered where he was, and sent Titans to the spot, who, finding him at play, tore him to pieces, and cooked and ate his limbs, while Hera gave his heart to Zeus. To connect this with the myth of the Theban birth of Dionysus, it is said that Zeus gave the child's heart to Semele, or himself swallowed it and gave birth to the Theban god. Altogether there were, it was said, five different gods "Dionysus," each having different parentage. The conception of Zagreus, or the winter Dionysus, appears to have originated in Crete, but it was accepted also in Delphi, where his grave was shown, at which sacrifice was secretly offered annually on the shortest day. This feature of going away in the winter and returning at spring, which was common to Dionysus and Apollo, would commend the former god to the priests of Apollo at Delphi. Dionysus had further, in common with Apollo, the prophetic gift. Like Hermes, he was a god of the productiveness of nature, and hence Priapus was one of his regular companions, while not only in the mysteries but in the rural festivals his symbol, the phallus, was carried about ostentatiously. His symbols from the animal kingdom were the bull, panther, ass, and goat. His personal attributes are an ivy wreath, the thyrsus (a staff with pine cone at the end), a drinking cup (*cantharus*), and sometimes the horn of a bull on his forehead. Artistically he was represented mostly either as a youth of soft nearly feminine form, or as a bearded and draped man, but frequently also as an infant, with reference to his birth or to his bringing up in Nysa. The earliest images were of wood with the branches still attached in parts, whence he was called Dionysus Dendrites. He was figured also, like Hermes, in the form of a pillar or term surmounted by his head.

The Greek colonists of Southern Italy (Magna Græcia) had taken with them the worship of Dionysus, and so successfully had it spread there that Sophocles (*Antig.* 1106) speaks of him as the god who rules in Italy. From Campania the joint worship of Dionysus (Liber), Demeter (Ceres), and Kore (Libera) was introduced into Rome, and a temple was erected to them 495 B.C., in obedience to the Sibylline books. But the mysteries which were held in connection with this worship were suppressed by the senate, 186 B.C. In Campania Dionysus was styled Hebon, and conceived in the form of a bull with a human head. Libera, usually identified with Kore, corresponds rather to the goddess Hebe as worshipped at Phlius. (A. S. M.)

DIOPHANTUS. See ALGEBRA, vol. i. p. 511.

DIPHTHERIA (from διφθέρα, a skin or membrane), the term applied to an acute infectious disease, which is accompanied by a membranous exudation on a mucous surface, generally on the tonsils and back of the throat or pharynx. Although popularly believed to be a newly discovered disease, there is distinct evidence that diphtheria was known to the ancient physicians as a malady of great virulence. Under the name of the *Malum Egyptiacum*, Aretæus in the 2d century gives a minute description of a disease which in all its essential characteristics corresponds to diphtheria. In the 16th, 17th, and 18th centuries epidemics of diphtheria appear to have frequently prevailed in many parts of Europe, particularly in Holland, Spain, Italy, France, as well as in England, and were described by physicians belonging to those countries under various titles; but it is probable that other diseases of a similar nature were included in their descriptions, and no accurate account of this affection had been published till M. Bretonneau of Tours in 1821 laid his celebrated treatise on the subject before the French Academy of Medicine. By him the term *Le Diphthérite* was first given to the disease. The subject has since been largely investigated both in Britain and on the Continent, where epidemics more or less extensive have been of common occurrence in recent times; but while many important facts have been made out regarding the pathology of diphtheria, the real nature of the malady still appears to be undetermined. By some it is regarded as primarily a blood poison, the local manifestations being secondary and not essential, while others hold, and this is the view now largely maintained by Continental authorities, that diphtheria is at first a local disease, the constitution becoming secondarily affected or poisoned from the local affection. This latter view receives support both from experiments on inoculation of the disease in animals, and from the discovery in the diphtheritic membranes and surrounding tissues, as well as in the blood and other fluids of persons suffering from diphtheria, of the lower forms of vegetable organism (bacteria, micrococci, &c.), which are supposed to be the infecting agents both in the local affection and in its general constitutional effects. Whether this be the correct explanation of the disease, or whether as is held by many, these organisms are to be looked upon merely as accompaniments or complications of the affection, not present in all cases, the following facts appear to be made out respecting diphtheria :—

1. That it is a disease communicable both by infection and by contagion.

2. That grave constitutional disturbance is a constant and prominent symptom of diphtheria.

3. That certain important consequences or, as they are termed, sequelæ are apt to follow diphtheria, particularly some forms of paralysis.

These points, moreover, serve to distinguish this disease from croup, which, although in some cases presenting certain features of resemblance to diphtheria, differs from it in being a merely local inflammatory affection. See CROUP.

As already observed, diphtheria has frequently appeared as an epidemic. It is probably more common in a sporadic form (single cases). It is sometimes endemic in certain localities where the hygienic conditions are bad; and there is ample evidence to show that air or water contaminated with decomposing animal matter may readily cause an outbreak of diphtheria. The influence of climate, weather, and condition of soil appear to be inappreciable. When the disease has broken out in a dwelling it is apt to spread not merely by direct contagion, but apparently also through the air of apartments, this being notably the case in overcrowded habitations. The contagiousness of diphtheria is very marked, and has unhappily been often exemplified in the case of physicians, who have fallen victims to the disease from inoculation with its morbid products when cauterizing the throats or performing tracheotomy in those suffering from it. Children appear to be on the whole rather more liable to diphtheria than adults : and although the most robust people may be attacked, those whose health is weakened by any cause are specially predisposed. One attack of diphtheria appears to afford no immunity from others.

It must be observed, however, that the mere existence of a sore throat accompanied with some amount of membranous exudation does not constitute diphtheria, as is often erroneously supposed by non-medical persons, who are apt to fancy they have had diphtheria several times from having suffered from what is a comparatively simple complaint. The diagnosis can only be reliably made by a medical man.

Cases of diphtheria differ as to their intensity from the mildest forms, which resemble an ordinary catarrhal sore throat, to those of the most severe character (such as the gangrenous form), where the disease is hopelessly intractable from the first.

In general the symptoms at the commencement of an attack of diphtheria are comparatively slight, being those commonly accompanying a cold, viz., chilliness and depression. Sometimes more severe phenomena usher in the attack, such as vomiting and diarrhœa. A slight feeling of uneasiness in the throat is experienced along with some stiffness of the back of the neck. When looked at the throat appears reddened and somewhat swollen, particularly in the neighbourhood of the tonsils, the soft palate, and upper part of pharynx, while along with this there is tenderness and swelling of the glands at the angles of the jaws. The affection of the throat spreads rapidly, and soon the characteristic exudation appears on the inflamed surface in the form of greyish-white specks or patches, increasing in extent and thickness until a yellowish-looking false membrane is formed. This deposit is firmly adherent to the mucous membrane beneath or incorporated with it, and if removed leaves a raw, bleeding, ulcerated surface, upon which it is reproduced in a short period. The appearance of the exudation has been compared to wet parchment or washed leather, and it is more or less dense in texture. It may cover the whole of the back of the throat, the cavity of the mouth, and the posterior nares, and spread downwards into the air passages on the one hand and into the alimentary canal on the other, while any wound on the surface of the body is liable to become covered with it. This membrane is apt to be detached spontaneously, and as it loosens it becomes decomposed, giving a most offensive and characteristic odour to the breath. There is pain and difficulty in swallowing, but unless the disease has affected the larynx no affection of the breathing. The voice acquires a snuffling character. When the disease invades the posterior nares an acrid, fetid discharge, and sometimes also copious bleeding, takes place from the nostrils. Along with these local phenomena there is evidence of constitutional disturbance of the most severe character. There may be no great amount of fever, but there is marked depression and loss of strength. The pulse becomes small and frequent, the countenance pale, the swelling of the glands of the neck increases, which, along with the presence of albumen in the urine, testifies to a condition of blood poisoning. Unless favourable symptoms emerge death takes place within three or four days or sooner, either from the rapid extension of the false membrane into the air passage, giving rise to asphyxia, or from a condition of general collapse, which is sometimes remarkably sudden. In cases of recovery the change for the better is marked by an arrest in the extension of the false membrane, the detachment and expectoration of that already formed, and the healing of the ulcerated mucous membrane beneath. Along with this there is a general improvement in the symptoms, the power of swallowing returns, and the strength gradually increases, while the glandular enlargement of the neck diminishes, and the albumen disappears from the urine. Recovery, however, is generally slow, and it is many weeks before full convalescence is established. Even, however, where diphtheria ends thus favourably, the peculiar sequelæ already mentioned are apt to follow, generally within a period of two or three weeks after all the local evidence of the disease has disappeared. These secondary affections may occur after mild as well as after severe attacks, and they are principally in the form of paralysis affecting the soft palate and pharynx, causing difficulty in swallowing with regurgitation of food through the nose, and giving a peculiar nasal character to the voice. There are, however, other forms of paralysis occurring after diphtheria, especially that effecting the muscles of the eye, which produces a loss of the power of accommodation and consequent impairment of vision. There may be, besides, paralysis of both legs, and occasionally also of one side of the body (hemiplegia). These symptoms, however, after continuing for a variable length of time, almost always ultimately disappear.

In the treatment of diphtheria regard must be had both

ꞁ and general nature of the disease. Difference
ı exists among physicians as to the utility of
plications in the form of causties applied to the
ırts, some attaching great importance to their use
to arrest the progress of the disease, while
ld that the irritation so produced favours the
the false membranes. Probably at the outset,
local manifestations are but slight, the use of
ıstic as nitrate of silver, either in the solid form
g solution, may be of service; but after any con-
surface has been invaded by the false membrane
, it is to be feared, can be done in this way. The
emoval of the false membrane is generally con-
s by this means a raw bleeding surface is left,
h the deposit is reproduced with great rapidity.
ation, however, tends to be cast off spontaneously
ss of suppuration, and, as favouring this, and at
time acting as a soothing remedy, the inhalation
s recommended. The employment, in the form
r of washes or gargles, of solutions of carbolic
ly's fluid, perchloride of iron, chlorine water, or
f potash, is valuable in the way of disinfecting
and subduing the fetid exhalations which are
esent. When the disease has spread into the
l the breathing is embarrassed, an emetic may be
aiding the expulsion of the false membrane. It
r, in great measure to the constitutional treat-
; the physician's attention must be directed in
. The effect of the disease upon the patient's
s so marked that from the very beginning there
nt demand for strong nourishment, which should
administered in the form of milk, soup, &c., as
ere exists the power of swallowing, and when this
ent enemata should be resorted to. Large doses
and of the tincture of the perchloride of iron are
ded, and stimulants will in almost all cases be
from an early period. The question of tracheo-
to be considered when the false membrane has
to the air passages and threatens death by
and although the operation in such circum-
fords but a feeble chance of success, the cases of
y this means have been sufficiently numerous to
employment as a last resort. The paralysis
ows diphtheria usually yields in the course of
nics and good nourishment.

ld be mentioned that in all cases of diphtheria
uld be taken by isolation of the patient and the
nfectants to prevent as far as possible the spread
ase in a household; while the attendants ought
ıpulously careful to avoid inoculation with the
f the disease, and should frequently use gargles
those substances above mentioned. (J. O. A.)

MACY is the art of conducting the intercourse
with each other. The word obviously owes its
he source subsequently explained in the article
ICS. It is singular that a term of so much
mportance in politics and history should be so
its adoption that it is not to be found in
dictionary. There has, indeed, ever been a
in the English nature to acknowledge the art
ing international business as a pursuit worthy
sh statesman, or as one entitling its adepts to
fame. It is popularly looked on as the art of
to the business of nations a morality condemned
rcourse of men with each other, and as a means
ring subtlety where force is insufficient to
some statesman's object. Hence the term has
quially used to express a modified degree of
and conduct which is wily and subtle, without
tly false or fraudulent, is styled "diplomatic."
The subject has been usually treated under the head of the Law of Nations, or, as it is now more properly termed, international law. But a little examination will show that diplomacy, though closely associated with international law, is a separate sphere of intellectual exertion. The diplomatist undoubtedly requires to be acquainted with international law, and to observe its general injunctions. He often finds it necessary to appeal to the rules, or supposed rules, of that code; but it would be a confusion of terms to count him an officer engaged in the execution of international law. He has to accomplish objects which are not achievable through any law real or fictitious, but are achieved solely through the art of diplomacy. Questions in which private rights and obligations are concerned are a perpetual source of diplomatic exertion. In England, and to some extent in the other states called the great powers, the administration of justice is pursued on rules so absolute that there is no chance of their being relinquished to favour a friendly or to injure a hostile nation. Further, diplomacy, besides the larger operations connected with great treaties or alliances, keeps a vigilant eye on the ordinary details of international law, for the purpose of seeing that it is equitably administered. In this sense the diplomatist is like a law-agent, whose duty it is to see that his client receives justice at the hands of other nations under this code.

Diplomacy, as a science, has arisen out of the development of the European powers, and their rise on the ruins of the Roman empire. As a uniform system, following principles nearly as well established as those of many codes of law, it exists solely among the European powers, partly embracing those nations, such as Turkey and Persia, which have been brought into close association with them. The difficulty, however, of getting those Eastern states to understand and obey the laws of diplomacy, and submit to its restraints, has ever been an object of anxious comment to Wickefort and the other systematic writers on diplomacy. To submit to be bound in the moment of power by a theoretical system not enforced by the strong hand of any judge, spiritual or temporal, is not consistent with the Oriental mind; and the great civilized powers, in dealing with the Eastern states, as in their intercourse with barbarous tribes, have relied on their own strength, exercised with cruelty or with mildness as the case might be. Alliances and leagues, declarations of war and treaties of peace, have taken place, it is true, among those states, but it would be an historical absurdity to suppose diplomatic relations connecting together China, Burmah, and Japan, as they connect the great European powers.

In the same manner the ancient world had its treaties and leagues, but no systematic diplomatic relations. The pretensions of Rome during the empire, indeed, superseded every kind of international engagement, since she would permit of no relation between the empire and any other state, save that of predominance on her part and subjection on the other. Yet it is evidently from this system of centralization that the diplomatic relations of the European states arose. Freed from the temporal jurisdiction of the empire, and no longer mere dependencies, the European states were still subject in a modified shape to an influence radiating from the old centre of imperial authority. The bishop of Rome, in claiming a spiritual authority at least co-extensive with the geographical area of the temporal authority of the departed emperors of Rome, created a sanction, though an imperfect one, for the execution of justice among nations, and acted in some measure as a controlling influence over their diplomatic operations. A memorable instance of the influence of the Pope is found in the relations between John of England and Philip of France. The semi-judicial authority of the court of

Rome was cited in support of the English conquest of Ireland, and was appealed to by both parties in the Scottish War of Independence. Little as the Papal authority was respected by even the most Catholic monarchs when they were at the head of large and well-found armies, yet in matters of dubious equilibrium the authority of the Pope had some weight; and as his was a power not limited to any particular state or cluster of states, but ever present throughout all the transactions of Christian realms with each other, it had, beyond doubt, an influence gradual and continuous in giving modern diplomacy the amount of specific character which it had obtained at the period of the Reformation. Under the head BALANCE OF POWER, the evils arising from the absence of a supreme power to judge between states, as the courts of law decide questions between individual citizens, will be found discussed. It suffices here to say, that much of the deficiency is filled up by the fortunate train of events which have created, throughout the civilized world, a traditional system of diplomatic practice.

The representatives of great nations, following up the traditions of the science of diplomacy, have often sought by similar acts to do what they considered their duty to their country by taking advantage of every opportunity of aggrandizing it. But modern political philosophy and morality teach us that this is not the manner in which great nations are to be supported or aggrandized, and that for their diplomatic servants there is spread out a far nobler field of exertion. It is founded on the consciousness that the real power of states must come from within—from the sound condition of the people, physically, industrially, and morally—from well-poised political institutions and good government. If these are absent no diplomatic skill can make up for them; if they be present it cannot enhance the real power of the state which possesses them. But to the diplomatic representatives of states both powerful and honest a function of a higher character still than mere national aggrandizement belongs, in the capacity, by able, temperate, and honourable negotiation, to keep feeble states from being crushed by their potent neighbours, to preserve peace in the world so long as it can honourably be preserved, and to see generally that international justice is observed among mankind. The true functions of the great powers are in some measure embodied in the well-known lines of Virgil:

> "Tu regere imperio populos, Romane, memento;
> Hæ tibi erunt artes; pacisque imponere morem,
> Parcere subjectis, et debellare superbos."

The historical events, and the industrial and commercial progress which have during the past hundred years so aggrandized the power of Britain among European nations, have, in this view of the uses of our diplomacy, become a great boon to the smaller states, and even to the citizens of the greater. The parliamentary responsibility, and the perpetual public scrutiny and discussion to which the acts of our statesmen are subjected, are not only checks on our own diplomatic acts, but on those of every other civilized state. It was a boast attributed to one of the great fabricators of British diplomacy, the elder Pitt, that not a gun should be fired throughout the world without Britain knowing why. If Britain could make good this boast, it would extend in some measure to mankind at large the blessings enjoyed at home from living under a responsible government. As it is even at present, the continuous liability of having whatever he does called before Parliament and the public, must be an ever present and influencing motive with every British diplomatist. Hence he not only dare not countenance any act of national rapacity, tyranny, or fraud, but he is, as the representative of a nation which has great power and no secrets, a check upon the diplomatic honesty of all the world.

In contrast to the old opinions which attributed the power and prosperity of nations to diplomatic ability, overlooking the substantial sources of material progress, a political sect has appeared in recent times who denounce the diplomatic system as foolish or wicked, and proclaim the doctrine of non-intervention in the affairs of other nations. It is practically clear, however, that whatever degree of perfection the world may reach in time, the first great power which avows this opinion will become the immediate victim of its rivals; and thus, should Britain withdraw herself from the diplomacy of Europe, the despotic states would soon become strong enough to shut up the commerce of the world, and cast the world two centuries back in civilization.

It is perhaps scarcely necessary to mention that the source of the diplomatic organization in any nation is its supreme power; but it is useful to keep in view that, for the rapid movements of this department of politics, nations the most jealous of their constitutional rights have been obliged to place at least provisional power in the hands of individual rulers. Thus in Britain the sovereign, independently of Parliament, has technically the power to make treaties and to declare peace and war; and an authority not much less extensive is committed to the president of the United States. The guidance of a great state's relations with foreign countries is generally committed to one department of the Government—with us it is the function of the foreign secretary. How far he is bound to consult his colleagues in his intercourse with foreign states has sometimes been matter of acrimonious discussion. The representatives of the Government at foreign courts, though the dignified character of their missions sometimes gives them a rank much higher than that of their instructor, must obey the directions of the foreign minister. In the negotiation of treaties there is an old-standing dispute among publicists, how far nations can be bound if their ambassadors exceed the instructions given to them, which are generally kept secret. When, therefore, an important international act, such as a treaty, is undertaken, there are many sanctions and ceremonials to be accomplished before it is held to be completed. While matters are in a vague condition, many briefly expressed fundamental suggestions will have passed among the negotiators in the form of notes. When the matter becomes more ripe for adjustment, it assumes the shape of a protocol, or draft of the conditions. The ambassadors, when all is adjusted, sign the articles of the treaty; but still it is generally deemed essential that the several Governments should ratify it, or, admitting that their representatives have not exceeded their instructions, engage to fulfil the bargain they have made. In this country, whenever treaties affect the private rights of the citizen, they must be ratified by Act of Parliament. In addition to notes and substantive treaties, the most important documents in diplomacy may be considered the manifestoes, in which, paying homage to public opinion and the established rules of diplomacy, Governments profess to justify their conduct. When any vile act of oppression or injustice is perpetrated, it is generally followed by an able manifesto, and the ingenuity of the accomplished diplomatist is taxed to make the deed appear just, rational, and necessary.

The nature and functions of the large body of officers who chiefly conduct the diplomacy of the world having been described under the heading AMBASSADOR, it only remains to notice the incidental circumstance that custom has for some time established the French language as the language of diplomacy. In the 16th and during a great part of the 17th century, Latin was employed. In Ludlow's memoirs there is, under the year 1656, a curious notice to the effect that the Swedish ambassador "com-ined of the delays in his business, and that, when he desired have the articles of this treaty put into Latin accord- g to the custom of treaties, it was fourteen days they de him stay for that translation, and sent it to *one Mr ilton, a blind man*, to put them into Latin, who, he said st use an amanuensis to read it to him, and that anuensis might publish the matter of the articles as he ssed, and that it seemed strange to him there should be ne but a blind man capable of putting a few articles into tin." In turning over the pages of the great collection treaties by Dumont and Rousset, one may observe how adually, during the ascendency of Richelieu, and the sub- quent reign of Louis XIV., the use of the French nguage radiates from the immediate diplomatic transac- ns of France over those of Europe at large. Probably propagation was originally connected with the visions that universal French empire to which Louis XIV. emed to be marching before he encountered the combina- ns of William of Orange. At the present day it can only pronounced a fortunate thing that diplomatists have reed to use one language, and that the best adapted for eir peculiar functions.

DIPLOMATICS, the science derived from the study of cient diplomas, so called from being written on two ves, or on double tablets. The Romans used the term re specially for the letters of licence to use the public nveyances provided at the different stations, and gene- lly for public grants. Subsequently it attained a more tended signification, and in more modern times has been ed as a general term for ancient imperial and ecclesiastical ts and grants, public treaties, deeds of conveyance, ters, wills, and similar instruments, drawn up in forms d marked with peculiarities varying with their dates and untries. With the revival of literature, the importance such documents in verifying facts and establishing public d private rights led to their being brought together from e historical works and the monastic registers in which ey had been copied, or, in rarer instances, from public d ecclesiastical archives where the originals were still eserved. Then arose questions of authenticity, and ubts of the so-called originals; disputants defended or ndemned them; and, in order to establish principles for istinguishing the genuine from the forged, treatises were ritten on the whole subject of these diplomas. With a iew to establish the credit of those preserved in the riginal, the Benedictine, Dom Mabillon, in the year 1681 roduced his masterly work *De re diplomatica*,—Papebroch, he Jesuit, having already, in the year 1675, written his *ropilæum antiquarium circa veri ac falsi discrimen in tustis membranis* in the *Acta Sanctorum*, April, vol. ii. n the following century appeared the *Nouveau Traité de Diplomatique*, by Dom Toustain (who, however, died before he completion of the work) and Dom Tassin, Benedictines f the congregation of St Maur, 6 vols. 4to, 1750–1765, reating of the whole subject of diplomas, and accordingly ntering at length into a minute investigation of the peculiarities and characteristics of writing proper to different ges and countries. Thus treatises on the subject of liplomas gave the name of diplomatics to the study of ncient writing, now more properly termed PALÆOGRAPHY, under which it will be separately treated.

Imperial decrees and privileges, public acts and treaties, nd, no doubt, contracts between private persons, were in remote times inscribed on marble and stone, on wood and n metal. The wonderfully preserved monuments of ncient Nineveh show the prevalent use of sun-burnt brick. In Egypt papyrus was used from the remotest imes. The Greeks and Romans recorded public documents on wooden tablets, on stone, bronze, lead, and vory, as well as on papyrus, parchment, and other substances. Tablets of wax served for letters and writings of various kinds, but must have been unsuitable for public acts. Pliny speaks of the use of rolls of lead and of linen. There are many Greek documents preserved in the British Museum, the Bibliothèque Nationale of Paris, and elsewhere, such as royal letters, petitions, contracts, and wills, of the time of the Ptolemies, written on papyrus. See *Notices et Extraits des Manuscrits*, tome xviii., with plates. The Byzantine emperors often used golden and coloured inks from the 8th to the 12th century.

We know that archives were provided by the Romans for the preservation of their public acts; but fire and war have been the great destroyers of these documents so precious to the historian. Suetonius relates that Vespasian undertook to restore from copies 3000 brazen tablets, containing most ancient records, dating almost from the beginning of the republic, which had been consumed when the Capitol was burnt. Original documents of the nature of diplomas, written in Latin, are now not forthcoming of an earlier period than the 5th century. The acts emanating from royal authority anterior to the 13th century are almost exclusively derived from ecclesiastical archives, and consist of foundations of monasteries, and grants of property, privileges, and immunities. In England, from the 13th century they are systematically registered in the royal chancery; the series of rolls in which they are written, under different classes, is very complete from the reign of King John. History is greatly indebted to the care with which religious houses registered their title deeds. From an early time it was their practise to copy them into volumes, arranging them generally under the name of the property. Chartularies of this character of the 10th century are still extant. The chartulary of Winchester Abbey, compiled early in the 12th century, and containing numerous documents of the time before the Conquest, is in the British Museum.

Imperial acts affecting the state at large were proclaimed through the governors of provinces; as in later times, in England royal writs and ordinances were addressed to the sheriffs of the several counties. In England, it would seem, when the object was to appeal to the people, the document was publicly exhibited. When Edward III. landed, as Prince of Wales, on the Yorkshire coast, with the design of overthrowing his father's government, he drew up a manifesto of his purposes, addressed to the citisens of London, who exhibited it on the cross in the Cheap, placing copies in their windows (*Chron. Monasterii de Melsa.*)

At all times diplomas have been drawn very much in set forms. The Romans employed official clerks, (*scribæ*), assigning them to the different magistrates. Under the empire they are called *tabelliones*, and act as public notaries. After the breaking up of the Roman empire, there was a period when the chanceries of the new states were imperfectly served. The notarial science was partially lost, and, in the general neglect of learning, the composing a public act or private document was a task of difficulty. In the 7th century the monk Marculfus composed a formulary for guidance in drawing up documents of various kinds. It was first published by Bignon in 1613. In Migne's edition, *Patrologiæ Cursus*, vol. xxxvii., it is accompanied with several anonymous compilations of the same character. In the 12th and 13th centuries we meet with works of the same kind under the title of *de arte dictaminum*. A very interesting collection of precedents of royal warrants, state letters, papal bulls, and other documents, arranged under many heads of subjects, was compiled by the English poet Occleve, while he was a clerk in the council office at the beginning of the 15th century, and is now in the British Museum. We are best able to understand the nature of early diplomas by examining the originals, still extant, on papyrus or parchment, which go back in date to the 5th century. The oldest come chiefly from Ravenna. They have been commented on by Maffei in his *Istoria diplomatica*, 1727, and printed in full with facsimiles in the *Papiri diplomatici* of the Abbate Marino-Marini, 1805. A considerable number of the original diplomas of the Merovingian and succeeding sovereigns of France have also been preserved, and have been published in facsimile (Letronne, *Diplomata et Chartæ*), and in letterpress. England also can boast of a series of very beautifully written royal charters from the 7th century. The larger number of them are in the British Museum, and are in course of publication in facsimile (*Facsimiles of Ancient Charters*, parts i. ii. iii.). Many original papal bulls, too, of an early date, are still extant, in different repositories.

There is a general uniformity in the diplomas of the earlier times. Taking the French series as examples, we find a regularity of formulas in the following order :—

1. An invocation, as *In nomine domini Dei Salvatoris nostri Jesu Christi*.

2. The name and style of the sovereign, and the name and title of the person addressed. In the 6th, 7th, and 8th centuries, the style of the French kings was in general *N. Francorum rex, vir inluster*; Pepin added *Dei Gratia*. From the time of Louis le Débonnaire the form was *Divina ordinante* (or *propitiante, annuente*, or *favente*) *providentia* (*clementia*, or *misericordia*). Popes called themselves simply bishop until the end of the 11th century, when, or only rarely before, they used the title *Papa*. Gregory the Great (590-604) introduced the form *servus servorum Dei*. They placed their name before or after that of the person addressed indifferently, before the 10th century, when the custom prevailed to give it precedence.

3. A preamble, consisting of a moral or religious reflexion, or a recital of the motives to the grant. In the earlier times the moral sentiment is expressed briefly, as *Memor finis mei*, or *Pœnas inferni cupiens effugere*; but later on it is often of great length and in inflated language, with admixture of barbarised Greek words.

4. The substance of the act or donation.

5. A protecting clause, in the nature of an imprecation on such as should infringe the privilege granted, or thwart the object of the act. It is first met with in papal bulls of the 6th century, and appears in an exaggerated form in a later time, the bitterest curses being heaped on the hypothetical offender without measure. The papal type is closely followed in French and English diplomas. In the 12th century it took a milder form, as in papal bulls, *Nulli ergo hominum liceat*, &c. In the 10th and 11th centuries the comminatory clause was often placed after the date, having sometimes been previously introduced into the text.

6. The Merovingian sovereigns authenticated their diplomas by the addition of their signature. Those who were unable to write signed with their monogram. The Carlovingians signed with a monogram, and the same form prevailed from the 9th century in Germany and Italy. It ceased to be used in France in the 14th century. The clergy adopted the use of the monogram in the 11th and 12th centuries. It is not found in the charters of English sovereigns. In the earlier times the monogram was formed of letters of tall cursive character; capitals and uncials were afterwards more commonly used. Sometimes the word *rex* was added. It is possible that the monogram was in some instances entered by the hand of the sovereign, for so much is indicated by the words in which it is introduced, but it was usually added by the chancellor or scribe. It was not used for some kinds of documents, as judgments, decrees, and mandates. In acts of the later Roman emperors, the form of subscription is simply the word *Legi*, with a cross prefixed, as in a diploma of Valentinian, printed by Marini, p. 94. The name of the referendary or chancellor, with the expression *optulit*, was in France, in the earliest time, inserted before, subsequently after, the subscription of the monarch. A paraph of the word *subscripsi*, and often Tironian notes, accompanied the subscriptions. Sometimes in royal diplomas, and commonly in private charters, the names of several witnesses were subscribed, each preceded by the word *signum*, with a cross, or followed by *subscripsi*. The popes, in their bulls, originally used the form of *Bene valete*, or *Deus te incolumem servet*, in place of subscription of their name, which they applied only to synodal and other public acts. At the beginning of the 9th century they used their monogram. In the 11th century they signed with their own hand. In the 9th century also began the practice of adding the subscriptions of cardinals, but it was not commonly followed until the middle of the 12th century. Sentences from the Scriptures were used by popes for a signature, instead of their names, in consistorial bulls in the 11th century. English kings, before the Conquest, neither signed their name nor used a monogram. They affixed the sign of the cross—the scribe adding *Signum manus N. regis*, or variations of the form.

7. Dating clause. In France, this followed the subscription and attestation. The manner of dating varied at different times and in different countries. In diplomas of the emperors, the year is not expressed. For example, an act of Valentinian of about 450 A.D. has simply the words, *Dat. sexto idus Januarii Ravennæ.* - *Legi.* The Merovingian kings and their successors dated by their regnal years, adding the day of the month, the place, and generally the word *feliciter*. Some dated from epochs in their reign, as Louis le Débonnaire from Easter 781, the day of his coronation at Rome; from September 813, when he was associated in the imperial power, and from the 28th of January 814, the day of his accession after the death of Charlemagne.

The year of the incarnation was seldom used by the French kings before the end of the 9th century. In England it was generally added to royal charters in the times preceding the Conquest, but, subsequently to the death of William the Conqueror, was very rarely used in public or private deeds until the 13th century. The English charters of the early period often added also the regnal year and papal indiction. In papal bulls the date was given by the names of consuls from 385 to 546; by years of the Greek emperors from 550 to 772; by years of emperors of the west from 802 to 1047, and in 1111; and by years of the pontificate as early as the year 781, but often still by the year of the emperor, or by both together, eventually by the year of the pontificate alone. The year of the incarnation is found in bulls as early as the 7th century, and came into ordinary use in 968. Up to 1088, in the papal dominions, the year was calculated from the 25th of December; subsequently the Florentine and Pisan years were used, the former beginning three months after the nativity, the other nine months before it. The indiction was also added:—from 584 to 1087, that of Constantinople, beginning on the 1st of September; afterwards the Constantinian, or Cæsarean, beginning on the 25th of September, and the Papal, beginning on the 1st of January. These dates were accumulated principally in the bulls; in the briefs the year is rarely designated from 1086 to 1124, and is always wanting from 1124 to 1187. (See Jaffé, *Regesta Pontificum Romanorum*.)

An additional security was given to diplomas by the seal,—the antiquity (going back to remotest ages), the form, colour, substance, and use of which are treated of at great length in works on diplomatics (see SEALS). It was in use by the popes from the earliest time, and under the Merovingian kings and their successors; but by the great feudatories only from the 10th century. In England it is not found during the Saxon period, saving in a few instances in the reign of Edward the Confessor. The use of it came in with the Conquest and became general. The popes' seals were of lead, or in rare instances of gold, and suspended to the document. The precious material was introduced by Charlemagne, and was freely employed by the emperors of Constantinople, who with their principal officers used metal seals. In France, under the Merovingians, and elsewhere at the same period, the seal was of white wax, fixed "en placard," or to the surface of the document. From the 10th century, it was suspended, first by a parchment label, afterwards by cords of silk or other substances. The colour of the cords by which papal *bullæ* were attached varies under different pontiffs. White wax, but of various qualities, was in use to the 13th century, in which and subsequently it was coloured chiefly yellow, red, or green. The quality of the wax, the shape, the legend or inscription, the character of the charge or device—which was sometimes the impression of an antique gem—all these change with the progress of time and become evidence of age.

sh charters of the Saxon period have forms in
spects different from those of foreign diplomas.
ns have been already noticed, as, that the king
ieither with his name nor with his monogram, but
h a cross, and that they were dated from the in-
n. It would appear, indeed, that the charters
ot drawn up by an officer of the chancery, as
e, but were composed and written by ecclesiastics,
services were employed for the occasion. In
t of the monastery of Reculver to Christ Church,
ury, by King Eadred, in the year 949, to which
, then abbot of Glastonbury, and one of the king's
l ministers is a witness, he states that he both drew
orm and wrote the document with his own hand.
this account that we find in English charters before
quest a variety of styles of writing, even in those
me date; whereas on the Continent the writing is
in the several states. In the absence of a
official character, the grant was attested by nume-
nesses, varying from four or five, the more ordinary
in the earlier times, to from 30 to 100 subse-

For it was always an object with the religious
n whose favour a grant was made to fortify its
y and secure its recognition by impressive solemni-
They made the benefaction a religious act by
the grantor to offer the charter to God on the altar
church; and they obtained the approval and attes-
f the members of the court, or of the council over
e king might be at the time presiding. The names
e subscribed to the English charters add greatly
historical value. A difference in another respect
foreign type is attended with advantage to the study
the language and manners of the time. The pro-
nveyed was defined by a minute description of its
ies, written in English; and, as the documents are
d can generally be referred to special localities,
differences and the formation of names, with other
l lights on subjects of antiquity, are preserved.
lish charters of as early a date as the 9th
and from that time onwards, is sometimes found,
op or the bottom, the upper or lower half of an
on. It is often the word *chirographum*, but some-
her words, or merely letters. It was used when it
object that two parties to a contract should each
opy of the deed, which accordingly was written in
e on one skin; the inscription was written in large
etween the copies, and the skin was then divided.
e of division was at a later period generally in-
and the document was called an indenture. The
was not introduced into France until the middle of
century.

practise of forging and falsifying diplomas,
tical constitutions, and documents of all kinds is
ack to very early times. The laws of the Visigoths
th century enact severe punishments on offenders
lass, as do the *Capitularia* of Charlemagne. The
chronicler Hoveden, under the year 1196, gives
nt of wholesale forgeries of papal bulls and briefs
agent of the archbishop of York. A decretal
cent III. (1195–1216) gives rules for detect-
ricated bulls (*Epist.* i. 201, ed. Baluz.). It was
to impose upon the ignorance of people, and
ptations to falsify were so great, that we cannot
was done extensively. The science of diplomatics
to give the power to detect these forgeries.
o concluding books of the *Nouveau Traité de*
atique treat of the subject at great length, but the
ven for distinguishing the true from the false docu-
n only be applied by one who is practically versed
tudy. In passing judgment on a professed original,
not only the formulas, historical facts, and date have to be tested, but the external features have to be regarded—the material, the ink, the forms of abbreviation and character of writing, and the seal; and the properties and characteristics of these cannot well be learnt from written instruction. They are treated of in works on the general subject of palæography.

In testing the authenticity of diplomas, assistance will be found, in addition to authors already quoted, in the following works:—Germon (Barthélemi), *De veteribus regum Francorum diplomatibus*, Paris 1703–1707, 3 vols. 12mo; Muratori, *De diplomatis et chartis antiquis; Antiquit. Ital. medii ævi*, tom. iii.; Raguet, *Hist. des contestations sur la diplomatique*, 12mo, 1708, and 8vo, 1767; Hickes, *De antiquæ litteraturæ septentrionalis utilitate dissertatio epistolaris*, fol. Oxon. 1703; Marino-Marini, *Diplomatica pontificia*, 4to, 1841; Kemble, *Codex Diplomaticus ævi Anglosaxonici*, 6 vols. 8vo, 1839–1848; Quantin, *Dictionnaire raisonné de Diplomatique Chrétienne*, in Migne's *Encyclopédie Théologique*, 1846; *Archives de l'Empire, Monuments Historiques, Cartons des Rois*, ed. J. Tardif, Paris, 4to 1866; *Bibliothèque de l'École des Chartes*, 1839–1875; Gloria, *Compendio di Paleografia e Diplomatica*, 8vo., 1870. (E. A. B.)

DIPPEL, Johann Conrad (1673–1734), a German theologian and alchemist, who assumed as an author the name "Christianus Democritus," was born at the castle of Frankenstein, near Darmstadt, his father being a Lutheran clergyman. He studied at Giessen, where he took the degree of master in philosophy in 1693. After a short visit to Wittenberg he went to Strasburg, where he delivered lectures on astrology and chiromancy, and occasionally preached. He gained considerable popularity, but was obliged after a time to quit the city, owing to his irregular manner of living, and the suspicion attaching to him of having been concerned in a murder. He had up to this time espoused the cause of the orthodox as against the pietists, and had justified his gay and worldly habits on the ground that he intended to make a practical protest against pietism; but in his two first published works, *Orthodoxia Orthodoxorum* (1697) and *Papismus vapulans Protestantium* (1698), he assailed vehemently the fundamental positions of the Lutheran theology, denying the inspiration of Scripture, the efficacy of the sacraments, and the doctrine of justification by faith. He held that religion consisted not in dogma but exclusively in love and self-sacrifice. To avoid persecution he was compelled to wander from place to place, and he resided successively in various towns of Germany, Holland, Denmark, and Sweden. He took the degree of doctor of medicine at Leyden in 1711. From 1698 he devoted himself to experiments in alchemy, which wasted a considerable fortune, and he was frequently imprisoned for debt. He made several valuable discoveries in chemistry, one being Prussian blue, and another an oil, still known as Dippel's animal oil, which he offered as a panacea, and which has useful medicinal properties of a more limited kind. Provoked by false reports of his death, he published in 1733 an intimation that he would live until 1808. In spite of this, however, he died at Berleburg on the 25th April 1734.

An enlarged edition of Dippel's collected works was published at Berleburg in 1743. See a somewhat too eulogistic biography by Ackermann (Leipsic, 1781), and a memoir by Büchner in the *Historisches Taschenbuch* for 1858.

DIPSOMANIA. See Mental Diseases.

DIPTERA (Aristotle, from δι, double, and πτερα, wings), an Order of the *Insecta*, containing the "flies," properly so called, with which, also, in spite of not possessing its chief characteristic, the sub-order *Aphaniptera* (fleas), a part of the obsolete *Aptera*, is now incorporated. The *Diptera* proper (with the exception of the apterous *Nycteribiidæ*, and a few aberrant species of other families, to which the majority of the characters given will not strictly apply, but which cannot, from their general structure, metamorphoses, habits, or evident natural affinities, be separated from the Order under consideration) have the following characters:—wings two, mesothoracic, membranous, mostly horizontal and transparent, not capable of being folded, with nervures generally few and longitudinally disposed, and having a pair of alulets at the base; metathoracic wings replaced by a pair of halteres or balancers; mouth antliate (whence the Fabrician name *Antliata* for the Order), with a proboscis formed of the labium, inclosing modifications of other usual parts of the mouth, except of the labial palpi, which are wanting; tarsi 5-jointed; prothorax reduced to a very small collar. They are divided into two sections—the ORTHORHAPHA, in which the pupa is incomplete (the details of the future perfect insect being visible), and the CYCLORHAPHA, in which the pupa is coarctate (of a hard, uniform surface, cylindrical, rounded at the extremities). The ORTHORHAPHA are again divided into two sub-sections—the *Nematocera* (antennæ composed of more than 6 joints, palpi 4- or 5-jointed), and the *Brachycera* (antennæ short, with apparently only three distinct joints, palpi 1- or 2-jointed). Of these, the *Nematocera* comprise three tribes, viz.:—1, the *Oligoneura*, in which the wings have very few nerves (fam. *Cecidomyiidæ*); 2, the *Eucephala*, in which the larva has a distinct head (fams. *Mycetophilidæ*, *Bibionidæ*, *Rhyphidæ*, *Simuliidæ*, *Chironomidæ*, *Culicidæ*, and *Psychodidæ*); and 3, the *Polyneura*, in which the wings have many veins (fam. *Tipulidæ*). The *Brachycera* also comprise three tribes, viz.:—1, the *Cyclocera*, in which the third joint of the antennæ is annulated (divided into two groups—*a*, *Notacantha*, = fams. *Stratiomyiidæ*, *Xylophagidæ*, and *Acanthomeridæ*; and *b*, *Tanystoma*, = fams. *Tabanidæ* and *Leptidæ*); 2, the *Orthocera*, in which the antennæ are normal (divided into two groups—*c*, *Polytoma*, = fams. *Therevidæ* and *Scenopinidæ*; and *d*, *Procephala*, = fams. *Acroceridæ*, *Bombyliidæ*, *Nemestrinidæ*, *Mydasidæ*, *Asilidæ*, *Empidæ*, and *Dolichopodidæ*); and 3, the *Acroptera*, in which the wings are pointed (fam. *Lonchopteridæ*). The CYCLORHAPHA in like manner are divided into two sub-sections—the *Proboscidea*, possessing a proboscis, and the larvæ having an œsophageal frame; and the *Eproboscidea* (also variously termed *Coriacea* or *Pupipara*), in which the proboscis is wanting, the body leathery, and the larvæ have no œsophageal frame. Of these, the *Proboscidea* comprise three tribes, viz.:—1, the *Hypocera*, in which the antennæ are inserted quite close to the mouth (fam. *Phoridæ*); 2, the *Pseudoneura*, in which the wings have a false longitudinal veinlet (fam. *Syrphidæ*); and 3, the *Eumyiidæ*, or type flies (fams. *Pipunculidæ*, *Platypezidæ*, *Conopidæ*, *Muscidæ*, and *Œstridæ*). The *Eproboscidea* comprise three families, all parasitic,—the *Hippoboscidæ*, *Nycteribiidæ*, and *Streblidæ*, the latter a very limited and aberrant group stated to be oviparous, and having the wings distinct and well veined, unlike the *Nycteribiidæ*.

The sub-order *Aphaniptera* consists of two families only, the *Pulicidæ* and *Platypsyllidæ* (the latter so peculiar in structure as to have been claimed for the *Coleoptera*). Its members are parasitic, entirely coriaceous, much compressed or flattened, and destitute of wings or balancers, these organs being represented by more or less obsolete leathery plates; they have 3- or 4-jointed antennæ, 4-jointed maxillary and 3-jointed labial palpi, and 5-jointed tarsi. The larvæ of such of them as are known are vermiform, and the pupæ inactive, incomplete. If not considered as a sub-order, these two families would apparently have to be placed at the head of the Eucephalous *Nematocera*,—in that case, of course, deranging the characters given for that tribe.

Other families of the *Diptera* have been proposed, but need not be here noticed, being as yet scarcely established, or merely entitled to the rank of sub-families (the *Muscidæ* especially comprising many of the latter).

The *Diptera*, in number of species and individuals (very many having swarming propensities), have been considered to be the order of animated beings most diffused over the globe; and the extremes of heat and cold seem alike indifferent to them. They have long been known to abound in very high latitudes; and, among the insects brought back by Captain Feilden, the naturalist attached to Sir George Nares's Arctic expedition, were Dipterous species of apparently the most feeble organism. The Rev. A. E. Eaton, attached as naturalist to the late "Transit of Venus" expedition, discovered also, on the desolate shores of Kerguelen's Island, *Diptera* of a degraded type suitable to the climatic peculiarities of the locality. Tropical countries naturally furnish the most developed and in some cases extraordinary forms,—the genera *Pangonia*, *Rhopalomera*, *Achias*, *Diopsis*, and *Elaphomyia*, and various *Acroceridæ* (even in temperate regions) abounding in instances of exaggerated and apparently unnatural structure. To a geographical distribution of the widest extent, the flies add a range of habits of the most diversified nature; they are both animal and vegetable feeders, an enormous number of their species acting as scavengers in consuming putrescent or decomposing matter of both kinds. The phytophagous species are attached to various parts of the plant, dead or alive; and the carnivorous in like manner feed on dead or living flesh, many being parasitic on living animals of various classes (even *Reptili* as a fly is parasitic upon frogs in Australia), and mo especially upon other insects, including *Hymenoptera*, [illegible] which they frequently simulate the external facies. N reasonable approximation can be made to the number existing species, as the *Diptera* are not collected or examin with the same assiduity as the more attractive orde Schiner, however, in 1868, stated the number th recorded to be no less than 20,800, to which a considera annual increase is being made (*e.g.*, 550 species in 18 and 230 in 1875); and more than 4000 different gen have been found necessary for their reception. Th must be nevertheless taken as vastly below the mark existent species. No catalogue of the British species recently been made; Westwood, in 1840, enumera about 2350.

Considered in relation to man, there would seem to sufficient reason for placing this apparently feeble orde the head of our insect enemies. Allowing for the effected by the clearing away of animal and veget impurities by many species, and for the indirect advan caused by the known instances of a few others assistin the fecundation of plants, there remains a long li direct injuries effected by *Diptera*. Without laying stress upon the formation of galls and other veget deteriorations caused by many species, there can b doubt that the destruction of grass-lands by the larva the crane-fly, or "Daddy Long-Legs" (*Tipula olerac* of olive-crops by *Dacus*, of oranges by *Ceratitis*, of vario culinary plants by *Psila*, *Tephritis*, *Anthomyia*, *Phytomy* *Drosophila*, &c., and of wheat and other crops by t "Hessian fly," *Oscinis*, and *Chlorops*, are of very serio consequence. Our domestic animals, moreover, suffer fr the bot flies (*Œstrus*, *Gasterophilus*, and *Cephenemyia*), th tick (*Melophagus*), gad-flies (*Tabanus*, *Hæmatopota*, *Chrysops*, and *Stomoxys*, many of which attack man himself), and last, and most dreaded, the African "Zimb," or "Tsetse," *Glossina morsitans*, which is of sufficient power to close the exploration of a region in which it occurs. Nor is man himself spared; the petty inconveniences of wasted food, broken rest, and slight personal pain or irritation experienced in temperate regions from fly-larvæ, gnats, midges, &c., and the parasitic species, are aggravated in both warmer and more boreal countries to a dangerous extent, and have even been found prejudicial to life. There are many recorded instances of the larvæ of *Diptera* feeding upon the human intestinal canal, and of species (dubiously referred to *Œstrus*) attacking man; as also of loathsome cases of individuals being eaten alive by the larvæ of flies, developed in food secreted about the persons of beggars. Various cases have, moreover, recently been noted of the diffusion of the germs of disease by flies; and instances of death from transference of putrid animal matter in New Caledonia have also been recorded. One of the *Muscidæ*, *Lucilia hominivorax*, is known to have caused considerable destruction to human life among French convicts in Cayenne, laying its eggs in the mouth or nostrils during sleep; and a very precise account of much disease and death in man and domestic animals at Mohilew, by a similar action of another of the same family, *Sarcophila wohlfarti*, has recently been given by Portchinsky, a Russian naturalist. It is perhaps superfluous to speak of mosquitoes, too well known since the Biblical "plague of flies;" but it may be observed that the corresponding plague of sand-flies, *Simulium*, so well known to affect the eyes of sufferers from ophthalmia in Egypt, has made its appearance in the deserts of West Australia, where the last exploring expedition of Mr Ernest Giles suffered severely from it.

The antiquity of the fly is scarcely more than historical. Very few fossil species are known (5 only being recorded from the Solenhofen Lithographic Oolite); but the more recent "flies in amber" are so constantly found that the expression has become a common proverb. (S. C. R.)

DIPTYCH, a double tablet made with a hinge to open and shut. Diptychs were used in the time of the Roman empire for sending letters—"mainly love letters," says Facciolati, quoting the scholiast to Juvenal ix. 36, whose note does not, however, seem to imply as much. The consuls and quæstors used, on assuming office, to send diptychs containing their names and portraits to their friends. The exterior of the leaves was often ornamented with other paintings. The tablets were made, the more ordinary kind of boxwood or maple, the richer sort of cedar, of ivory, of silver, and sometimes even of gold. They were very frequently sent by friends to each other as presents at the beginning of a new year. The early Christians used tablets thus made in the celebration of divine worship. And Cardinal Noris (*Dissertat. de Hist. Synod.*) expends much learning in showing, what is very evident, that the Christians adopted the use of them from that of the consular diptychs. They were placed on the "ambones,"—the pulpits, or reading desks, which may still be seen in ancient basilicas at the west end of the choir or presbytery; and from them were read to the congregation of the faithful the names of the celebrating priests, of those who occupied the superior positions in the Christian hierarchy, of the saints, martyrs, and confessors, and, in process of time, also of those who had died in the faith. It is the diptychs that are referred to by the early Christian writers under the names of "mystic tablets," "anniversary books," "matriculation registers" of the church, and sometimes "books of the living," or "books of life." The word is also occasionally found used in other senses, *e.g.* for the priest's vestment, which was usually folded in two (see Ducange, *ad voc.*) When it became customary to write in the diptychs names so numerous as those of the different classes of persons above mentioned, it will be easily understood that it became impossible to inscribe them on two tablets of convenient size. Hence the diptychs became triptychs, *i.e.*, consisting of three such conjoined tablets. But, though triptychs are often spoken of in the art-language of a later time, these were by the early church writers still called diptychs; and continued to be so called, even when many leaves, probably of parchment in some cases, though more frequently of wood, were introduced between the two original folds of the diptych, thus forming a veritable *book*. The inscription on the diptychs of deaths and baptisms, naturally led to the insertion of *dates*, and the diptychs seem thus to have grown into calendars, and to have been the germ from which necrologies, lists of saints, and almanacs have been developed. Much doubt exists as to the time when the use of diptychs to read from died out in the church. The best opinion seems to be that their use lasted to about the end of the 8th century. The outsides of the diptych folds being often very richly ornamented, their preservation was carefully attended to, and even those which were ornamented with profane paintings or carvings were often to be found in use in the primitive churches. This ornamentation caused the diptychs to be exhibited to the congregation, and used as adornments for the altar. And in this position, by a natural process of development, the ornamentation became the main end and object of the thing itself. The best painters of the time employed their talents in painting them—generally in the form of triptychs, and on both sides of the folding doors, so that the triptych when closed showed two subjects, often the portraits of the donor and his wife, and when open three paintings;—hence the very large number of diptychs and triptychs which are found in our museums and galleries.

See Bingham, *Orig. Eccles.*, lib. xv. ch. 13, sec. 13, and Moroni, *Erudizione Storica-Ecclesiastica.*

DIRCE, in Greek legend, the personification of a fountain (and stream) at Thebes, from the water of which Hercules derived part of his strength, and which was usually identified with the fountain of Ares in the legend of Cadmus. Besides, the fountain was the grave of Dirce, at which sacrifices for the dead and other rites were performed. According to the legend, Dirce, the wife of Lycus, king of Thebes, had sorely persecuted Antiope, who at last escaped to Mount Cithæron, where her twin sons Amphion and Zethus were being brought up by a herdsman unconscious of their parentage. Mother and sons met, but had not recognized each other, till Dirce, who had come to the hill for a Dionysiac ceremony, proposed that Amphion and Zethus should tie Antiope to the horns of a wild bull to be dragged to death. They were about to do this when the herdsman announced their relationship, and they then tied Dirce to the bull instead. She was dragged by it over the hill to the fountain into which she was transformed.

DIRSCHAU, in Polish *Szczewo*, a town of Prussia, in the government of Dantzic and district of Stargard, on the left bank of the Vistula, at a railway junction about twenty miles S.S.E. of Dantzic. Besides dealing in wood and cattle, it displays considerable industrial activity in the manufacture of agricultural implements, iron and tin wares, and cement; but its principal claim to attention is the lattice-work iron bridge, thrown across the river in 1850–1857, which, with its total length of 2726 feet and its six spans of 410 feet each, is a noble testimony to the engineering skill of Lentze and Schinz, and affords a passage for the railway between Königsberg and Berlin, for two ordinary carriage roads, and two sideways for foot passengers. Unfortunately, as it lies only about 12 feet above the highest level attained by the river, and there is no opening for the passage of ships, it is necessary in passing under it to remove or drop the masts. J. Forster, the traveller, was born at Dirschau in 1729. Population in 1875, 9727.

DISCUS, a quoit, or circular plate of stone or metal, 10 or 12 inches in diameter, which was used by the ancient Greeks and Romans for throwing to a distance as a gymnastic exercise. Sometimes a kind of quoit of a spherical form was used for the same purpose, and through a hole in its centre a thong was passed, to assist the player in throwing it. Statius, in *Theb.*, vi. 646–721, fully explains the manner in which the discus was used. In the British Museum there is a copy of a famous statue by Myron of a discobolus in the act of throwing the discus.

DISINFECTANTS are agents or substances employed to prevent the spread of contagious or infectious disease. Recent investigations all tend to demonstrate that the efficiency of any disinfectant is due to its power of destroying, or of rendering inert, specific poisons or disease germs which possess in themselves an independent existence; and which, when introduced into the animal system, under favourable conditions, increase and multiply, thus producing the phenomena of special diseases. Therefore, antiseptic substances generally, which check or stop putrefactive decay in organic compounds, by preventing the growth of those minute organisms which produce putrefaction, are, on that account, disinfectants. So also the deodorizers, which act by oxidizing or otherwise changing the chemical constitution of volatile substances disseminated in the air, or which prevent noxious exhalations from organic substances, are in virtue of these properties effective disinfectants in certain diseases. A knowledge of the value of disinfectants, and the use of some of the most valuable agents, can be traced to very remote times; and much of the Levitical law of cleansing, as well as the origin of numerous heathen ceremonial practices are clearly based on a perception of the value of disinfection. The means of disinfection, and the substances employed, are very numerous, as are the classes and conditions of disease and contagion they are designed to meet. Nature, in the oxidizing influence of freely circulating atmospheric air, in the purifying effect of water, and in the powerful deodorizing properties of common earth, has provided the most potent ever present and acting disinfecting media. Of the artificial disinfectants employed or available three classes may be recognized:—1st, volatile or vaporizable substances, which attack impurities in the air; 2d, chemical [illegible] the diseased body or on the infected [illegible] therefrom; and 3d, the physical agencies of [illegible]. In [illegible] of these cases the destruction of [illegible] is effected by the formation of new ch[illegible] by oxidation, deoxidation, or other [illegible] the conditions favourable to life are [illegible] destroyed by high temperature. Of the [illegible] life:—sulphate of copper, chloride of aluminium, chromic acid and bichromate of potassium, bichloride of mercury, benzoic acid, bromal hydrate, chloral hydrate, hydrocyanic acid, alum, hydrochlorate of strychnia, ferrous sulphate, arsenious acid, and picric acid. Of the physical agents heat and cold, the latter, though a powerful natural disinfectant, is not practically available by artificial means; heat is a power chiefly relied on for purifying and disinfecting clothes, bedding, and textile substances generally. Different degrees of temperature are required for the destruction of the virus of various diseases; but as clothing, &c., can be exposed to a heat of about 250° Fahr. without injury, provision is made for submitting articles to nearly that temperature. For the thorough disinfection of a sick-room the employment of all three classes of disinfectants, for purifying the air, for destroying the virus at its point of origin, and for cleansing clothing, &c., may be required.

DISLOCATION. This term is applied in surgery to the displacement from each other of the cartilaginous articular surfaces of the bones entering into the formation of a joint. In a normal joint these surfaces are in contact and held together by ligaments and muscles; in a dislocated joint they are separated more or less completely—in the great majority of cases by external violence; in some instances, however, by powerful muscular exertion. The ease with which a joint is dislocated varies with the form and structure of the joint and with the position in which the joint is when the force is applied. The relative frequency of fracture and dislocation depends on the strength of the bones above and below the joint relatively to the strength of the joint. These points may be illustrated by examples from the joints of the arm and leg, because, with perhaps the exception of the joint between the lower jaw and the skull, it is in these situations that dislocation is most frequently observed. The strength of the different joints in the body is dependent on either ligament, muscle, or the shape of the bones. In the hip, for instance, all three sources of strength are present; therefore, considering the great leverage of the long thigh bone, the hip is rarely dislocated. The shoulder, in order to allow of extensive movement, has no osseous or ligamentous strength; its strength is muscular, therefore it is frequently dislocated, because the muscular strength varies in power, the muscles may be relaxed, the person is unprepared, and dislocation occurs; if, on the other hand, the muscles are tense, and the patient is prepared for the strain, then the result will be either a sprain of the joint or a fracture of one of the adjoining bones. The wrist and ankle are rarely dislocated; in the wrist the radius gives way, in the ankle the fibula, these bones being relatively weaker than the respective joints. The wrist owes its strength to ligament, the ankle to the shape of the bones. The elbow is osseously strong, but this strength necessarily varies with the position of the arm. The symptoms of a dislocation are distortion and limited movement, with absence of the grating sensation felt in fracture when the extremities of a broken bone are rubbed together. The treatment consists in reducing [illegible]. The [illegible] this is done the better [illegible] the more difficult it becomes [illegible]. After a variable period, [illegible] the joint and the age of the [illegible] to replace the bones. The [illegible] joint. The administration [illegible] the muscles, greatly assists [illegible]. The length of time that a [illegible] has been restored to its [illegible]; if osseously strong, then [illegible] as in the elbow joint; if [illegible], then early movement is unjustifiable. More especially is this the case when, associated with osseous

, the strength of the joint is ligamentous, as in
o-clavicular and superior radio-ulnar articulations.
joints the bones must be kept in accurate position
rest for a lengthened period; if movement is
oon after the accident the bone will again slip out
ce.

AL SWAMP, the name given to two extensive
of morass on the western seaboard of North
The larger of the two, distinguished as the
ismal, lies in the peninsula between the James
the north and Albemarle Sound on the south,
belongs partly to Virginia and partly to North
Its length from north to south is about 40
l its breadth about 25. The greater part of the
overed with a thick stratum of spongy vegetable
out any mixture of earthy particles, which at once
and is augmented by a luxuriant growth of
lants, brushwood, and timber. The prevailing
cypress, juniper, and white cedar, and on the
dges oak and beech. By a curious arrangement,
described by Sir Charles Lyell in his *Travels in
erica*, the surface of the swamp is actually higher,
parts by as much as 12 feet, than that of the
ng country; so that, except on the western side,
receives a few small streams, the waters flow
The centre is occupied by Drummond's Lake,
basin about 6 miles long and 3 wide, with
ular banks and an extreme depth of 15 feet; the
lear and abounds with fish. The swamp has long
large supplies of timber, much of which has been
by excavation from the peaty soil in which it was
. The transit is facilitated by means of canals,
the two most important are the Dismal Swamp
iting the western branch of Elizabeth river with
otank, and the Chesapeake and Albemarle Canal,
g the eastern branch of Elizabeth river with
Sound. The former is flanked by a stage road,
minates in the south at Elizabeth City, and in the
Norfolk. Two lines of railway pass through the
of the Virginian portion of the swamp.
tle Dismal is of much less importance. It lies in
rolina, in the peninsula between Albemarle Sound
lico Sound; and in the days when slavery was
it was a noted harbour of runaway negroes.

NSATION is a term used by the canonists to
act of jurisdiction by which the rigour of the
w is relaxed in a particular case. Regarded from
t of view a dispensation is considered by the
not to be an exception to, but a complement of,
and it is granted with discretion in cases where
ould otherwise work injustice. "Fuit dispensatio
it esset pars distributivæ justitiæ." The exercise
risdiction in the earlier days of the Christian
as vested in respect of minor matters in the
nd in more important matters in the provincial
but by degrees this latter jurisdiction came to be
by the patriarchs exclusively, and ultimately, in
of the Western Church, by the Pope alone,
the time of the Reformation of the Anglican
ad acquired for the Holy See supreme authority
more important matters of dispensation. It was
t of the Parliament of England, by the statute
ng Peter Pence and Dispensations" (25 Henry
21), to divest the Pope of the exercise of
rs of dispensation within the realm of England,
ling the king and his subjects to sue to the Pope
Holy See for any dispensation. The Parliament
sted the power of granting dispensations, such as
hitherto obtained from the see of Rome, in the
opal see of Canterbury—subject, however, to the limitation that they should be only granted for such causes as were not contrary or repugnant to Holy Scripture or to the laws of the realm, and for this purpose the archbishop of Canterbury was empowered to constitute a sufficient commissary, and a clerk who should write and register all such dispensations. The representative of the clerk so appointed by the archbishop is the registrar of the office of faculties, over which the master of the faculties presides, as the archbishop's commissary. The matters for which dispensations were accustomed to be granted from the office of faculties, in the reign of Henry VIII., have almost all become obsolete, or have been withdrawn from the cognizance of the master of the faculties; and the special authority of his court in the present day consists in the grant of special licences for marriages, which are valid in both the provinces of Canterbury and of York, and the right of granting which has been preserved to the archbishop of Canterbury in all subsequent marriage Acts. These special licences are simply dispensations for the solemnization of marriage at other times and in other places than those to which marriage is restricted by the Anglican canons or by the statute law of the realm.

D'ISRAELI, ISAAC (1766–1848), was born at Enfield in May 1766. He belonged to a Jewish family which, having been driven by the Inquisition from Spain, towards the end of the 15th century, settled as merchants at Venice, and assumed the name which has become famous. In 1748 his father, then only about eighteen years of age, removed to England, where, before passing the prime of life, he amassed a competent fortune, and retired from business. Both he and his wife gradually dropped connection with their co-religionists, with whom their son never appears to have associated himself.

The strongly marked characteristics which determined D'Israeli's career were displayed to a singular degree even in his boyhood. He spent his time over books, and in long day-dreams, and evinced the strongest distaste for business and all the more bustling pursuits of life. These idiosyncracies met with no sympathy from either of his parents, whose ambitious plans for his future career they threatened to disappoint. At length, when he was about fourteen, in the hope of changing the bent of his mind, his father sent him to school at Amsterdam, where he remained four or five years. Here in the principal's library, and under the principal's influence, he studied Bayle and Voltaire, and became an ardent disciple of Rousseau. Here also he wrote a long poem against commerce, which he produced as an exposition of his opinions when, on his return to England, his father divulged his intention of placing him in a commercial house at Bordeaux. Against such a destiny his mind strongly revolted; and, in this extremity, it was natural that he should eagerly seek the sympathy and counsel of a literary friend. He carried his poem, with a letter earnestly appealing for advice and assistance, to Samuel Johnson; but when, full of eager hope, he called again a week after to receive an answer, the packet was returned unopened—the grand old censor was on his deathbed. He also addressed a letter to Dr Vicesimus Knox, in a tone of the loftiest sentiment, displaying all his literary aspirations, his earnestness and simplicity of heart, and his utter lack of all the qualities of "that despicable thing" (as he called him) "a mere man of the world," and begging to be received into the scholar's family, that he might enjoy the benefit of his learning and experience. How this application was answered we do not know. The evident firmness of his resolve, however, was not without effect. His parents gave up their purpose for a time. He was sent to travel in France, and allowed to occupy himself as he wished; and he had the happiness of spending some months in Paris, in the society of literary men, and devoted to the literary pursuits in which he delighted.

In the beginning of 1788 he returned home, being then a few months past his majority, to lay the first stone of his literary fame by an attack on Peter Pindar, under the form of a poem in the manner of Pope *On the Abuse of Satire.* Published, as it was, at a most appropriate moment, it at once attained popularity. Its authorship became the great subject of debate in literary circles, and it was attributed by some to Hayley, upon whom it was actually revenged, with characteristic savageness, by its victim. It is greatly to Wolcott's credit that, sensitive though he was to attacks upon himself, he at once, on learning his mistake, sought the acquaintance of his young opponent, towards whom he seems to have borne no malice, and whose friend he remained to the end of his life. But of all the fortunate issues of this success not the least fortunate was that it brought D'Israeli what he had so long earnestly desired—the friendship of a refined man of letters. Through it he made the acquaintance of Henry James Pye, who helped to persuade his father that it would be a mistake to force him into a business career, and who introduced him into literary circles. Henceforth his life was passed in the way he best liked—in quiet and almost uninterrupted study. His health was for the most part sufficiently robust, though he was for some years the victim of a nervous depression and weakness, which came upon him when he was about twenty-eight years of age, and which doubtless was chiefly caused by his sedentary habits. He was able to maintain his strenuous and extraordinary devotion to study till he reached the advanced age of seventy-two, when, though still in the enjoyment of unimpaired health, and in the very midst of what would have been his greatest undertaking, he was forced, by paralysis of the optic nerve, to give up work almost entirely. He lived ten years longer, and his death, which took place at his seat at Bradenham House on the 19th January 1848, was due not to old age but to an epidemic which carried him off after a few hours' illness.

Isaac D'Israeli is most celebrated as the author of the *Curiosities of Literature*, by far the best and most popular of all the many works of the kind which have appeared in England. It is a miscellany of literary and historical anecdotes, of original critical remarks, and of interesting and curious information of all kinds, animated by genuine literary feeling, taste, and enthusiasm. The first volume was published anonymously in 1791; and it immediately attained the popularity it deserved. Two years later it was followed by a second volume; it was not, however, till the lapse of twenty-four years that the third made its appearance. Three other volumes were subsequently added, and in the later editions the first two volumes were much improved. With the *Curiosities of Literature* may be appropriately classed D'Israeli's *Miscellanies, or Literary Recreations* (1796), the *Calamities of Authors* (1812), and the *Quarrels of Authors* (1814). Towards the close of his life D'Israeli formed the project of embodying his wide knowledge of English literature in a continuous history; loss of sight, however, prevented him from publishing more than three volumes, which appeared in 1841 under the title of the *Amenities of Literature.* But of all his literary works the most interesting and delightful is his *Essay on the Literary Character* (1795), which, like most of his writings, abounds in illustrative anecdotes. His contribution to the famous "Pope controversy"—in which Bowles and Hazlitt so vigorously attacked, and Byron and Campbell so vigorously asserted, the poetical merit and personal worth of the great poet of the 18th century,—a defence of Pope contained in a criticism of Spence's *Anecdotes* contributed to the *Quarterly Review* (July 1820)—is of interest, both as indicating the nature of his critical views, and as founded upon elaborate study of the life and en of the poet. He also published a slight sketch of Jewi history, and especially of the growth of the Talmud, entitle the *Genius of Judaism*, as well as a few poems in imitatio of Pope, and several novels.

He was, besides, the author of two historical works— brief defence of the literary merit and personal and politic character of James I. (1816), and a work of considerabl research and magnitude entitled a *Commentary on the Li and Reign of King Charles I.* (1828–31). The latter wor was recognized by the University of Oxford, which co ferred upon the author the honorary degree of D.C.L. A an historian D'Israeli is distinguished by two characteri tics. In the first place, he had small interest in politic and no sympathy with the passionate fervour, or adequa appreciation of the importance, of political struggles. An secondly, with a laborious zeal then less common than n among historians, he sought to bring to light fresh histori material by patient search for letters, diaries, and ot manuscripts of value which had escaped the notice previous students. Indeed, the honour has been clai for him of being one of the founders of the modern sc of historical research, whose patient labours have th so much light upon important events and characters.

Of the amiable personal character and the placid l Isaac D'Israeli a charming picture is to be found in brief memoir prefixed to the *Curiosities of Literature*, b his son the earl of Beaconsfield, from which the following may be quoted:—Isaac D'Israeli "was a complete literary character, a man who really passed his life in his library. . . . . He disliked business, and he never required relaxation; he was absorbed in his pursuits. In London his only amusement was to ramble among booksellers; if he entered a club, it was only to go into the library. In the country he scarcely ever left his room but to saunter in abstraction upon a terrace, muse over a chapter, or coin a sentence. . . . . He had by nature a singular volatility which never deserted him. His feelings, though always amiable, were not painfully deep, and amid joy or sorrow, the philosophic vein was ever evident. He more resembled Goldsmith than any man I can compare him to; in his conversation, his apparent confusion of ideas ending with some felicitous phrase of genius, his *naïveté*, his simplicity not untouched with a dash of sarcasm affecting innocence—one was often reminded of the gifted and interesting friend of Burke and Johnson. There was, however, one trait in which my father did not resemble Goldsmith; he had no vanity. Indeed one of his few infirmities was rather a deficiency in self-esteem."

DISTILLATION, a generic term for a class of chemical operations which all agree in this, that the substance operated upon is heated in a close vessel ("retort," "still") and thereby wholly or partially converted into vapour, which vapour is then condensed, by the application of cold, in another apparatus (the "condenser") connected with the vessel, and allowed to collect in a third portion of the apparatus, called a "receiver." In most cases the substance is a liquid, or assumes the liquid form previous to emitting vapours, and the product obtained (the "distillate") is also in greater proportion liquid. The comparatively few and special cases of distillation, wherein solids are converted into vapours which condense directly from the gaseous into the solid form, are designated "sublimations." Thus we speak of the "distillation" of water or of spirits, while we speak of the "sublimation" of sal-ammoniac. Distillations may be divided into two classes—viz., 1st, those which are *not*, and 2d, those which *are*, accompanied by chemical changes. The word "distillation," in a narrower sense, is generally understood to apply to the first class only. The second might be called "destructive distillations," if it were not customary to reserve this term for the particular case in which the substance operated on consists of vegetable or animal matter which is being decomposed by the application of heat alone, *i.e.*, without the aid of re-agents.

The general object of simple distillation is the separation of substances of different degrees of volatility. The apparatus used varies very much according to the nature of the substance operated on and of the product extracted, and according to the scale on which the operation is carried out. Of the various contrivances used in chemical laboratories, the simplest is a glass retort, the descending neck of which is inserted into, and goes to near the bottom of, a slanting globular flask. The retort serves for the reception of the substance to be distilled, and is heated by means of charcoal or gas fire; the vapours pass into the flask, which is kept cool by a continuous current of cold water running over it, or, in the case of more volatile substances, by being immersed in ice or some freezing mixture. This somewhat primitive arrangement works satisfactorily only when the vapours are easily condensible, and when the product is meant to be collected as a whole. In the majority of cases, however, the distillate has to be "fractionated," *i.e.*, collected in a number of separate, consecutive portions; and it is then desirable that the apparatus should be so constructed as to enable one at any moment to examine the distillate as it is coming over. For this purpose it is necessary to condense the vapours on their way to, and not within, the receiver, so that the latter can, at any time, be removed and replaced by another. The condenser most generally used in chemical laboratories is that known as *Liebig's condenser.* It consists of a straight glass or metal tube, 1 to 3 feet long and ½ to 1 inch wide, fitted co-axially, by means of corks or india-rubber tubes, into a wider tube (made of glass or iron) which communicates at the lower end with a water tap, and at the upper with a sink, so that a stream of cold water can be made to run *against* the current of the vapour. The condenser tube is fixed in a slanting position, and the vapours made to enter at the upper end. The dimensions of the condenser and rate of water-flow depend on the speed at which the vapour is driven over, and on the temperature of that vapour, and, last not least, on the *latent heat of the vapour* and *specific heat of the distillate.* To show the importance of the last-named point, let us compare the quantities of heat to be withdrawn from 1 lb of steam and 1 lb of bromine vapour respectively, to reduce them to liquids at 0° C. We have in the case of water and bromine—

	Water.	Bromine.
For the temperature of the vapour......	100°	63°
For the latent heat......................	536°	45°·3
For the specific heat of the liquids......	1°	0°·106
For the total heats of the vapours.......	636°	52°·3

The withdrawal of 52·3 units of heat from 1 lb of bromine vapour reduces it to liquid bromine at 0° C. By the withdrawal of $\left(\frac{100}{63} \times 52{\cdot}3 = \right)$ 83 units from the steam, as an easy calculation shows, only 0·16 lb of liquid water, of even 100°, could be produced—hence *more* than 0·84 lb of steam remains uncondensed (at a temperature of about 96° C., assuming the steam to remain saturated, and to have the temperature of the condensed water). But obviously a condenser under all circumstances is the more efficacious the greater its surface and the thinner its body. It is also obvious, *cæteris paribus*, that the most suitable material for a condenser tube is that which conducts heat best. Hence a metal tube will generally condense more rapidly than one of glass, and for metal tubes copper is better than tin, and silver better than either. In chemical laboratories glass is the only material which is quite generally applicable. In chemical works, on the other hand, glass, on account of its fragility, is rarely used; condensers there, wherever possible, are made of metal, usually fashioned into spirals ("worms") and set in tub-shaped refrigerators. Where acids have to be condensed, stoneware worms are generally employed. In the distillation of acetic acid platinum worms, notwithstanding their high price, have been found to work best, and in the long run to be cheapest.

The theory and successful execution of the process assume their greatest simplicity when the substances to be separated differ so greatly in their volatility that, without appreciable error, one can be assumed to be non-volatile at the boiling point of the other. A good illustration of this special case is afforded by the customary process used for the purification of water. A natural sweet water may in general be assumed to consist of three parts—1st, water proper, which always forms something like 98 per cent. or more of the whole; 2d, non-volatile salts; 3d, gases. To obtain pure water from such material, we need only boil it in a distillation apparatus, so as to raise from it dry steam, which steam when condensed yields water contaminated only with the gases. To expel these all that is necessary is to again boil it for a short time; the gases go off with the first portions of steam, so that the residue, when allowed to cool in absence of air, constitutes pure water. To pass to a less simple case, let us assume that the substance to be distilled is a solution of ether in water, and the object is the separation of these two bodies. Ether boils at 35° C., water at 100° C. The elastic force of saturated steam at 35° is 42 mm., $= \frac{42}{760} = \frac{1}{18}$th of an atmosphere. Assuming now the mixture to be distilled from a flask, what will go on? Neglecting for the sake of simplicity the small tension of the steam at 35°, we should expect that at first the ether would simply boil away, so to speak, from a bath of warm water at 35° C.; that the vapour would be pure ether, and maintain that composition until all the ether had boiled off; then there would be a break—the temperature of the liquid would gradually rise to 100°, and the water then distil over in its turn. And so it is approximately, but not exactly. Our theory obviously neglects some important points. Water at 35° has a tension of $\frac{1}{18}$th atmosphere, ether of one atmosphere; hence the two saturated vapours together should press with a force of $1\frac{1}{18}$th atmosphere—in other words, the mixture should commence to boil at less than 35°. This, however (as in the majority of analogous cases), is not confirmed by experiment. The mixture commences to boil at a little above 35°, and the boiling point rises *steadily* as the proportion of ether in the liquid decreases. Now, *a priori*, we should presume that at every given moment the volumes of ether and water in the vapour should be, approximately at least, proportional to the respective vapour tensions at the temperature at which the mixture happens to boil. Thus, for instance, assuming at the first that the liquid boils at 40° C., when the two tensions are equal to 910 and 55 mm. respectively, the vapour will contain $\frac{910}{910+55} = 0{\cdot}94$ of its volume of ether vapour, and 0·06 of its volume of steam, supposing both substances to have the same chances of forming saturated vapour, which, of course, holds only so long as they both are present in appreciable quantities. We easily see that, as the distillation progresses, the ether vapour must get more and more largely charged with vapour of water, until at last what goes off is *steam*, contaminated with less and less of ether vapour. A thermometer placed near the entrance end of the condenser will, of course, record lower than one plunged into the boiling liquid, because the vapour in rising undergoes partial condensation, and the thermometer being bedewed with the condensed vapour will approximately indicate the boiling point of that dew, *i.e.*, of that which is just going over. The composition of the vapour as above given must not be confounded with the composition by *weight* of the distillate. To obtain the latter we must multiply each of the two volumes by the density of the respective vapour, or, what comes to the same thing, by its molecular weight as expressed by the chemical formula. In our case the vapour volume ratio

$$\frac{\text{water}}{\text{ether}} = \frac{55}{910}$$

corresponds to the weight ratio

$$\frac{55 \times H_2O}{910 \times C_4H_{10}O} = \frac{55 \times 18}{910 \times 74} = \frac{1}{65} \text{ nearly.}$$

This consideration strips of its apparently anomalous character what we observe when vegetable substances containing essential oils are distilled with water, when we find that these oils, although boiling far above 100° C., go over with the first fractions of the water. Take the case of lemon oil, which boils at about 174° C. The molecular weight of the oil is $136 = C_{10}H_{16}$; its vapour tension at 100° is 70 mm. Hence what goes over at first when lemon peel is distilled with water should contain oil and water in the proportion—

$$\overbrace{\overset{\text{Mol. wt.}}{136} \times \overset{\text{Vap. tension.}}{70}}^{\text{Oil of Lemons.}} : \overbrace{\overset{\text{Mol. wt.}}{18} \times \overset{\text{Vap. tension.}}{760}}^{\text{Water.}} = 12 : 17 \text{ (nearly).}$$

The oil, although the less volatile substance of the two, being present in small quantity, but finely diffused, is soon completely driven over. No doubt the latent heats of vaporization of the two constituents have something to do with the composition of the vapour formed, as the chance of every particle of the mixture to be vaporized is obviously the greater the less its latent heat of vaporization.

After what has been said it will be clear that in the distillation of a mixture of two substances of approximately equal molecular weight and latent heats of vaporization, supposing neither to predominate overwhelmingly over the other, the one with the lower boiling point will predominate in the early, and the other will gradually accumulate in the later, fractions of the distillate. And similarly with mixtures of three or more bodies. The further the respective boiling points are removed from one another the more complete a separation can be effected; but in no case is the separation perfect. It is, however, easily seen that the analytic effect of a distillation can be increased by causing the vapour, before it reaches the condenser, to undergo *partial* condensation, when naturally the less volatile parts chiefly will run back. This artifice is largely employed by chemists, technical as well as scientific. The simplest mode is to let the vapour ascend through a long, vertical tube before it reaches the condenser, and to distil so slowly that a sufficiently large fraction of the vapour originally formed fails to survive the ascent through the cooling influence of the atmosphere. A more effective method is to let the condensed vapour accumulate in a series of small receptacles inserted between flask and condenser, constructed so that the vapour cannot pass through the receptacles without bubbling through their liquid contents, and so that the liquid in the receptacles cannot rise above a certain level, the excess flowing back into the next lower receptacle or into the still. But the most effective method is to let the vapour ascend through a slanting condenser kept by means of a bath at a certain temperature, which is controlled so that while the liquid in the flask boils rapidly, the distillation only just progresses and no more.

The general principles thus stated regarding fractional distillation are liable to not a few exceptions, of which the
following may be cited as examples. A solution o
part of hydrochloric acid gas in four parts of wate
(constant) at 110° C.—*i.e.*, 10° above the boiling p
water, although the acid constituent is an almost perm
gas. This, however, is easily explained; there can
doubt that such an acid is a mixture of real hydrate
does not contain either free water or free hydrochlori
A similar explanation applies to the case of aqueous
vitriol, which boils the further above 100° the stronge
although the vapour may be, and in the case of acids c
ing less than 84 per cent. of real acid really is, pure
The following cases, however, can scarcely be dispo
by the assumption of the interference of chemical
Propyl alcohol boils at 97° C., water at 100°; and
mixture of the two, as Pierre and Puchot found,
distilled always commences to boil at 88°·5 with fo
of a distillate of the approximate composition C_3
$2·78H_2O$; and this particular aqueous alcohol boils w
apparent decomposition at 88°·3. Some time later D
and Steuart made a precisely analogous observatio
regard to aqueous allyl alcohol. A strong temptation
to explain these anomalies by the assumption of d
hydrates in the aqueous alcohols, and this hypothesis
serve in the meantime were it not for the curiou
discovered by the two French chemists named, tha
alcohol and water (two liquids which *do not mix*)
distilled simultaneously out of the same retort, go
a constant temperature less than 100°, and with for
of a distillate which, although it is not even a mixtu
a constant composition. The most natural explana
these phenomena is to assume them to be owing
chemical action, but rather to an exceptional abs
chemical affinity between the two components
mixture, which for once gives the physical forces fa

DRY (DESTRUCTIVE) DISTILLATION.—Of the
number of chemical operations falling under this he
can notice only those which are carried out industria
the manufacture of useful products. Of such the
important are those in which wood, coal, shale, and
form the materials operated upon. But as these pro
form so many important industries, which have all
articles devoted to them, we must confine ourselves
summing up shortly the features common to all.

In all cases the "retorts" consist of iron or fi
semi-cylinders placed horizontally in a furnace and
nected by iron pipes with refrigerators, and through
with gas-holders. Within these retorts the materia
brought up, more or less gradually, to a red heat, w
maintained until the formation of vapours prac
ceases. Each of the materials named is a complex
of different chemical species. Wood consists mai
cellulose and other carbo-hydrates, *i.e.*, bodies comp
carbon and the elements of water; in coal and sh
combustible part consists of compounds of carb
hydrogen, or carbon, hydrogen, and oxygen, ric
carbon than the components of wood; bones con
about half of incombustible and infusible phosphate
(bone earth) and half of organic matter, of whi
greater part is gelatine (compounds of carbon, ni
hydrogen, and oxygen), and the lesser is fat (compo
carbon, hydrogen, and oxygen). The chemical dec
tion in each case is highly complex. An infinite va
products is invariably formed, which, however,
readily divide into three:—1st, a non-volatile resid
sisting of mineral matter and elementary carbon (
charcoal," "coke," &c.) which, in the case of
matter, contains chemically combined nitrogen;
part condensible at ordinary temperatures which
readily separates into two distinct layers, viz.:—
aqueous portion ("tar-water"), and (*b*) a semifluid,

oily, or resinous portion ("tar"); and 3d, a gaseous portion.

The "tar-water" is the one, of all the four products, of which the qualitative composition most directly depends on the nature of the material distilled. In the case of wood it has an acid reaction, from the presence in it of acetic acid, which is associated (amongst many other things) with acetone and methyl alcohol. In the case of coal it is alkaline, from ammonia, present as carbonate, sulphide, sulphocyanide, and in other forms. Alcohols and oxygenated acids are absent.

The "tar" is a complex mixture of carbon compounds, all combustible, but, although all directly derived from a vapour, not by any means all of them *volatile*. (Regarding the components, see TAR.) The quantity and quality of the tar naturally depend on the kind of material used, but perhaps yet more on the mode in which the distillation is conducted. Thus, for instance, a coal tar produced at low temperature contains a considerable percentage of paraffins. If, on the other hand, the distillation is conducted at a high temperature, the paraffins are almost absent, while the proportion of benzols considerably increases. A similar remark applies to the gaseous portion, as will readily be understood when we say that *all* volatile tar constituents, when passed through red hot tubes, are decomposed with formation of hydrogen and gaseous hydrocarbons, which latter again, when submitted to the same operation, are all liable to undergo dissociation into simpler compounds and association into more complex.

DISTILLATION OF WATER.—The continual interchange and circulation of water, between oceans and other great reservoirs of water on the one hand and dry land on the other, may be regarded as a process of distillation. Rain is thus a form of distilled water; and when it falls through a pure atmosphere it is found to possess the softness and freedom from dissolved salts characteristic of water artificially distilled. Rain water, however, absorbs a considerable proportion of air and some carbonic acid from the air, and also frequently contains ammonia, salts, and free acids.

Water of that purity which can be secured only by distillation is of indispensable value in many operations both of scientific and industrial chemistry. The apparatus and process for distilling ordinary water are very simple. The body of the still is made of copper, with a head and worm, or condensing apparatus, either of copper or tin. The first portion of the distillate brings over the gases dissolved in the water, ammonia, and other volatile impurities, and is consequently rejected, and scarcely two-fifths of the entire quantity of water can be with safety used as pure distilled water.

Among the innumerable schemes which have been proposed for the production of a potable fresh water from the salt water of the ocean, two or three dependent on simultaneous distillation and aeration have been found, in practice, to produce most satisfactory results. Of course the simple distillation of sea water, and the production thereby of a certain proportion of chemically fresh water, is a very simple problem; but it is found that water which is merely evaporated and recondensed has a very disagreeable empyreumatic odour, and a most repulsive flat taste, and it is only after long exposure to pure atmospheric air, with continued agitation, or repeated pouring from one vessel to another, that it becomes sufficiently aerated to lose its unpleasant taste and smell and become drinkable. The water, moreover, till it is saturated with gases, readily absorbs noxious vapours to which it may be exposed. For the successful preparation of potable water from sea water, therefore, the following conditions are essential:—1st, aeration of the distilled product so that it may be immediately available for drinking purposes; 2d, economy of coal to obtain the maximum of water with the minimum expenditure of fuel; and 3d, simplicity of working parts, to secure the apparatus from breaking down, and enable unskilled attendants to work it with safety. Among the forms of apparatus which have most fully satisfied these conditions are the inventions of Dr Normandy and of Chaplin of Glasgow. While these have met with most acceptance in the United Kingdom, the apparatus of Rocher of Nantes, and that patented by Galié and Mazeline of Havre, have been highly appreciated by French maritime authorities.

Normandy's apparatus, while leaving nothing to be desired in point of economy of fuel and quality of water produced, is very complex in its structure, consisting of very numerous working parts, with elaborate arrangements of pipes, cocks, and other fittings. It is consequently expensive, and requires for its working the careful attention of an experienced workman. It consists of three essential parts, in addition to any convenient form of boiler from which steam under a certain amount of pressure may be obtained. These parts are called respectively the evaporator, the condenser, and the refrigerator. These are all closed cylindrical vessels, permeated internally with sheaves of pipes, through which pipes the steam generated percolates, condenses, and is aerated as explained below. The refrigerator is a horizontal vessel above which the condenser and the evaporator are placed in a vertical position. When the apparatus is in operation the refrigerator and condenser are filled with sea water, and a constant current is maintained which enters by the refrigerator, passes upwards through the condenser, and is discharged by an overflow pipe at a level a little above the top of the condenser. The evaporator is filled only to about two-thirds of its height with water from the condenser, and the admission and regulation of its contents are governed by a stop-cock on the pipe communicating between the two vessels. The vessels being so prepared, superheated steam is admitted by a pipe leading from the boiler into the top of the evaporator, and, passing through the sheaf of pipes immersed in water, is there condensed. The condensed water passes direct from the evaporator into the pipes of the refrigerator, in which it is cooled to the temperature of the surrounding sea water. Here then is produced pure distilled but non-aerated water; and the means by which it is aerated and rendered fit for immediate use may be now traced. The superheated steam in permeating the pipes in the evaporator heats and vaporizes a portion of the water around them. The steam so generated passes into the sheaf of pipes in the condenser, in which, as already explained, a current of water is constantly rising and passing away by the overflow pipe. The condensation of the steam within the pipes, again, communicates a high temperature to the upper stratum of water in the condenser. As water at a temperature of 54°·5 C. parts with its dissolved air and carbonic acid gas, a stream of water is continually rising to the upper part of the condenser at a temperature more than sufficient to liberate these gases, and by means of a pipe these pass over into the upper part of the evaporator, and there mingle with and supersaturate the steam generated in that vessel. Instead, therefore, of it being simply steam which passes from the evaporator to the tubes of the condenser, it is a mixture of steam and gases, the latter being in sufficient quantity not only to supersaturate the steam with which they are mixed, but also fully to aerate the condensed steam which passed direct from the evaporator into the refrigerator. The super-aerated condensed steam passes from the pipes in the condenser into those in the refrigerator, where it meets the non-aerated water from the evaporator pipes, the course of which has already been traced. Here the two products mingle, cool down to the temperature of the sea, and passing outwards through a filter, may be drawn off as pure aerated water of excellent quality. In Dr Normandy's apparatus the combustion of 1 lb of coal yields from 14 to 20 lb of potable water. The apparatus is extensively adopted in the British navy, the Cunard line, and many other important emigrant and mercantile lines.

Chaplin's apparatus, which was invented and patented later, has also, since 1865, been sanctioned for use on emigrant, troop, and passenger vessels. The apparatus possesses the great merit of simplicity and compactness, in consequence of which it is comparatively cheap and not liable to derangement. In addition to a boiler for generating steam from sea water the apparatus consists of an aerator, a condenser, and a filter. The condenser is a cylinder, usually of cast iron with an internal worm pipe of copper, which is found to be the only really suitable metal for this use. The steam to be condensed is admitted to this worm or coil through the aerator. This part of the apparatus—the aerator—is really the essential feature in the invention, and consists simply of a series of holes perforated around the steam inlet pipe at the point where it enters the condenser. The steam passing down in a powerful jet draws with it through these holes a proportion of atmospheric air sufficient to properly aerate the water for drinking purposes. The steam and air thoroughly commingled are together condensed as they pass through the coils of the worm,—cold sea water passing in to the condenser at its lowest end, and rising upwards and flowing away at the top. After passing through the filter placed directly under the condenser, the aerated water is delivered or stored ready for use, clear, bright, colourless, palatable, and devoid of odour, at a temperature of about 15° C. The cold sea water for condensing may be forced into the condenser by a special steam pump attached to the apparatus—a plan usually followed on sailing vessels—or any other convenient pumping arrangement may be resorted to. The steam for condensation is, in steamers, frequently supplied from the engine boilers; but generally it is preferable to employ a special small upright boiler, or to use the boilers attached to steam winches. Chaplin's apparatus has been adopted by many important British and Continental shipping companies, among others by the Peninsular and Oriental, the Inman, the North German Lloyd, and the Hamburg American Companies.

Distillation of Spirits.—Notwithstanding the enormous scale on which this industry is now prosecuted, it is only in modern and comparatively recent times that it has attained to the important position which it now occupies. The art of separating alcoholic spirit from fermented liquors appears, however, to have been known in the far East from the most remote antiquity. It is supposed to have been first known to, and practised by, the Chinese, whence a knowledge of the art gradually travelled westward. A rude kind of still, which is yet employed, has been used for obtaining ardent spirits in Ceylon from time immemorial. The name alcohol indicates that a knowledge of the method of preparing that substance probably came to Western Europe, like much more chemical knowledge, through the Arabs. Albucasis, who lived in the 12th century, is spoken of as the first Western philosopher [illegible] the art of distillation as applied to the [illegible] spirits, and in the 13th century Raymond Lully was not only well acquainted with the process, but also knew the method of concentrating it into what he denominated [illegible] by means of potassic carbonate. At the time when Henry II—in the 12th century—invaded and conquered Ireland, the inhabitants were in the habit of making and using an alcoholic liquor—usqueb (*uisge-béatha*, water of life), a term since abbreviated whisky, which consequently is synonymous with classical *aqua vitæ*. It is further a noticeable fact Captain Cook found, among the inhabitants of the Pac Islands discovered by him, a knowledge of the art distilling spirit from alcoholic infusions.

The preparation of ardent spirit involves two sepa series of operations:—1st, the making of an alcoholic solut by means of vinous fermentation; and 2d, the concentra of the alcoholic solution so obtained by the process of tillation and rectification.

All substances in nature which contain sugar in an its forms are susceptible of undergoing vinous fermentat and may therefore be used as sources of alcohol. Furt all starchy substances and ligneous tissue, seeing tha various chemical processes starch and cellulose may converted into grape sugar, may also be used for the paration of alcohol. It is thus obvious that the variet organic substances, especially of the vegetable kingd from which alcohol may be elaborated is almost endl and in practice it is found that the sources employed very numerous. Commercially, distilled alcoholic liq are manufactured of varying strength, or proportio alcohol to water, according as the spirit is intended used for drinking purposes or for employment in the The standard by which excise duty on alcoholic liqu charged in Great Britain is proof spirit, in which alcohol and water are in almost equal proportion weight, there being in 100 parts 49·24 of absolute alco and 50·76 of water. Distilled spirits are said to be "o proof" when the proportion of alcohol is greater, "under proof" when there is more water present th indicated by "proof." Thus a spirit 11 over proof (o. is a compound which requires the addition of 11 vol of water to every hundred to reduce it to proof streng and similarly 10 under proof (u.p.) indicates a liquor fr every 100 gallons of which 10 gallons of water must withdrawn to bring it to proof strength. Spirit for dri ing is seldom sold at more than 11 over proof, from wh it varies downward to 25 and more under proof. R however, is manufactured and imported as highly conc trated as from 10 to 43 over proof. Spirit of wine as in the arts must be at least 43 over proof, and generall is sold at from 54 to 64 over proof.

The alcoholic liquors enumerated below are those commonly distilled for drinking or medicinal purpo Brandy, when genuine, is a spirit chiefly distilled in Fra from wine. Rum is made from molasses or treacle, and distilled in the West Indies, and generally in all countr where the sugar cane is cultivated. From ferment infusions of grain, malted and unmalted, and chiefly fr barley, whisky is distilled, and that spirit when "silen or flavourless is the basis of flavoured spirits, such as and factitious or British brandy. Arrack is an Orien spirit distilled from "toddy," or the fermented juice certain palm trees, and also from rice, which grain is t source of saké, the national spirit of the Japanese. Pot brandy is very extensively prepared from the fecula potatoes in Germany and Russia, and is a spirit much for fortifying wines, and for making factitious wine, as well as in the arts. Beet root, carrots, Jerusalem artichokes, and several other saccharine roots are also used for the distillation of spirit on a commercial scale. The only example of a spirit drawn from animal sources is the koumiss of the Tartars, which is distilled from the fermented milk of mares.

The modifications of stills or of distilling apparatus used in the preparation of alcoholic liquor are exceedingly numerous, and many of the later inventions are of most

:d structure. The simple and primitive varieties :us yield only a comparatively weak spirit on the lation, while the effect of the complex appliances ally used is to produce, in one operation, a highly ted spirit, and that with a great saving of fuel, . labour. All varieties of distillatory apparatus emselves under these heads:—1st, stills heated and y the direct application of the heat of a fire; 2d, ed by the action of steam blown direct into the solution from a steam boiler; and 3d, stills heated passing in coiled pipes through the alcoholic to be acted upon.

first of these classes—stills heated by direct fire— e earliest and simplest forms of distillatory ; and for producing particular classes of alcoholic ills very simple in their construction are yet . The common still is a flat-bottomed, close opper, with a high head to prevent the fluid within rer. To the top of this head a tube is connected, carried in a spiral form round the inside of a tub (the condenser or refrigerator), filled with cold d from its twisted form this tube receives the the "worm." The tube terminates at the bottom rrel, passing through it to the outside, and is con- to the vessel termed the receiver, a stopcock, or monly a vessel termed a "safe," being usually placed be where it leaves the refrigerator. In distilling pparatus of this simple construction, it is obvious he beginning of the operation, when the wash or be distilled is rich in alcohol, and its boiling sequently low, the distillate will pass over at a erature and contain a high percentage of alcohol. he operation progresses, the boiling point of the n the still rises, the heat has therefore to be forced, quantity of watery vapour which passes over with ol is proportionately increased. As the wash or the still continually weakens, a point is arrived the value of the weak distillate produced will not he expenditure on fuel for maintaining the heat ation.

the earliest devices for economizing the heat of n consisted in interposing between the still and gerator a wash warmer, or vessel charged with dy for distillation. Through this vessel the pipe g the hot vapours to the refrigerator coil passed, vapours, partly condensing there, heated up the ich was thus prepared to pass into the still at an temperature. The "pot" stills, in which the flavoured Irish whisky is made, are of this con- . In the great establishment of the Banagher Company, King's co., Ireland, simple stills of a of 20,000 gallons are erected having a rousing within them to keep the wash in agitation so as t solid particles from settling on the bottom and

Beyond a wash warmer, or intermediate charger d between the still and the condenser, there is no pliance attached to the apparatus. The first dis- m the still is termed "low wines," and passes into r wines receiver," whence it passes into No. 1 ne still" to undergo a second distillation. The of the second distillation, under the name of r feints," is caught in the "faints receiver," from passes to No. 2 low wines still, and from this it ged as Irish whisky.

troduction of another principle into distillatory is illustrated by Dorn's still, which was intro- o Germany in the early part of the century, and ch used in smaller establishments in that country. pparatus the vessel, of copper, interposed between nd the condenser is divided horizontally into two unequal compartments by a diaphragm of copper. The upper and larger portion acts as a wash warmer (German, *Vorwärmer*), and through it the pipe from the still body coils, opening into the lower division. For a time the whole distillate condenses in this division, but as the temperature of the wash in the upper division rises, and the heat of the more watery distillate from the still also increases, the condensed liquor in the lower division in its turn begins to boil, and undergoes a second distillation or rectification, the vapours from it passing onwards to be condensed in the ordinary refrigerator. In many forms of distillatory apparatus two or more such rectifiers are placed between the primary still and the final condenser. The principle of the rectifier is easily understood. Supposing the operation of distilling to commence, the vapours which condense in rectifier No. 1 are much richer in alcohol than the liquid remaining in the still. The boiling point of the condensed liquid is consequently proportionately lower, and the vapour from the still passing into it gradually raises it to the boiling point, so that in its turn rectifier No. 1 distills into rectifier No 2 a liquid of still higher alcoholic richness. The relation of No. 2 to No. 1 is the same as that of No. 1 to the still body, and thus the concentration and redistillation might be carried on to any practicable or desired extent.

Another principle brought into play in complex stills for the separation of stronger from weaker alcoholic solutions consists of dephlegmation, or the submitting of the vapour to a temperature so regulated that a portion of it, and that of course the most watery, is condensed and separated, running back into the still or into a special vessel, whilst the richly alcoholic vapour passes on to the rectifier or condenser. In Dorn's still the wide and lofty head attached acts as a dephlegmator, watery vapours condensing on it, and thence falling back into the body; but in the more recent forms of apparatus—such as those of Pistorius and Siemens—special dephlegmators of an elaborate nature are introduced.

Of the second class of stills—those in which the operation is conducted by the heat of steam generated in a boiler, and forced into the apparatus—the Coffey still may be taken as an example. It is the form most frequently adopted in Great Britain for the manufacture of "silent" spirit, and it is generally recognized as the best and most economical device for preparing a highly concentrated spirit in a single operation. The Coffey still may further be regarded as a type of continuous distilling apparatus, as in it the necessity for withdrawing exhausted solutions and recharging the still with fresh wash is avoided. Beginning, as the Coffey still does, with the steam of pure water, the principle of rectification formerly alluded to is here carried out from the first step. The watery vapour becomes more and more highly charged with alcoholic fumes, till in the end the strongest spirit falls, condensed, into the receiver. In Coffey's apparatus the wash is exposed in a series of shallow chambers, placed one over the other, to the vapour of steam, which rises through the perforated bottoms of each chamber, and carries off the alcoholic vapours into the condenser. This condenser also consists of a series of chambers separated from each other by perforated plates, and is so contrived that the cold wash passing in pipes through these chambers, in its way to feed the other series of chambers, acts as the condenser to the vapour of the alcohol, the wash being gradually heated thereby, as it passes through the successive chambers. The still, therefore, consists essentially of three separate but connected parts. The first is a large square receiver at the base, which receives the spent wash after it has been deprived of its alcohol by passing through the series of evaporating chambers; the second, a large, square, upright box, termed an "analyzer," contains the series of evaporating chambers, each communicating with the one below by means of a valved tube, which allows fluid to escape from the upper to the lower chamber only, and having the dividing partition of each chamber perforated with fine apertures, to allow the steam which is admitted from below to pass from chamber to chamber through the shallow layer of wash of each. A safety or escape valve is also fitted to each chamber. The already heated wash enters the uppermost of these chambers in a continuous regulated stream, is gradually deprived of its alcohol by the steam as it passes from chamber to chamber, and at last escapes into the lower large receiver, from which it flows off after attaining a certain depth. The third part of the apparatus also consists of a square upright box, termed a "condenser," divided into compartments by means of finely perforated plates, and in each chamber is a link of the tube which carries the cold wash onwards to supply the evaporating chambers just described. The alcoholic vapours escaping from the uppermost of the evaporating chambers are carried by pipes to the lowermost of these chambers, and are partly condensed by each successive chamber being colder than the one below it, in consequence of the wash entering the pipes from above, and only getting gradually heated by contact with the alcoholic vapour as it advances from chamber to chamber. As in the lowest of these chambers the heat is greatest, the alcoholic vapour or the condensed spirit contains a large amount of water; but as the chambers are successively cooler, the alcoholic vapour and condensed spirit at last arrive at a temperature only sufficient to convert spirit of the strength wished into vapour, and by an adaptation of valves, the substitution of an impervious partition for the perforated plate, and the admission of the alcoholic vapour into the chambers cooled by the passage of the cold wash in its contained pipes, that spirituous vapour is condensed, and the spirit is drawn off at one operation, of the very strength which it ought to have, and of the utmost purity.

Flat-bottomed and fire-heated stills are considered the best for the distillation of malt spirit, as by them the flavour is preserved. Coffey's still, on the other hand, is the best for the distillation of grain spirit, as by it a spirit is obtained almost entirely destitute of flavour, and of a strength varying from 55 to 70 over proof. Spirit produced of this high strength evaporates at such a low temperature that scarcely any of the volatile oils on which the peculiar flavour of spirits depends are evaporated with it, hence the reason why it is not adapted for the distillation of malt whisky, which requires a certain amount of these oils to give it its requisite flavour. The spirit produced by Coffey's still is, therefore, chiefly used for making gin and factitious brandy by the rectifiers, or for being mixed with malt whiskies by the wholesale dealers.

As the preparation of alcoholic spirit is the most important industry in which the operation of distillation occupies a prominent place, the establishments in which the manufacture is conducted are known as distilleries. But there are many other important industries in which distillation is an essential feature, being in them employed either for the separation, purification, or concentration of various products. A large proportion of the essential oils are, for example, obtained by the distillation of the substances containing them from water or a mixture of salt and water. The treatment of other bodies in which distillation plays a part will be found under their respective headings. (W. D.—J. PA.)

DISTRESS is one of the few cases in which the law still permits an injured person to take his remedy into his own hands. Other instances mentioned in the text-books are self-defence in the case of a personal assault, the
reseizure of property wrongfully taken away, th
of nuisances, &c. Distress differs from these
remedy for what is really a breach of contrac
the only case of the kind in which such a reme
It is the right which the landlord has of
personal chattels of his tenant for non-paym
Cattle *damage feasant* (doing damage or tresp.
a neighbour's land) may also be *distrained*,
detained until satisfaction be rendered for the
have done. The cattle or other animals thus
are a mere pledge in the hands of the injured
has only power to retain them until the owne
make satisfaction for the mischief they have done
for rent was also at one time regarded as a me
security; but the remedy, having been found t
and efficacious, was rendered more perfect by
allowing the thing taken to be sold. Blackston
the law of distresses in this respect "has b
altered within a few years last past." The le
fact, converted an ancient right of personal re
powerful remedy for the exclusive benefit of a
of creditors, viz., landlords. Now that the
landlord and tenant in England has come to
as purely a matter of contract, the language
books seems to be singularly inappropriate. Th
tenant is a "wrong-doer," the landlord is th
party;" any attempt to defeat the landlord's
carrying off distrainable goods is denounced as
and knavish." The operation of the law has,
point out, been mitigated in one important
recent Act, but it still remains an almost uniq
of one-sided legislation.

At common law distress was said to be inci
service, and by particular reservation to rent c
by 4 Geo. II. c. 28 it was extended to *rent*
assize, and chief rents (see RENT.) It is
general remedy for rent certain in arrear.
chattels are distrainable with the following exc
things in which there can be no property, as
naturæ; 2, things in actual use; 3, things d
person following a public trade, as a horse sent
&c.; 4, things already in the custody of the la
unless placed in a sealed bag; 6, things whi
restored in as good a plight as when distrained
8, beasts of the plough and instruments of h
instruments of a man's trade or profession.
tions, it will be seen, imply that the thing di
be held as a pledge merely—not to be sold.
imply that in general any chattels found on
question are to be available for the benefit of
whether they belong to the tenant or not. T
worked with peculiar harshness in the case
whose goods might be seized and sold for the
the rent due by their landlord to his superi
Now, however, by the Lodgers' Goods Protec
and 35 Vict. c. 79), where a lodger's goods ha
by the superior landlord the lodger may serve
notice stating that the intermediate landlord h
in the property seized, but that it is the prope
lawful possession of the lodger, and settin
amount of the rent due by the lodger to hi
landlord. On payment or tender of such rent
cannot proceed with the distress against the g
tion. And originally the landlord could only
actually on the premises, so that the reme
defeated by the things being taken away. B
c. 14, and 11 Geo. II. c. 19, he may follow t
lently or clandestinely removed off the pre
thirty days after their removal, unless they
the meantime *bona fide* sold for a valuable c

The sixth exception mentioned above was held to extend to sheaves of corn; but by 2 Will. and Mary c. 5, corn, when reaped, as well as hay, was made subject to distress.

Excessive or disproportionate distress exposes the distrainer to an action, and any irregularity formerly made the proceedings void *ab initio*, so that the remedy was attended with considerable risk. The statute 11 Geo. II. c. 19, before alluded to, in the interests of landlords, protected distresses for *rent* from the consequences of irregularity. In all cases of distress for rent, if the owner do not within five days replevy the same with sufficient security, the thing distrained may be sold towards satisfaction of the rent and charges, and the surplus, if any, must be returned to the owner. To "replevy" is when the person distrained upon applies to the proper authority (the registrar of the county court) to have the thing returned to his own possession, on giving security to try the right of taking it in an action of replevin.

Duties and penalties imposed by Act of Parliament are sometimes enforced by distress.

DISTRIBUTION

THE subject specially discussed under this heading is the Distribution of Life, Animal and Vegetable, in Space and Time.

So long as each species of organism was supposed to have had an independent origin, the place it occupied on the earth's surface or the epoch where it first appeared had little significance. It was, indeed, perceived that the organization and constitution of each animal or plant must be adapted to the physical conditions in which it was placed; but this consideration only accounted for a few of the broader features of distribution, while the great body of the facts, their countless anomalies and curious details, remained wholly inexplicable. But the theory of evolution and gradual development of organic forms by descent and variation (some form of which is now universally accepted by men of science) completely changes the aspect of the question and invests the facts of distribution with special importance. The *time* when a group or a species first appeared, the *place* of its origin, and the area it now occupies upon the earth, become essential portions of the history of the universe. The course of study initiated and so largely developed by Mr Darwin has now shown us the marvellous interdependence of every part of nature. Not only is each organism necessarily related to and affected by all things, living and dead, that surround it, but every detail of form and structure, of colour, food, and habits, must—it is now held—have been developed in harmony with, and to a great extent as a result of, the organic and inorganic environments. Distribution becomes, therefore, as essential a part of the science of life as anatomy or physiology. It shows us, as it were, the form and structure of the life of the world considered as one vast organism, and it enables us to comprehend, however imperfectly, the processes of development and variation during past ages which have resulted in the actual state of things. It thus affords one of the best tests of the truth of our theories of development; because, the countless facts presented by the distribution of living things in present and past time must be explicable in accordance with any true theory, or at least must never directly contradict it.

From these indications of the scope and bearing of the subject, it will be seen that its full and adequate treatment would require volumes, and would necessarily involve an amount of details only suited to specialists in the various branches of natural history. All that can be attempted here is to give such a general sketch of the whole subject as to place the reader in possession of the main results arrived at, and enable him to comprehend the bearing of the more detailed information he may meet with elsewhere.

Arrangement of the Subject.—The three great heads under which the various matters connected with distribution may be classed are—1st, the geographical distribution of living organisms; 2d, the geographical distribution of extinct organisms; and 3d, the geological succession of the chief forms of life. Owing, however, to the fact that the study of animals and of plants form very distinct sciences, and that there are special peculiarities in the phenomena presented by each which require to be carefully discriminated, it is found to be necessary to make a primary division of the subject into the distribution of animals and of plants respectively.

DISTRIBUTION OF ANIMALS.

The distribution of living animals in space naturally forms the first division of our subject, both because the phenomena are simpler and better known, and because it puts before us the main problems and difficulties to the solution of which the other divisions furnish the key. Animals may be roughly divided into two great series, broadly distinguished as regards their mode of life—the terrestrial and the aquatic; and for the purpose of our present study these divisions are of primary importance, because that element which limits the range of the one class offers a free passage to the migrations of the other, and *vice versa*. The first series is by far the most important. It is the best known, and includes almost all the higher animals; while the variety and interest of the various land divisions of the globe are far greater than in the case of that portion of its surface covered by water. We shall therefore consider first, and with a greater amount of detail, the distribution of land animals, including among them the fresh-water forms whose range is limited by the same general conditions.

THE GEOGRAPHICAL DISTRIBUTION OF LAND ANIMALS.

As soon as we begin to examine into the distribution of animals over the land surface of the globe, we meet with two very distinct and sometimes conflicting classes of facts, which may be conveniently grouped as *climatal* and *geographical* distribution. The first is the most obvious, and was long considered to be the most essential, since we find that not only many species, as the polar bear and musk sheep, are strictly limited to cold countries, and others, as the tapir, to warm, but that entire groups, as the sheep on the one hand and the trogons on the other, seem almost equally dependent on temperature. But when we come to compare the productions of the several continents, we find a set of differences in which climate appears to play no part. Thus, almost the whole of the warblers (*Sylviidæ*) of Europe and North Asia are absent in similar climates in North America, their place being taken by a totally distinct family, the wood-warblers (*Mniotiltidæ*); the ant-eaters, sloths, and tapirs of tropical America are replaced in tropical Africa by aard-varks (*Orycteropus*), lemurs, and hippopotami; while islands like Borneo and New Guinea, situated in the same ocean not very far apart, and whose climates and physical conditions are, as nearly as possible, identical, are yet as radically different in their chief forms of animal life as are remote countries situated respectively in the cold and tropical zones. It is evident then, that although climate has a certain amount of influence on the distribution of animal forms, yet geographical conditions are far more important. There is reason to believe that the direct action of climate on animal life is far less effective than its indirect action through the limitation of the variety and quantity of vegetable and insect food; whereas geographical isolation has led to diversity of type by its influence on development during successive ages, as pointed out by Mr Darwin (*Origin of Species*, 6th ed. p. 81, 83.) It follows that zoological regions, or those primary divisions of the earth characterized by distinct assemblages of animals, will, for the most part, coincide with natural geographical divisions. They do not, however, conform to the actual divisions of our geographies, because these are often political or ethnographical, rather than physical—as in the separation of Europe from Asia. In another case, the coincidence of a mountain chain (the Himalayas) and the plateau of Thibet, with the demarcation of the tropical and temperate zones, forms a zoological division across a continent almost as complete as would be effected by a considerable extent of ocean.

Vertical Distribution of Animals.—Besides the horizontal distribution dependent on the various causes just indicated, the range of animals is more or less determined by the altitude of the land surface above, or its depth below the sea-level. As we ascend lofty mountains, the forms of life change in a manner somewhat analogous to the changes observed in passing from a warm to a cold country. This change is, however, far less observable in animals than in plants; and it is so unequal in its action, and can so frequently be traced to mere change of climate and deficiency of food, that it must rank as a phenomenon of secondary importance. Vertical distribution among animals will be found in most cases to affect species rather than generic or family groups, and to involve in each case a mass of local details which can hardly be introduced in a general sketch of the whole subject of distribution. The same remarks apply to the bathymetrical zones of marine life. Many groups are confined to tidal, or shallow, or deeper waters; but these differences of habit are hardly "geographical," but involve details, suited rather to the special study of individual groups than to such a general outline of the distribution of the animal kingdom as we are here attempting to lay before our readers.

Powers of Dispersal of Animals.—Animals differ greatly in their powers of dispersal or migration; and this is an important element in determining the causes of their actual distribution. Mammalia as a class are more limited in this respect than birds; because the former have no means of passing over seas and oceans, or, with few exceptions, over lofty mountains or arid deserts, all of which when of moderate width can be easily traversed by many birds. Reptiles in their adult state are almost as restricted in their powers of dispersal as mammals, but most of them being oviparous, their eggs may be floated on drift wood over seas and straits, or even, in rare cases, be carried by birds; whereas the young of mammalia are for some time wholly dependent on their parents. Amphibia and fresh-water fishes have yet another advantage, that many of them can endure great cold, and their ova may sometimes be frozen without injury. Thus floating ice becomes an important agent in their dispersal, and enables us to account for the curious fact that their distribution often differs in a remarkable manner from that of the three higher classes of vertebrates. When we come to insects, we find the power of dispersal (as regards land animals) at a maximum; for not only can they travel by almost every mode available to other groups, but their small size, low specific gravity, and (in many cases) great tenacity of life, give them altogether exceptional advantages in this respect. Th
carried for great distances through the air
storms; and there is evidence to show that
islands have been thus stocked, and that man
groups owe their extensive range to this ca
can float uninjured for many days at sea; wh
or larvæ, inclosed in crevices of tree-trunks
under bark, may be carried for hundreds or ev
of miles by surface currents across extensive s
Geographical Distribution of Animals, vol
209–214). The fact, then, that these small c
often a more extensive range, and present grea
in their distribution, than larger animals, is
might expect; and if we keep their unusu
dispersal ever present to our minds, we sha
account for most of the anomalies they pres
bring them under the same general classific
phenomena of distribution which is most
studying the history of the higher animals.

But the actual power of dispersal is by
only factor in determining the distribution
or a group. It is no use to bring a c
new country if it cannot live and maintain
Whether it can do so depends upon many
must be able to adapt itself to a different
generally to different physical conditions; it
to live upon whatever food it may find in it
and, most important of all, it must be able to
against new kinds of enemies and to live in s
petition with allied organisms which are
possession of the soil.

Wide-spread and Local Groups.—There is
to believe that the last-mentioned condition
difficult for an intruder to fulfil, and that a
tion of the immigrants which from any caus
new country, are unable to maintain themse
because the country itself is not well ada
wants, but solely because it is already occu
creatures somewhat better adapted to all the
conditions. Hence arise the phenomena of
dominant species, and others which are exc
and often rare, that is, consisting of but a s
individuals. The former are best adapted
environment, and are generally increasing t
and area of distribution; the latter are
adapted, and probably diminishing in numbe
road to final extinction. The power of adap
generally speaking, to be in an inverse ratio
of dispersal. The larger mammalia and m
capable of enduring a great variety of climate
maintaining themselves in many new countri
tion with the native inhabitants. Thus hors
from the Old World have run wild and greatly
both North and South America, and are proba
existing in any country where there is a suffic
uncultivated land. Insects, on the other ha
dependent on some one kind of vegetable food,
liable to injuries by climate, and unless ve
would be liable to be at once exterminat
various enemies.

Barriers which Limit the Distribution of Ani
are of many kinds, and affect the several grou
degrees. The nature of the vegetation alo
the range of a number of animals. Deserts,
plains, and especially forests, have each t
inhabitants which can hardly stray far beyon
This is particularly the case with the tropical
perennial foliage and almost perennial success
and fruits supply the wants of an immens
peculiar forms of life. These forests are, in f

all that is most characteristic of the tropics, and their limits form the dividing lines between very distinct faunas. Rivers, when very large, also determine the range of many species, but this is probably because their valleys have been once arms of the sea separating districts with somewhat different faunas. Mountains, when rising to a great height in unbroken ranges, form an impassable barrier to many groups; but their geological age is also an important factor, and they are seldom so ancient and so continuous as to form absolute barriers. Climate, whether determined by latitude or by elevation above the sea, is also a very effective barrier, though probably its action is indirect, and is determined by its influence on vegetation, and by bringing diverse groups into competition. The limits of the tropical and temperate zones, generally marked out by more or less extensive deserts, form the boundary between regions or sub-regions all round the globe. Oceans are, however, by far the most important barriers; and this is due not only to their great extent and general impassability to land animals, but also to their enormous antiquity, so that for countless ages they have separated the faunas of remote continents from each other.

In accordance with these principles, it is found, that continents separated by the widest and deepest oceans differ most radically in the entire series of their animals; while those which are less completely separated, or which are only divided by climatal differences or by mountain ranges, are less unlike in their chief forms of life. Thus are constituted zoological regions, which represent the most permanent geographical features of the globe, and afford us an indication of that permanence in the isolation and peculiarity of their animal inhabitants.

Zoological Regions.—Although there is some difference of opinion as to the number and limits of the primary divisions of the earth termed regions, the following are now generally admitted to be the most satisfactory. They are nearly identical with those first proposed by Mr P. L. Sclater in 1857.

1. The Palæarctic Region, which includes all Europe to the Azores and Iceland, all temperate Asia from the high Himalayas and west of the Indus, with Japan, and China from Ningpo and to the north of the watershed of the Yang-tse-kiang; also North Africa and Arabia, to about the line of the tropic of Cancer. This may be popularly called the European region, Europe being the richest and most varied portion of it, and containing representatives of all the more important types; but it must not be forgotten that the region includes a much larger area in Asia, and that there are many peculiar North Asiatic animals.
2. The Ethiopian Region, which includes all Africa south of the tropic of Cancer, as well as the southern part of Arabia, with Madagascar and the adjacent islands. It may be popularly termed the African region.
3. The Oriental region, which is comparatively small, including India and Ceylon, the Indo-Chinese countries and southern China, and the Malay Archipelago as far as the Philippines, Borneo, and Java. It may be popularly called the South Asiatic or Indian region.
4. The Australian Region, which is composed of the remainder of the Malay Archipelago, Australia, New Zealand, and all the tropical islands of the Pacific, as far east as the Marquesas and the Low Archipelago.
5. The Neotropical Region, which comprises the whole of South America and the adjacent islands, the West Indies or Antilles, and the tropical parts of Central America and Mexico. It may be well called the South American region.
6. The Nearctic region, which consists of all temperate and arctic North America, with Greenland, and is thus well described as the North American region.

These six regions, although all of primary importance from their extent, and well marked by their total assemblage of animal forms, vary greatly in their zoological richness, their degree of isolation, and their relationship to each other. The Australian region is the most peculiar and the most isolated, but it is comparatively small, and poor in the higher animals. The Neotropical region comes next in peculiarity and isolation, but it is extensive and excessively rich in all forms of life. The Ethiopian and Oriental regions are also very rich, but they have much in common. The Palæarctic and Nearctic regions, being wholly temperate, are less rich, and they too have many resemblances to each other; but while the Nearctic region has many groups in common with the Neotropical, the Palæarctic is closely connected with the Oriental and Ethiopian regions. The cause of these various resemblances and differences depends on the past history of the earth, and will be better understood when we have sketched the zoological features of each region and the changes they have undergone in the latest geological periods.

I. *The Palæarctic Region.*—This extensive region, though varied in physical aspect, and often covered with luxuriant vegetation, is poor in animal life when compared with the great tropical regions of the Old and New Worlds. This is no doubt due mainly to climate, but also in part to so much of its surface being densely populated and highly cultivated. It contains, however, a number of characteristic and not a few altogether peculiar animal forms. Beginning with the Mammalia, we have first the sheep and goats with such allied forms as the chamois and saiga-antelope, which are especially characteristic; deer are abundant and varied; the smaller cats, the wolves, the foxes, and the bears abound, with a variety of smaller groups, as weasels, badgers, and some otters. Seals are plentiful on the northern coast, and even in the Black and Caspian Seas; wild horses and asses abound in Asia, as they once did in Europe; there are many peculiar forms of mice, voles, and hamsters; while dormice, squirrels, marmots, hares, and pikas are well-marked features of the region. The insectivorous family of the moles is almost peculiar, as are the curious mole-rats (*Spalax*). The genera which are peculiar to the Palæarctic region belong to the following families:—to the moles (*Talpidæ*) 7 genera; to the dogs (*Canidæ*) 1 genus; to the weasels (*Mustelidæ*) 3 genera; to the pandas (*Æluridæ*) 1 genus; to the seals (*Phocidæ*) 1 genus; to the camels (*Camelidæ*) 1 genus; to the deer (*Cervidæ*) 6 genera; to the hollow-horned ruminants (*Bovidæ*) 7 genera; to the rats (*Muridæ*) 6 genera; to the mole-rats (*Spalacidæ*) 2 genera; to the *Octodontidæ*, a peculiar group of rat like animals only found in South America, Abyssinia, and North Africa, 1 genus.

In birds, the Palæarctic region is pre-eminently rich in thrushes, warblers, titmice, jays and magpies, sparrows, and buntings. It also abounds in grouse, and in its eastern half in magnificent pheasants. Water-birds are plentiful, and its northern districts produce many fine ducks and divers. The following enumeration of the families of which the Palæarctic region possesses peculiar genera will help to give an idea of the characteristic features of its ornithology:—Of the warblers (*Sylviidæ*) 15 genera, many of which, however, migrate into tropical Africa and India in winter; of babblers (*Timaliidæ*) 1 genus; of reedlings (*Panuridæ*) 4 genera; of creepers (*Certhiidæ*) 1 genus; of tits (*Paridæ*) 1 genus; of the crow family (*Corvidæ*) 4 genera; of finches and buntings (*Fringillidæ*) 12 genera; of starlings (*Sturnidæ*) 1 genus; of larks (*Alaudidæ*) 2 genera; of sand-grouse (*Pteroclidæ*) 1 genus; of grouse (*Tetraonidæ*) 4 genera; of pheasants (*Phasianidæ*) 5 genera; of vultures (*Vulturidæ*) 1 genus; of rails (*Rallidæ*) 1 genus; of snipes (*Scolopacidæ*) 4 genera; of coursers (*Glareolidæ*) 1 genus; of bustards (*Otididæ*) 1 genus.

Of the remaining groups less accurate information is obtainable, and their distribution is less generally interesting. Reptiles, being heat-loving animals, are comparatively scarce, yet in the desert regions they are more plentiful and furnish a considerable number of peculiar types, there being two genera of snakes and four of lizards not found in any other region. All reptiles diminish rapidly as we go north, and cease before we reach the Arctic circle. The common viper reaches 67° N. lat. in Scandinavia, the northern limit of reptiles in the region. Amphibia are much more patient of cold, the common frog ranging to the extreme north of Europe. There are no less than 16 peculiar genera of Amphibia, 8 of the tailed and 8 of the tailless group, the most remarkable being the *Proteus*, found only in subterranean lakes in Carniola and Carinthia.

Of fresh-water fishes about 20 genera are wholly confined to the region, of which the perches (*Percidæ*) have 3 genera; the salmons and trout (*Salmonidæ*) 3 genera; the carp (*Cyprinidæ*) 13 genera; with a peculiar genus and family (*Comephorus*) found in Lake Baikal, and another (*Telia*) belonging to the *Cyprinodontidæ*, in the Atlas Mountains.

Insects are so extensive a class that the barest enumeration of their most remarkable forms would be out of place in such a sketch as this. We can only mention that, although butterflies are not very numerous, yet no less than 15 genera are peculiar to the region. Beetles, however, abound, and the most characteristic Palæarctic group is undoubtedly the *Carabidæ*, or predaceous ground-beetles, which are more predominant here than in any other region, and are also of larger average size—a most unusual circumstance in the insects of a temperate as compared with those of tropical regions.

Land shells are tolerably numerous both in species and individuals, but are of small size and little beauty as compared with those of warmer countries. Very few of the genera are peculiar.

The total number of the generic forms of Vertebrata peculiar to the Palæarctic region is, as nearly as can be estimated, 138,—a very large number when we consider the general severity of the winter, and the circumstance that along its whole southern margin this region is bounded by tropical lands with no absolute barrier against intermigration. The amount of peculiarity may be even better estimated by the fact that, out of a total of 274 genera of Mammalia and birds inhabiting the region, 87, or somewhat less than one third, are confined to it. This mode of estimating the zoological character of a region by *genera*, gives a far truer idea than any enumeration of peculiar *species*, because the former imply more radical and important differences than the latter.

Sub-divisions of the Palæarctic Region.—The general zoological characters here given apply with considerable uniformity to the whole of the Palæarctic region, the similarities being of course greater where climate and physical conditions generally correspond. Thus, even between such remote islands as Great Britain and Yesso (North Japan) there is a wonderful similarity in the general forms of life, many of our most familiar birds and insects reappearing at the other extremity of the region under identical or but slightly modified forms. Owing perhaps to the great climatal changes the north temperate zone has undergone in recent geological times, and the vast amount of migration thereby produced, as well as to the absence of any continuous barriers, it is very difficult to mark out with accuracy the zoological subdivisions of this region. Certain broad divisions, depending partly on climate, partly on physical features, and partly on geographical proximity to other regions, may, however, be indicated.

Europe, north of the Pyrenees, Alps, Balkans, and Caucasus, may perhaps be considered as the most typical portion of the Palæarctic region, possessing most of its characteristic features in their full development. It may be termed the European sub-region. South of this comes the Mediterranean sub-region, including South Europe and North Africa, which wonderfully resemble each other in all their chief forms of animal life, although some few purely African species are found south of the Mediterranean. This sub-region includes also Asia Minor and Persia, with Syria and Northern Arabia. It is chiefly characterized by a number of desert forms, such as gazelles, civets, jerboas, quails, desert-larks, and numerous lizards; and by a number of species which cannot endure the colder climate of the north, as porcupines, monkeys, ichneumons, and a host of peculiar groups of insects. To this region belong the Atlantic islands from the Azores to the Canaries, the animal productions of all of them being closely related to those of South Europe or North Africa. It is a curious fact that the remotest of those islands, the Azores, offer less peculiarity in their birds and insects than Madeira and the Canaries, which are so much nearer the continent; but this is sufficiently explained by the greater prevalence of storms and gales in the more northern latitude of the Azores, and helps to prove that aerial currents are the chief means by which these two classes of animals are dispersed. For a discussion of this interesting subject and its bearing on the theories of distribution and development, see Wallace, *Geographical Distribution of Animals*, vol. i. p. 206.

The northern part of Asia differs very little in the main features of its zoology from the corresponding parts of Europe, but as we approach the northern slopes of the great plateau of Central Asia many peculiar forms occur, as wild horse, pikas (*Lagomys*), starlings of the genus *Podoces*, and many others. The great desert plateaus of Thibet and Mongolia form another subdivision, with many peculiar forms. Here are found the yak, some peculiar antelopes, with wild sheep and goats, and several peculiar rodents; and among birds many peculiar forms of grouse, partridges, and pheasants.

Another well-marked division is formed by the temperate portion of Eastern Asia, comprising Japan, Manchuria, Northern and Central China, with parts of East Thibet and the higher portions of the Himalayas as far west as Nepaul. This is a fertile and luxuriant district which receives several tropical forms of life from the adjoining Oriental region. It is rich in Insectivora and in deer, the deer-like musk being confined to it; it has a peculiar form of wild-dog (*Nyctereutes*), and even several peculiar species of the monkey tribe. It is also pre-eminently the home of the pheasant tribe, such magnificent birds as the golden, silver, and Reeve's pheasants being peculiar to it. It has also a number of showy jays, finches, tits, and warblers; and its insects present a number of fine tropical-looking species. The Manchurian sub-region has thus a very beautiful and varied fauna, but the intermingling of Oriental types, and the uncertainty of its southern boundary, render it less characteristically Palæarctic than the European sub-regions.

II. *The Ethiopian Region.*—This region is much less extensive than the last, but being almost wholly tropical it presents a richer and more varied assemblage of animals. Its southern extremity, although really extra-tropical, is yet so warm and so little subject to extremes of temperature that the growth of vegetation and the corresponding development of animal life are scarcely diminished, and the same may be said of the elevated interior of the continent. As Madagascar is quite isolated and its productions very peculiar, it will be best first to sketch the main features of African zoology, which are tolerably well marked and homogeneous.

The African continent is pre-eminently the country of large Mammalia. It possesses an abundance of elephants, rhinoceroses of several species, giraffes (now peculiar to it), gorillas and baboons—the largest of the ape tribe, a host of large and remarkable antelopes, the huge hippopotamus, several species of zebras, wild buffaloes, several remarkable forms of swine, and an abundance of lions, leopards, and hyænas,—forming together an assemblage of large and highly organized animals such as occur nowhere else upon the globe. There are also many smaller, but very remarkable forms. There are 7 peculiar genera of apes, 3 of lemurs, 5 of *Insectivora*, 12 of *Viverridæ*, the remarkable *Proteles* forming a distinct family allied to hyænas and weasels, 2 of *Canidæ*, 2 of *Mustelidæ*, 2 of *Suidæ*, 1 of *Tragulidæ*, 12 of *Bovidæ* (antelopes), 18 of various families of Rodents, and the curious aardvark (*Orycteropus*), forming a distinct family of *Edentata*.

In birds Africa is not so peculiar, yet it has many remarkable groups. Such are the plantain-eaters (*Musophagidæ*), the colies (*Coliidæ*), the secretary-birds (*Serpentariidæ*), the ground horn-bills, and the guinea-fowl,—all of which are peculiar. It abounds also in peculiar fly-catchers, shrikes, sun-birds, weaver-birds, starlings, larks, barbets, grouse, and hawks,—more than half the genera of land-birds being peculiar, and, if we include those of Madagascar, nearly two-thirds.

Reptiles abound, there being three peculiar families of snakes and one of lizards; and there is one peculiar family of toads. There are also three peculiar families of fresh-water fishes.

It is impossible to give any idea of the special features presented by the insects and land-shells without going into details which would be out of place in such a sketch as we are here giving. In both these groups Africa is fully as rich as the other tropical regions, and exhibits perhaps more peculiar features than among the higher animals.

We must, however, just mention the remarkable absence from the Ethiopian region of certain groups of Mammalia which abound in the countries to the north and east of it, as this phenomenon has an important bearing on the probable origin of the fauna. The most striking of these deficiencies are the two families of the deer and the bears, which abound over the whole northern hemisphere, in tropical Asia and the Malay islands, and even in North Africa, but are both entirely unknown over the whole Ethiopian region, as are, among smaller groups, the goats and sheep, the true oxen, and the mole family. Among birds such wide-spread groups as the wrens (*Troglodytidæ*), dippers (*Cinclidæ*), and the true pheasants are also entirely wanting.

The exceeding speciality of the forms of life which are still found in the Ethiopian region is well shown by the fact that there are about 24 family groups of vertebrate animals which are entirely confined to it, while two-thirds of its genera of Mammalia, and three-fifths of the genera of birds, are also peculiar.

Subdivisions of the Ethiopian Region.—The most remarkable of these is undoubtedly that comprising Madagascar and the Mascarene islands, a district which contains so many singular forms of life that it has been proposed by some naturalists to make it one of the primary zoological regions. The peculiarity of these islands is twofold, consisting as much in the absence of a great number of the most characteristic African forms as in the possession of others entirely peculiar. The apes and monkeys, the large Carnivora, the zebras, giraffes, antelopes, elephants, and rhinoceroses, and even such smaller forms as the porcupines and squirrels, are entirely wanting. Yet Madagascar possesses a host of remarkable *Lemuridæ*, consisting of 7 genera and 35 species, all of which are peculiar; a peculiar family of *Insectivora*, comprising 5 genera and 10 species; a peculiar family and 5 peculiar genera of small *Carnivora*; and 3 peculiar genera of *Muridæ*. Even among birds, so much better able to traverse a narrow sea, there are some curious deficiencies, the families of woodpeckers (*Picidæ*), honey-guides (*Indicatoridæ*), barbets (*Megalæmidæ*), plantain-eaters (*Musophagidæ*), colies (*Coliidæ*), hornbills (*Bucerotidæ*), and mockers (*Irrisoridæ*)—all abundant on the opposite coast of Africa—being entirely wanting. Yet birds are sufficiently abundant, nearly 120 species of true land-birds being known, while there are no less than 33 genera which are altogether confined to Madagascar and the Mascarene islands. If we consider the species, the peculiarity is even more remarkable, there being more than a hundred which are peculiar to about a dozen which are found elsewhere. These numbers, however, by no means fairly represent the special character of the Mascarene bird-fauna, which consists in the anomalous character of many of the forms, so that it is to this day a matter of dispute among ornithologists in what families a considerable number of them should be placed. Among these anomalous genera are *Mesites*, *Tylas*, *Artamia*, *Calicalicus*, *Euryceros*, *Philepitta*, *Leptosomus*, *Atelornis*, and several others. Taking all these facts into consideration, we arrive at the conclusion that the fauna of Madagascar is more peculiar than that of any other single island on the globe.

The reptiles of Madagascar are less known, but they exhibit some remarkable peculiarities. Many African groups are wanting, others are represented by peculiar genera, while a considerable number of groups have their nearest allies, not in Africa, but in tropical Asia and in South America. Among insects the butterflies are allied to those of Africa; but the beetles, like the reptiles, show many cases of affinity with the Malay islands and South America, though the majority are perhaps related to true Ethiopian forms.

The continental part of the Ethiopian region appears to have no subdivisions clearly marked out by natural barriers, yet it may be divided into three tolerably well-defined sub-regions in accordance with differences of climate and vegetation. These may be termed the sub-region of open plains, the forest sub-region, and the south temperate sub-region.

The first comprises the greater part of Central and East Africa, and a northern belt from Senegambia through Lake Chad to Abyssinia, while it extends to the Atlantic coast from Angola to Damara Land. This extensive district may doubtless be further subdivided, but it exhibits throughout the main features of Central African zoology as distinct from that of West and South Africa. Its zoological characters are negative rather than positive, as it has very few peculiar groups; but all the great African Mammalia abound, and a greater variety of antelopes are found here than in the other sub-regions.

The West African or forest sub-region extends from the Gambia to the Congo, and inland to the sources of the Nile and the western watershed of the great lakes. It is characterized generally by a luxuriant forest-vegetation, and it possesses many peculiar animal forms. Here we find the gorilla and chimpanzee, a great variety of monkeys, and two peculiar genera of lemurs, as well as some remarkable genera of *Insectivora*, *Viverridæ*, and *Tragulidæ*. It is the home of the gray parrots (*Psittacus*), the typical plaintain-eaters (*Musophaga*), one of the Eastern group of ground thrushes (*Pitta*), and many peculiar genera of passerine birds. Reptiles are very abundant, no less than 13 genera of snakes and 3 of lizards being peculiar to this sub-region. As is always the case in tropical forest-districts, insects are especially numerous, of large size and brilliant colours.

The South African or extra-tropical sub-region, though quite open to the central districts and to a large extent overrun with the same fauna, yet presents so many peculiarities as to indicate, probably, a former southward extension of the continent. We find here 3 peculiar genera of *Viverridæ*, the remarkable *Proteles*, peculiar *Canidæ* and *Mustelidæ*, many peculiar rodents, including *Bathyergus* (one of the mole-rats), *Petromys* (one of the spiny-rats), and *Pedetes* (the Cape-hare). There are also some peculiar genera of birds, among which are a sun-bird, 2 weaver-birds, 3 larks, and a curious woodpecker (*Geocolaptes*). Reptiles are still more peculiar, 4 genera of snakes and 10 of lizards being almost or quite restricted to this limited district. Insects, too, are very remarkable, there being 7 peculiar genera of butterflies, and a host of beetles which are either quite peculiar or have their nearest allies in Madagascar, in India, or America. This remarkable and isolated fauna must be considered, in connection with the wonderful Cape flora—so much richer and more isolated than that of any other part of Africa—as indicating important changes in the past history of this part of the globe.

III. *The Oriental Region.*—The Oriental region is wholly tropical, but is of smaller extent than the Ethiopian. It is very largely covered with forest-vegetation, and is much broken up into islands and promontories, conditions so favourable to animal life as fully to compensate for its smaller area.

In the larger Mammalia there are many resemblances between the Oriental and Ethiopian regions. Both have anthropoid apes, elephants, rhinoceroses, large felines, buffaloes, and an abundance of civets. But the Oriental region abounds in deer and bears, it has many remarkable Insectivora, the Malay tapir, and many wild cattle. It has also a great number of characteristic forms of life. It has 6 peculiar genera of apes, and 3 of lemurs; 5 of Insectivora, among which are two peculiar families, *Galeopithecidæ* and *Tupaiidæ*; 12 of *Viverridæ*; 1 one of *Canidæ*; 5 of *Mustelidæ*; 2 of *Ursidæ*; 1 of *Traguiidæ*; 1 of *Cervidæ*; 4 of *Bovidæ*; and 5 of Rodents.

The birds of this region are exceedingly abundant, varied, and remarkable. Among them are 3 peculiar families of passerine birds—the hill-tits (*Liotrichidæ*), the green bulbuls (*Phyllornithidæ*), and the gapers (*Eurylæmidæ*); while the babblers (*Timaliidæ*), the fruit-thrushes (*Pycnonotidæ*), and the king-crows (*Dicruridæ*) are far more abundant than in the adjacent regions. Tits, flycatchers, crows, sun-birds, starlings, kingfishers, pigeons, and pheasants are also very abundant, and are represented by many remarkable forms. More than 340 genera of land-birds inhabit the region, of which number 165 are peculiar to it. Reptiles are very abundant. Three small families of snakes are peculiar, and there are a large number of peculiar genera both of snakes and lizards.

Insects are exceedingly varied and beautiful, especially in the Himalayas and in the Malay islands. Among butterflies the *Danaidæ* are very abundant, while the true *Papilios* are perhaps finer than in any other part of the world. Among beetles the *Lucanidæ*, *Cetoniidæ*, and *Buprestidæ* are especially remarkable, while the elegant Longicorns have their full quota of curious and beautiful forms.

Subdivisions of the Oriental Region.—These are tolerably well marked, though very unequal in extent and productiveness. The Himalayan slopes with all the Indo-Chinese countries form the chief and most typical part of the region. Here are the greatest variety of Mammalia and birds, and almost all the more important groups are represented. Three genera of Mammalia and 44 of birds are peculiar to this sub-region.

The Malay Peninsula, with the larger Malay islands, as far as Java, Borneo, and the Philippines, form a sub-region which has much in common with the last, and is almost equally rich, and in some groups even richer and more peculiar. Thus it has no less than 14 genera of Mammalia and more than 40 genera of birds which are wholly peculiar to it, among which are such interesting forms as the orang-utans (*Simia*), the spectre-lemur (*Tarsius*), the flying-lemur (*Galeopithecus*), the feather-tailed tupaia (*Ptilocercus*), the sun-bear (*Helarctos*), and the magnificent argus-pheasants (*Argusianus*). About an equal number of genera are common to the Malayan and the Indo-Chinese sub-regions, but are not found elsewhere; so that the two have much in common, and together comprise nearly all that is most remarkable and beautiful of the Oriental fauna.

The other two sub-regions consist of the peninsula of India and Ceylon, whose chief feature is their comparative zoological poverty. Taking first what may be termed the Indian sub-region, extending from the foot of the Himalayas to the Carnatic, we find that this extensive and fertile region, though abounding in life of every kind, yet possesses no peculiar genus of either Mammalia or birds; while, favoured by the open and arid plains of which much of the surface consists, some African types are more abundant than in other parts of the region, though these are numerically unimportant.

Ceylon and Southern India are somewhat more interesting, as they possess some peculiar forms, and others in common with the Malay islands. Among the former is *Loris*, a peculiar lemur; and there is a peculiar genus of *Muridæ*, as well as one or two peculiar genera of birds. There are also several peculiar species of monkeys, and the Malayan genus *Tupaia*; while among birds we find Malayan forms of cuckoos and *Timaliidæ*. The reptiles, however, best characterize this sub-region, as it possesses an entirely peculiar family of snakes (*Uropeltidæ*), consisting of 5 genera and 13 species, as well as 4 other peculiar genera of snakes. There are also many peculiar genera of lizards belonging to the *Agamidæ* and *Acontiadæ*, and 8 peculiar genera of tailless Batrachia. The insects also offer some remarkable cases of Malayan affinity, the genus *Hestia* (or spectre-butterflies) being found in Ceylon only beyond the Malay islands; while 6 genera of Malayan Longicorns and the wingless *Tricondyla* belonging to the *Cicindelidæ*, are in the same category. The combination of so many peculiarities justifies the separation of Ceylon and a portion of Southern India as a distinct Oriental sub-region.

IV. *The Australian Region.*—On entering this region we meet with such a radical change in all the higher forms of life, that the zoologist seems to have got into a new world. Even the Austro-Malay islands, though differing in no way in climate or luxuriance of vegetation from the Indo-Malay islands to the west of them, exhibit this change in an almost equally marked degree. With the exception of Celebes, which is a debatable land hardly belonging to either region, the other islands only possess a few deer and pigs to represent the host of varied Mammalia—from the elephant and tapir to the squirrel and monkey—which characterize every part of the Oriental region to its extreme south-eastern limits in Java and Borneo. In place of these we have Marsupials only, in great variety in the extensive country of Australia and less abundantly in the islands; and besides these, only those flying mammals—the bats, which can traverse the ocean, and the smallest forms of rodents, the mice—which may be occasionally carried by floating trees or other accidental means across narrow arms of the sea. There are 5 distinct families and 33 genera of Australian Marsupials, as well as 2 families and genera of the still more lowly-organized Monotremata which comprise the anomalous *Ornithorhynchus* and *Echidna*.

Birds, as might be expected, are not so excessively peculiar, a large number of almost cosmopolitan families extending into Australia; yet there are no less than 16 families altogether characteristic of the region, among which are such remarkable forms as the Paradise-birds (*Parad* *seidæ*), the honey-suckers (*Meliphagidæ*), the lyre-bir (*Menuridæ*), the cockatoos (*Cacatuidæ*), the lories (*Trichogl* *sidæ*), the mound-builders (*Megapodiidæ*), and the cas waries (*Casuariidæ*). Among the important groups which a entirely wanting in Australia are the barbets (*Megalæmidæ*), the woodpeckers (*Picidæ*, otherwise cosmopolitan), the trogons (*Trogonidæ*), and the pheasants (*Phasianidæ*). T reptiles, as in most other cases, offer less marked peculia ties than the birds; but a large proportion of the gen are peculiar, and there are even 3 peculiar fam of lizards, as well as the singular *Hatteria* of New Zea which constitutes not only a separate family but a order of reptiles. The Amphibia and fresh-water fis present a corresponding amount of peculiarity; and recent discovery of the genus *Ceratodus* (the mud-fi very interesting, since its nearest allies appear to ha lived early in the Secondary period, while other memb of the same group are found isolated in the rivers o tropical Africa and America.

Insects are very abundant in Australia and the Austro-Malay islands; but owing to the various means by which these small creatures are conveyed across the seas, and the identity of physical conditions in the Oriental and Australian portions of the archipelago, the true Australian fauna is chiefly developed in Australia itself, where there are a considerable number of peculiar genera in all orders of insects.

Subdivisions of the Australian Region.—Besides the Australian continent, which is by far the richest and most important part of the region, there are three groups of islands which have each some distinctive peculiarities. These are the Austro-Malay islands, comprising New Guinea, the Moluccas, and the Timor group; the Pacific islands; and the New Zealand group. The first is very rich, especially in birds and insects, while the other two are exceedingly poor.

The Austro-Malayan sub-region, of which New Guinea is the central mass, is comparatively poor in Mammalia, only 9 genera of marsupials being yet known, 6 of them being peculiar, with just a few mice, and some deer (perhaps introduced) in the Moluccas. Birds are far more numerous, the Paradise birds and the true crimson lories being peculiar to the sub-region, while more than 40 genera of land-birds are confined to it. It is exceptionally rich in peculiar forms of flycatchers, honey-suckers, kingfishers, cuckoos, and pigeons; and its birds are generally characterized by a brilliancy of plumage far exceeding that which prevails in the surrounding regions. The insects exhibit a similar brilliancy, some of the finest butterflies and beetles in the world belonging to this sub-region.

Directly we pass east of the Solomon Islands we enter upon one of the poorest zoological regions in the world in proportion to its extent and luxuriant vegetation, the only exception to this poverty being in the land-shells, which are very largely developed and very peculiar. Indigenous Mammalia are wholly wanting. Birds are very scarce, no more than about 150 species being known from the numerous islands scattered over 5000 miles of the Pacific, while there are only about a dozen peculiar genera. Reptiles are more numerous than might be expected, considering the wide extent of ocean separating many of the islands. There are 14 genera of lizards, of which 6 are peculiar, but few extend eastward of the Samoa Islands. Snakes are much less abundant, and none are found east of the Fiji Islands. Insects are exceedingly scarce, and of little interest.

The New Zealand group, though situated beyond the tropics and very remote from other lands, yet possesses a more ample and more interesting fauna. If we except two bats, mammals are wanting; but birds are tolerably abundant, and are very peculiar and interesting. There are 34 genera of land-birds, of which 14 are peculiar. Twelve of these are passerine birds, chiefly *Meliphagidæ* and *Sturnidæ*, with *Nestor* and *Stringops*, peculiar genera of par and the extraordinary wingless *Apteryx*. Reptiles are few. There are a few lizards, with one peculiar genus, but no snakes. Th anomalous *Hatteria* has been already mentioned. There is also one frog belonging to a peculiar genus. There are some interesting fresh-water fishes, one genus belonging to the *Salmonidæ*, a family not occurring elsewhere in the southern hemisphere; and there are several species allied to South American fishes.

Insects are very few, and generally of small size and incons cuous colours. Many of them are peculiar, but they have most affinities with Australian groups, or with those from the Orien region.

V. *The Neotropical Region.*—This is in some respects the richest zoological region on the globe, yet it has certain resemblances to the Australian region, which is the poorest, and which it follows in natural order. This is owing to both being inhabited mainly by low types of Mammalia and birds, some of which have been preserved from early geological times, the Marsupials being a good example. But there has also been some intermigration between south temperate America and Australia by means of intermediate islands and floating ice, and this has led to a community of forms in a few groups to which such a mode of transmission was possible.

The Mammalia are as abundant and varied as in any other countries except Africa and tropical Asia; but the region is characterized by poverty in the more highly organized forms, with a corresponding abundance of lower types. Monkeys are abundant, but all belong to two peculiar families—*Cebidæ* and *Hapalidæ*—different in structure and of a somewhat lower organization than those of the Old World. About half of them have powerfully prehensile tails, a character unknown among the monkeys of the eastern hemisphere. Bats are very numerous, and one extensive family—the *Phyllostomidæ*, or vampyre-bats—is peculiar. Insectivora are unknown in South America, but one peculiar genus occurs in the larger Antilles, and a few shrews in Central America. The Carnivora are but moderately numerous, the *Civet* family being entirely wanting, as are the bears, with the exception of a solitary species in Chili. There is, however, one peculiar family—the *Procyonidæ*—which extends over North America as well. A marked feature is the excessive scarcity of the great family of the Ungulata, or hoofed animals. There are no wild cattle, sheep, goats, antelopes, horses, or rhinoceroses; and only a very few species of tapirs, peccaries, llamas, and deer in their place. Coming to the small and feeble Rodents, however, we find a great abundance and variety of forms, including the largest on the globe. Five families are peculiar or nearly so,—the chinchillas and the cavies being the most important, while all the genera, except *Sciurus* and *Lepus*, are peculiar to the American continent. We now come to the Edentata, the most imperfectly organized and the most characteristic of the Neotropical mammals. There are twelve genera belonging to the three families of the sloths (*Bradypodidæ*), the armadillos (*Dasypodidæ*), and the ant-eaters (*Myrmecophagidæ*). Lastly, we have the Marsupial opossums, which range far over temperate North America, but are most abundant in the tropical regions of South America.

In birds the Neotropical region is wonderfully rich. It possesses far more distinct genera and species than any other region, and it has 24 entire families peculiar to it, while the region which comes next in speciality and isolation as regards this order—the Australian—has only 16. Most of these peculiar families are, however, of a somewhat low grade of organization, and it is these which abound most in genera and species and give a special feature to the ornithology of the country. These peculiarly American families (for some of them range into North America) are the tyrant fly-catchers (*Tyrannidæ*), the manakins (*Pipridæ*), the chatterers (*Cotingidæ*), the plant-cutters (*Phytotomidæ*), the tree-creepers (*Dendrocolaptidæ*), the ant-thrushes (*Formicariidæ*), and the wren-thrushes (*Pteroptochidæ*). All these have a deficiency in the singing-muscles of the throat, and they comprise more than 300 genera. Then, among the *Picariæ*, which are a low though wide-spread order, we have the toucans (*Rhamphastidæ*), the puff-birds (*Bucconidæ*), the jacamars (*Galbulidæ*), the motmots (*Momotidæ*), and the humming-birds (*Trochilidæ*), comprising 140 genera. The only peculiar families of high organization are the sugar-birds (*Cœrebidæ*), the greenlets (*Vireonidæ*), the hang-nests (*Icteridæ*), and the tanagers (*Tanagridæ*), comprising in all 82 genera. The most highly organized groups of birds, and those which are most abundant in the eastern hemisphere, such as crows, starlings, thrushes, warblers, and flycathers, are either scarce or entirely wanting. Finches are numerous, as are parrots. Among game-birds the higher types, as the grouse (*Tetraonidæ*), are scarce; while the more lowly-organized curassows (*Cracidæ*) and tinamous (*Tinamidæ*) are much more abundant and more widely distributed over the whole region. Among the wading groups (*Grallæ*), which are decidedly of low organization, there are 6 peculiar and very isolated families, the most remarkable being the *Cariamidæ*, the *Psophiidæ* (trumpeters), the *Eurypygidæ* (sun-bitterns), and the *Palamedeidæ* (horned-screamers). The very low struthious type is represented by the American ostriches (*Rhea*).

Reptiles are also very abundant in the Neotropical region, and there are many peculiar groups. Snakes are represented by peculiar genera only, the families being almost always widely and often universally distributed in warm regions; lizards are more restricted in their range, and no less than 5 families are peculiar to the region, while 9 are found only in the American continent. All are of very small extent except two, the *Teiidæ* and *Iguanidæ*, which are very numerous, and comprise the most characteristic American lizards. There are also 4 peculiar families of tailless Batrachians, the most popularly known being the *Pipidæ*, which contains the remarkable Surinam toad.

Fresh-water fishes are probably more abundant and varied than in any other region. Three entire families and several sub-family groups are peculiar, and the enormous forest-bordered rivers and extensive tracts of annually flooded woodland have led to the development of special groups of fruit-eating fishes, which, as articles of food, are not only unsurpassed but altogether unequalled in any other part of the globe. Fresh-water rays (*Trygonidæ*) and electric eels (*Gymnotidæ*) are also peculiar to Neotropical rivers, and there are an immense variety of *Siluridæ*, *Characinidæ*, and *Cyprinodontidæ*. It is reported that Professor Agassiz obtained more than a thousand species of fishes in the Amazon alone; but, although this may be exaggeration, there is no doubt that a still greater number exists in that wonderful river and its tributaries.

The insects of tropical America are so inexhaustible in their variety, and so wonderful in their beauty, that it is hopeless to attempt to give an adequate idea of them. The butterflies are far more abundant and more gorgeous than in any other region, and their variety may be imagined from the fact that the peculiar genera are nearly equal in number to those of the rest of the world. The beetles, though very abundant, are not so clearly preponderant over those of all other regions. The stag-beetles (*Lucanidæ*) and rose-chafers (*Cetoniidæ*) are somewhat poorly developed; but all the other large families are very abundant, and comprise many forms of extreme beauty and interest. Such are the genera *Agra* among Carabidæ, *Pyrodes* among Longicorns, and *Entimus* among Curculionidæ. Land-shells equally surpass those of all other regions, but this is owing to the exceptional richness of the West Indian islands, the continent of America being by no means extraordinarily rich in this class of animals.

Subdivisions of the Neotropical Region.—The manner in which this region may be most naturally and conveniently divided for zoological purposes is doubtful. Almost the whole of tropical South America (excluding only the higher Andes south of Chimborazo and the dry plain to the west) forms a compact area in which all the more characteristic Neotropical animal groups are developed in their highest luxuriance. This, however, falls naturally into three subdivisions, which may be generally indicated as Guiana, Brazil, and the Eastern Andes, each of which is characterized by a great number of peculiar generic types. These three areas are considered by Professor Newton (in his article BIRDS in this work) to be sub-regions, each equivalent to the whole of south temperate America, and to the tropical part of North America, which may be termed the Mexican sub-region. But each of these latter may be also divided. South temperate America consists of a western and an eastern division, each with many distinct groups, while the southern parts of Central America differ greatly from the northern; and all these subdivisions may be considered as provinces of their respective sub-regions. It seems better, therefore, for the purposes of such a general sketch as the present, to consider the tropical parts of South America, as above limited, to be one great sub-region, characterized by possessing a large proportion of the animal forms of the whole region. It will therefore only be necessary to indicate in what way the other sub-regions differ from this.

The Chilian sub-region, or temperate South America as above defined, is well characterized by its exclusive possession of the family of the *Chinchillidæ* (comprising three genera) and the genus *Auchenia* (the llamas and alpacas), the only representatives of the *Camelidæ* in the New World. It also has a peculiar form of bear, several peculiar genera of rodents, and two peculiar forms of armadillos. Among birds it has the curious plant-cutters (*Phytotomidæ*), a peculiar family of waders (*Thinocoridæ*), about 26 peculiar genera of passerine birds—1 of parrots, 2 of pigeons, and 2 of tinamous. It also possesses the American ostriches (*Rhea*), and 3 peculiar genera of plovers. The reptiles are usually of tropical genera, but a few are peculiar. Many of the fresh-water fishes are of peculiar genera, but there are some Australian forms, and even one species (*Galaxias attenuatus*) is common to New Zealand, Tasmania, and Patagonia.

Among insects alone we meet with indications of a decided affinity for forms of the north temperate zone. There are several butterflies allied to *Erebia*, an Arctic genus, and others belonging to the northern genera *Hipparchia*, *Argynnis*, and *Colias*. The mass of the butterflies, however, are purely Neotropical. Of the beetles some are Australian, but the majority are allied to Neotropical forms; yet among the *Carabidæ*, or carnivorous ground-beetles, there are many truly northern genera, such as *Carabus*, *Anchomenus*, *Trechus*, &c., whose presence supports the theory of a migration along the Andes from the northern hemisphere. (See Wallace's *Geographical Distribution of Animals*, vol. ii. pp. 44–48.)

In tropical North America, or the Mexican sub-region, we find far less peculiarity. The southern portion from Panama to Nicaragua can hardly be separated zoologically from the adjacent parts of South America, while further north the chief difference consists in the absence of many typical Neotropical groups, and the appearance of a few which more especially characterise the Nearctic region. A peculiar form of tapir (*Elasmognathus*) inhabits Central America, with one or two peculiar genera of rodents; while such northern forms as *Sorex*, *Vulpes*, *Lepus*, and *Pteromys* range as far south as Guatemala. Birds are more especially characteristic, since the sub-region possesses no less than 37 peculiar genera of land birds; but many Neotropical groups are absent. The most important of these deficiencies are the *Pteroptochidæ*, and the subfamilies *Furnariinæ*, *Conophaginæ*, and *Rupicolinæ*, as well as most of the peculiar groups of waders. In place of these are found tits (*Paridæ*), creepers (*Certhiidæ*), waxwings (*Ampelidæ*), and turkeys (*Phasianidæ*) from the north. The fresh-water fishes as well as the insects are almost wholly Neotropical in character, but exhibit a considerable amount of speciality.

There remains the West Indian Islands or the Antillean sub-region, which in the amount of isolation and speciality it exhibits is better marked than any other part of the region. The Mammalia are few but very interesting, as is usually the case in islands separated from continents by very deep sea. There are no monkeys, Carnivora, Ungulates, or Edentata, the only orders represented being the Insectivora and the Rodentia. The former, which is unknown in South America, is here represented by a peculiar genus, *Solenodon*, belonging to a family, *Centetidæ*, only found elsewhere in Madagascar. The Rodents consist of two very peculiar genera—*Capromys* and *Plagiodontia* belonging to a family which is especially South American, with a peculiar mouse, and an agouti (*Dasyprocta*) in the lesser Antilles. The birds are far more abundant, about 200 resident species being known, besides a large number of migrants from the United States. These belong to 95 genera, of which about one-third are peculiar. The only entirely peculiar family group is that of the todies (*Todidæ*), small and elegant birds whose nearest allies are the South American motmots and jacamars.

The reptiles are not very well known, but they seem tolerably numerous, and mostly allied to South American groups; and the same remark applies to the fresh-water fishes. Insects are not very abundant, and beetles seem especially scarce considering the luxuriant vegetation of most of the islands. In land-shells, however, the very reverse is the case, the Antilles being more productive than any other part of the world. The number of species of West Indian land-shells is equal to that of the entire continent of America, while the number of genera is greater. No less than 11 of the genera are peculiar, a very unusual degree of speciality considering the extensive range of most of the genera of land-mollusca.

VI. *The Nearctic Region.*—This comprises all temperate North America; and its peculiar fauna is best represented in the United States, and especially in that portion extending from the Mississippi valley to the Atlantic. It is allied both to the Neotropical and the Palæarctic regions, but also possesses a considerable number of peculiar or characteristic forms. Among Mammalia it possesses 3 peculiar genera of moles, 2 of weasels, 2 of hollow-horned ruminants—*Antilocapra* (the prong-buck) and *Aplocerus* (the mountain goat or antelope)—and a number of Rodents, among which the most peculiar are the *Saccomyidæ* or pouched rats. Of those groups which are more peculiarly Neotropical it has skunks (*Mephitis*), racoons (*Procyon*), and opossums (*Didelphys*). The number of Palæarctic groups is greater, the more important being lynxes, wolves, martens, bears, elks, bisons, sheep, flying-squirrels, and marmots.

Of birds there are between forty and fifty genera which are peculiar or highly characteristic. Most of them belong to the passerine families, the wood-warblers (*Mniotiltidæ*) and the finches (*Fringillidæ*) being especially rich in peculiar groups; and there are also a few among the thrushes, wrens, crows, hang-nests, woodpeckers, grouse, and some other families. Among the larger birds the turkeys (*Meleagris*), the ruffed grouse (*Cupidonia*, &c.), and the crested partridges (*Oreortyx*, &c.) are the most remarkable.

Reptiles seem to be more numerous than in the Palæarctic region. About a dozen genera of snakes are peculiar or characteristic, the most remarkable being the well-known rattle-snakes (*Crotalus*). Among lizards the so-called "glass-snake" (*Ophisaurus*) is a peculiar form analogous to our slow-worm; while the horned-lizards (*Phrynosoma*) and many other genera of Iguanidæ are peculiar. Fresh-water fishes are exceedingly numerous and highly peculiar, there being no less than five (or, according to recent authors, eight) peculiar families, and a large number of peculiar genera. The perches and their allies (*Percidæ*, *Ichthelidæ*, *Labracidæ*, and *Etheostomidæ*), the carps (*Cyprinidæ*), the suckers (*Catostomidæ*), and the catfish (*Siluridæ*) are the most abundant groups.

In insects the Nearctic region is not remarkably rich or very peculiar. Its butterflies, though tolerably abundant, belong for the most part to well-known European groups with a small infusion of Neotropical forms in the Southern States. The same may be said of its Coleoptera. Land-shells are tolerably plentiful but not strikingly peculiar; the Alleghany district being the most productive, and possessing a large number of peculiar species. In fresh-water shells North America surpasses every other part of the globe, considerably over a thousand species, most of them *Unionidæ* or fresh-water mussels, having been described.

Subdivisions of the Nearctic Region.—Owing to the researches of American zoologists these have been ascertained with tolerable accuracy, and may be termed respectively the Californian, the Rocky Mountain, the Alleghany, and the Canadian sub-regions.

The western or Californian sub-region comprises the narrow tract between the Sierra Nevada and the Pacific, not including Lower California, but extending northward into British Columbia to about 53° N. lat. It is characterized by a few very peculiar forms, and by a greater infusion of South American types than are found in similar latitudes on the east coast. Among Mammals *Macrotus*, a genus of vampyre bats; among birds a cuckoo of the genus *Geococcyx*, and 2 genera of humming-birds (*Selasphorus* and *Atthis*); and among reptiles *Lichanotus*, a snake allied to the boas, are Neotropical forms. California has also five or six peculiar genera of mammalia,—*Urotrichus*, one of the moles, and *Haplodon*, forming a distinct family of Rodents, being the most remarkable; while as, forming a distinct family allied to the wrens, is the most ting and peculiar bird.

central or Rocky Mountain sub-region extends eastward he Sierra Nevada across the Rocky Mountains to a line a little rd of the 100th meridian, where a marked change in the cli- vegetation, and animal life is found to occur. To the north unded by the great Canadian forest-zone on the upper Sas- wan, while southwards it extends into Texas and Lower nia and along the line of highlands to beyond the city of . This sub-region is characterized by many peculiar animals, f which are closely allied to Palæarctic types—as the so-called (*Bison americanus*), the big-horned sheep (*Ovis montana*), tton (*Gulo arcticus*), and the pika (*Lagomys princeps*); while are altogether distinct forms, as the prong-horn (*Antilo-* and the antelope or mountain goat (*Aplocerus*). Of Palæ- forms of birds it has two peculiar genera of grouse (*Centro-* and *Pedioecetes*), and the Arctic wood-pecker and ptarmigan. especially Nearctic are a genus of wrens (*Salpinctes*) and eculiar genera of finches and crows. The Nearctic pouched- *accomyidæ*) are abundant.

eastern or Alleghany sub-region comprises the country to st of the last, and as far north as Wisconsin and the southern f Canada. It contains examples of all that is most charac- in Nearctic zoology, and has besides a few peculiar groups. se the most noteworthy is the star-nosed mole (*Condylura*), mong birds the passenger-pigeon (*Ectopistes*) and a few groups d-warblers and finches. The reptiles are more peculiar, as are several genera of snakes, including two of *Homalopsidæ* vo of rattle-snakes, which hardly extend beyond it. Among the glass-snake (*Ophisaurus*) is peculiar, and no less than enera of tortoises are almost or quite confined to the sub- . Here, too, are found the peculiar Amphibia for which America is so remarkable, such as the two genera of the idæ (*Siren* and *Pseudobranchus*), *Menobranchus* allied to the us of Europe, *Amphiuma*, an eel-like creature with four entary feet constituting a distinct family, and three peculiar a of salamanders (*Salamandridæ*). Fishes, too, are very lant, and several of the peculiar North American forms are ed to this sub-region; such are the pirate-perch (*Aphredo-*), the cave-fishes (*Amblyopsidæ*), the trout-perches (*Per- læ*), several genera of sun-fishes (*Ichthelidæ*), and many others.

e sub-Arctic or Canadian sub-region has very few distinctive es, but it serves at once to connect and separate the other regions which almost merge into it. The musk-sheep (*Ovibos*) nost the only form peculiar to it, though this is more pro- Arctic. Many of the most characteristic Nearctic animals, as *Condylura* and *Mephitis*, only just enter its southern bor- while most of the Arctic forms are more abundant here than er south. Great numbers of birds migrate here in summer the Southern States and Mexico; while a few especially rctic groups (as *Budytes*, *Phylloscopus*, and *Pyrrhula*), which ot occur elsewhere in North America, have been found in a. The scanty fauna of Greenland shows that it forms a part is sub-region.

TRIBUTION OF THE HIGHER ANIMALS DURING THE TERTIARY PERIOD.

efore we proceed to other divisions of our sub- we shall find it useful to consider briefly the geo- hical relations of the Tertiary and post-Tertiary faunas at which now exists, as we shall thereby arrive at a r comprehension of the true nature of zoological ns, and the meaning of the diverse and complex rela- that exist between them.

ost-Tertiary Faunas.—Researches in alluvial clays and els, cave-earths, and other superficial deposits have known to us very completely the character of the a which immediately preceded that now existing, and h lived at the close of the glacial period and in the of prehistoric man. We find, as might be expected, a considerable number of the Mammalia were identical living species, but along with these we almost always a number of extinct forms, some closely related to g species in the same district, while others seem to ate migration and a change of climate, by their ablance to species which now only live further north uth. More extraordinary is the fact, that many of recently extinct forms were of huge size as compared y now living, often reminding us of the bulkiest in- ants of the tropics or of those huge animals which we associate with an earlier condition of the earth's surface. Thus, in Europe during the post-Tertiary period, the reindeer, the glutton, and the Tartarian antelope inhabited France, along with powerful felines allied to the existing lion. At the same time elephants and rhinoceroses of several species roamed all over Europe; and at one period hippopotami ranged as far north as the Thames, while the European beaver was replaced by a much larger species. In North America about the same time we find extinct lions, horses, tapirs, and camels, with bisons and musk-sheep, as well as elephants and mastodons; and along with these, three genera of gigantic sloths as large as rhinoceroses and elephants,—forming an assemblage of large Mammalia wonderfully different from that which now exists in the same country. In South America we find that there were larger monkeys than any now living, together with lions, bears, horses, tapirs, and antelopes, as well as mastodons, and a tree-porcupine as large as a peccary. Here also were armadillos as large as a rhinoceros, and huge sloths as in North America but of more varied kinds. Even in Australia very similar phenomena occur. Extinct wombats as large as tapirs, kangaroos the size of elephants, and a phalanger nearly as large as a lion have been found in cave-deposits, along with a number of other forms more nearly like those now living. But in this case *all* are Marsupials or Monotremes, and there is no sign of any migration from other lands, which indeed, owing to the insular nature of the country, we could hardly expect. Again, in New Zealand and Madagascar we have a similar phenomenon presented to us by the great extinct terrestrial birds—the "moas," the "dodos," and the *Epyornis*, which, from the conditions under which their remains are found, have evidently not long ceased to exist.

It appears then that in all parts of the world where we have been able to obtain the requisite information, the period which immediately preceded that in which we live was characterized by great movements or migrations of the higher animals where that was possible; and everywhere, by the extinction of a variety of huge animals belonging to almost every order of Mammalia and to several orders of birds, many of which are now totally unrepresented on the globe.

Tertiary Faunas, and their Geographical Relations with those of the six Zoological Regions.—When we go back to the late and middle Tertiary deposits, we find a series of remains of the higher animals which exhibit yet more remarkable changes of distribution. Various parts of central and southern Europe, for example, were then inhabited by animals which now form the most characteristic features of Ethiopian and Oriental zoology—such as apes and monkeys, lions and hyænas, horses, tapirs, elephants, rhinoceroses, giraffes, and various antelopes; and along with these a number of extinct ancestral forms of many of the same groups. Among birds, too, we find the eastern jungle-fowl, the edible-nest swift, and the trogon, along with African parrots and plantain-eaters. In the Miocene beds of Northern India are found such typical African groups as the hippopotamus and giraffe.

Now geology teaches us, that in the Eocene, or earliest portion of the Tertiary epoch, a continuous arm of the sea extended from the Bay of Bengal to the Atlantic Ocean, cutting off the peninsula of India and Central Africa from the Palæarctic region;[1] and it is therefore highly probable that, when this sea-bed became dry land, the various large Mammalia now so characteristic of Africa entered it for the first time from the north. This will explain many of the peculiarities of the Palæarctic, Oriental, and Ethiopian regions, and of their several sub-regions, and especially the persistence of low types in those districts which were wholly or partially protected from the competition of more highly organized animals.

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[1] See Mr Searles V. Wood, jun., "On the Form and Distribution of the Land Tracts during the Secondary and Tertiary Periods respectively, and on the effect upon Animal Life which great changes in Geographical Configuration have probably produced" (*Philosophical Magazine*, 1862).

The Tertiary fauna of North America compared with that of Europe exhibits proofs of a former communication between the two northern continents both in the North Atlantic and North Pacific, but always, probably, in rather high latitudes. This is indicated both by the groups which appear to have originated in one continent and then to have passed across to the other, and also by the entire absence from America of many important groups which abounded in Europe (and *vice versa*), indicating that the communication between the two hemispheres was always imperfect and of limited duration.

The past zoological history of North and South America exhibits a somewhat analogous series of phenomena. Their productions were generally very dissimilar. North America, in closer connection with the great northern continent, made an almost equal advance in the development of the more highly-organized animals; while South America, for the most part isolated and thus prevented from receiving a constant supply of immigrants from the larger land-areas, developed a series of lowly-organized creatures, the smaller forms of which still constitute its chief zoological feature.

The knowledge we possess of Tertiary and post-Tertiary Mammalia thus gives us an important clue to the successive migrations of the various groups of animals from one region to another, and to the geographical changes which rendered such migrations possible. The general result arrived at is, that the great northern continents represent the original seat of mammalian life, and the region of its highest development; while the southern continents—Australia, South America, and Africa—have been isolated for varying periods, and, after receiving an immigration of lowly forms, have developed and preserved these to a greater or less extent, according as they were more or less completely protected from the irruption and competition of higher types. Australia, during the Secondary period, received from the northern continent a stock of Marsupials and perhaps some still lower forms, and, having been since completely isolated, has developed these groups alone into its existing fauna. South America, at a somewhat later period, obtained the ancestors of its Edentata and Rodents; and though at various times some higher forms entered it from the north, these never seem to have been sufficiently numerous to overcome its indigenous fauna. In Africa the case was different. For a long time its Mammalia were probably analogous to those of South America; but when the great irruption of higher animals took place in the latter part of the Tertiary period, most of these were destroyed, and a few only remain—such as the *Orycteropus*, the Lemurs, and the peculiar Rodents—as indications of the character of the primeval fauna. In the peninsula of India a very similar course of events occurred, and the fauna of both these countries now consists mainly of comparatively recent immigrants. (For a fuller discussion of this subject see Wallace's *Geographical Distribution of Animals*, chapters vi. to xv.)

The Birth-place and Migrations of some Mammalian Families and Genera.—From the knowledge we now possess of the extinct fauna of most of the great continents, it is possible to determine approximately the original birth-place of some now widely distributed groups. The true bears, for example, date back in Europe to the older Pliocene, while in North America they occur only in post-Pliocene deposits. We may conclude, therefore, that they originated in the Old World and are comparatively recent immigrants in America. True horses of the genus *Equus* are also of older Pliocene date in Europe and of the post-Pliocene, or perhaps newer Pliocene, in America, and are therefore also recent immigrants into the latter country. But it is a curious fact that the most perfect series of ancestral forms of horses occur in the Miocene and Eocene deposits of North America; whence it would seem probable that the earlier stages of the development of this wonderfully specialized animal were effected in America, whence they passed to the eastern hemisphere, and there attained to the full development of the equine type, again, perhaps to be transferred to America,—to be largely developed there (for remains of eight or ten distinct species have been discovered), and finally to become wholly extinct, while continuing to exist in the Old World, whence the more perfect form has been again introduced, and seems quite capable of maintaining itself in a wild state. Tapirs, though now more abundant in America than in Asia, are an Old World group, going back to the Lower Miocene of Europe, but only appearing in Amèrica in the post-Pliocene epoch. The peccaries (*Dicotyles*), now almost wholly Neotropical, are really a North American group, and probably only entered South America in later Pliocene times. Camels, though now confined to Asia and South America, are really a North American form, having been largely developed during the Miocene period, whence the true camels appear to have passed into Asia and the llamas into South America. True deer are European from Miocene times, but only appear in America in the later Pliocene and post-Pliocene epochs. Elephants are an Old World type, abounding from the Miocene period in Europe and Asia, but only appearing in America in the later Pliocene and post-Pliocene times. It is possible, however, that the Eocene *Dinocerata* of North America may be ancestral forms of *Proboscidea*, and that, as in the case of the horses, the development of elephants may have begun in America to be subsequently perfected in the larger area of the eastern hemisphere. As a last and curious example we may refer to the marsupial opossums, now exclusively American, but which are certainly recent immigrants from Europe or Asia. No trace of them occurs in American deposits before the post-Pliocene period, while they existed in Europe both in Eocene and Miocene times.

The cases now adduced are sufficient to show how much interest attaches to the distribution of the ancestral forms of our existing animals; but we wait for fuller knowledge of the Tertiary deposits of Asia, Africa, and South America in order to complete the history of these migrations, and to gain some knowledge as to many other groups whose origin is now involved in obscurity (*Geog. Dist. of Animals*, vol. i. p. 153.)

DISTRIBUTION OF MARINE ANIMALS.

The zoological regions which serve to represent the main facts of the distribution of land animals are evidently inapplicable to those inhabiting the ocean, except in a few cases where the group is confined to shallow waters or to estuaries. It is true that, as the great continents are separated by the oceans, so the oceans are to some extent separated by the continents, but owing to the superior area of water the separation is far less complete and effective. In the southern hemisphere the Pacific, Atlantic, and Indian oceans freely communicate and for truly oceanic animals there would seem to be hardly any obstacle against universal distribution. Yet even in this case physical conditions, especially depth and temperature, are found to be effective barriers. The fact that the deep waters even of the tropical seas are cold, renders it indeed possible for some temperate or Arctic forms to cross the equator if they can travel at great depths; but for sur

lers the broad expanse of warm water between the
ith its hosts of specially adapted organisms, forms
te barrier. In like manner the inhabitants of the
hallow waters are limited, and it is only by tem-
bsidences of land or elevations of the sea-bottom
ie surface, allowing of a passage east or west, that
nigrate into remote areas. We have good reason
, however, that subsidences have often occurred
Vorth and South America, allowing of a free inter-
aquatic animals between the Atlantic and Pacific
while in Eocene times a strait is supposed to
ected the Atlantic and Indian oceans, and more
he Red Sea and Mediterranean have almost cer-
n united. We cannot, therefore, expect to find
trongly-marked zoological regions among aquatic
terrestrial animals, and the facts at our command
onfirm this view. For many groups the warm
old, or the northern, tropical, and southern seas,
ly well-marked divisions; while for others the
lantic, the North Pacific, and the Indian Ocean
tional regions of a more or less defined character.
al studies of the more highly-organized marine
s the Mollusca or Crustacea—a host of provinces
rovinces have been formed, each important sea or
enting some peculiar features; but as these divi-
tly depend on specific rather than generic distri-
ey need hardly be noticed here.

to the absence of any well-marked regions, and
l imperfection of our knowledge of the distribu-
rine animals, we must follow a different plan in
h of this subject from that adopted for the
fauna. We propose, then, to notice successively
important classes of marine animals, and to state
at general facts are established as to their distri-

nifera.—These exceedingly low organisms are im-
ecause their shells or tests are found extensively in
ological formations, and often form a considerable
e constituents of rocks. They are found in all
the species have often an enormous range. The
rimmers are almost universally distributed, while
n-livers—as the writer is informed by Mr H. B.
ppear to be distributed according to depth and
ather than to follow any circumscribed areas.
leman is now engaged in working out the
ger" collections, and already sees reason to think
may be found some differences between Atlantic
fic, and also between North Atlantic and South
orms. These organisms have been found living
face waters and down to a depth of 2000 fathoms,
their dead remains are brought up from the floor
p ocean.

la.—Sponges form another extensive group,
erved as fossils, of which our knowledge of the
ms is rapidly increasing. There seems, however,
e geographical limitation of groups. The fresh-
ongillidæ are found in all regions. The horny
reous sponges are widely distributed, but are
re abundant in warm and tropical seas. The
siliceous sponges—of which the glass-rope
ma) and Venus's flower-basket (*Euplectella*) are
us examples—are found scattered throughout all
s, and have recently been found in abundance in
the great ocean depths,—in the Atlantic at 2650
nd in the Pacific at 3000 fathoms,—so that they
exist wherever the nature of the bottom is
e. (Sir Wyville Thomson, *Depths of the Sea:*
from the 'Challenger,'" *Proc. Roy. Soc.*, vol.
owerbank's "Papers on Sponges" in *Proceedings*
ical Society, 1869–1874.)

Actinozoa.—The coral-bearing groups of these animals are the more important, because of the abundance of fossil forms of every geological age. By far the greater number of these are found exclusively in tropical seas. Many of the *Alcyonaria* are temperate and even Arctic, while among the *Zoantharia* the *Caryophyllidæ* alone are well represented beyond the tropics. The distribution of corals is in great part determined by the physical conditions of the sea-bottom. An influx of fresh water or of mud brought down by rivers is fatal to them, and volcanic deposits seem to be almost equally prejudicial. A high temperature is also necessary for most of the groups. Coral reefs are therefore restricted to certain seas and coasts within or near the tropics. They abound in and near the West Indies, on the east coast of Africa, in the Indian Ocean, in the Malay and Pacific archipelagoes, and on the coast of Australia; while they are absent from the whole of the west coasts of South America and of Africa, from the Indian peninsula, and from much of the east coast of South America. The coral-reefs of the Bermudas, in 33° N. lat., are the farthest from the equator; in the Red Sea they reach 30° N., in the Pacific 27° N., while they nowhere extend to more than 29° S. of the equator. Besides the corals actually forming the reefs, the same localities abound in what are termed deep-sea corals, and thus the general distribution of the group is determined by similar conditions. The coral regions are therefore somewhat peculiar, and differ considerably from those which best exhibit the distribution of other marine animals. The regions adopted by Mr Dana are three,—the first comprising the Red Sea and Indian Ocean; the second, the whole of the Pacific islands and the adjacent coasts of Australia; and the third the West Indies. This last region is the most isolated in position, and it is not surprising that it should contain the largest proportion of peculiar forms. The corals of the Central Pacific are also very peculiar, as are those of the Red and Indian seas. Considering the great similarity of the molluscan fauna of the Pacific and Indian oceans, it is remarkable that the corals should be so different as Mr Dana's tables show them to be. Although some corals exist at great depths in the ocean, they diminish rapidly when we pass the moderate depth of 200 fathoms. The "Challenger" expedition obtained 27 genera at a greater depth than 250 fathoms, but only 3 of these extended below 1500 fathoms. Count Pourtales on the American coast found them at 400 fathoms; the "Porcupine" expedition first found them at a greater depth than 1000 fathoms in the North Atlantic; while in the Pacific a single species has been found at the enormous depth of 2900 fathoms. The following genera were obtained by the "Challenger" dredgings at a greater depth than 1000 fathoms:—*Caryophyllia*, *Deltocyathus*, *Ceratotrochus*, *Flabellum*, *Amphehelia*, *Cryptohelia*, and *Fungia*. Some of these were of brilliant colours—pink, madder-red, white, and emerald green. A large proportion of fossil genera of corals survive in the deep seas, no less than seven genera, before only known in the fossil state, having been added by the explorations of the "Challenger;" seven of these are found at or below 1000 fathoms. It is curious, however, that the deepest by far of all corals, *Fungia*, is not known to be fossil, nor is any member of the family *Stylasteridæ*, six genera of which are deep-sea corals; so that too much importance must not be attached to the fact of genera hitherto only known as fossils having been found living at great depths in the ocean. (Dana's "Zoophytes" in *U.S. Exploring Expedition*, vol. vii.; "Report on Corals Dredged by the 'Challenger,'" by H. N. Moseley, *Proc. Roy. Soc.*, vol. xxiv. p. 544.)

Polyzoa.—The coral-like Molluscoida forming the extensive group of marine polyzoa, have been carefully studied, but they are so widely distributed as to offer few special features of distribution. One or two families—as the *Selenariadæ*—are almost exclusively tropical; others—as the *Catenicellidæ* and *Vinculariadæ*—are confined to the southern hemisphere. The *Diastoporidæ* are mostly northern, while the *Celleporidæ* are found in both north and south temperate seas. But the great mass of the families are either universally distributed or widely scattered over the globe. They range to high northern latitudes, having been found abundantly by the Swedish expedition on the shores of Nova Zembla in 70° N. lat. They inhabit the profound depths of the ocean, having been dredged from near 2000 fathoms in the North Atlantic, 2500 fathoms in the Pacific, and 2650 fathoms in the Southern Ocean during the voyage of the "Challenger." (Busk's *Brit. Mus. Catalogue of Marine Polyzoa*; "'Challenger' Reports," *Proc. Roy. Society*, vol. xxiv. pp. 466, 468, 572, 635.)

Echinodermata.—The best-known groups—the starfishes and sea urchins—occur abundantly as fossils, but their existing distribution does not offer many features of special interest. The *Asteroidea*, or star-fishes, are most abundant in the Indian and Pacific oceans, while the *Ophiuroidea* (brittle stars) are better represented in the European and African seas. A few genera are exclusively American, but on the whole star-fishes are far less abundant in the western than in the eastern hemisphere. Although most abundant in shallow seas, they also inhabit the floors of the deepest oceans, some having been obtained by the "Challenger" expedition from a depth of 2700 fathoms in the Pacific. They abound even in the Arctic seas, "hundreds of specimens" having been obtained by a single haul of the swab at 76° N. lat. in Novaya Zembla by the Swedish exploring ship "Proven" in 1875. The *Echinoidea* (sea-urchins) are also very abundant in Eastern seas, while they are comparatively scarce in America. Although much larger and more varied in the tropics, they are tolerably abundant in temperate and cold seas; and they probably reach the greatest depths in the ocean, since some have been obtained by the "Challenger" from a depth of nearly 3000 fathoms in the North Pacific. (*Nature*, vol. xii. p. 556; Van der Hoeven, *Handbook of Zoology*.)

Crustacea.—The distribution of the higher Crustacea has been discussed in detail by Mr James Dana in the *Zoology of the United States Exploring Expedition*; and, [illegible] most of the species are shore-dwellers, the facts [illegible] very interesting and often quite unexpected. We [illegible], give an abstract of the conclusions of this [illegible]

[illegible] which best represent the distribution [illegible] are three in number, termed by Mr Dana [illegible] the Africo-European, and the Oriental. [illegible] both [illegible] of the American continent; [illegible], the eastern [illegible] of the Atlantic [illegible] African [illegible], and the third comprehends the vast area [illegible] of Africa to the Central Pacific. Each [illegible] of course subdivided into climatal and local [illegible] the primary divisions alone are those which [illegible]. The facts [illegible] in support [illegible] of distribution are very interesting. No [illegible] 17 genera are exclusively American, and 15 are [illegible] and [illegible]; but as 26 genera [illegible] to the west [illegible], and 6 to the east, [illegible] provinces are really very di[illegible] [illegible] primary [illegible]. The [illegible] 19 peculiar genera, and only 8 [illegible] that the eastern [illegible] Atlantic are [illegible] more [illegible] of America. The [illegible] is far the richest, containing no less than 115 peculiar genera, and only 19 in common with the Africo-European region. About 40 genera are said to be found in all three regions.

The distribution of Crustacea in relation to temperature also presents some peculiar features. The species are almost equally divided between the tropical and the extra-tropical regions. The highest form of Crustacea—the Brachyura—are most abundant in the tropics, while the less developed Amphipoda and Isopoda are more numerous in temperate and frigid zones. This may, however, in part depend on these groups having been less assiduously collected in the tropics. More interesting, and less open to doubt, is the fact that among the four chief types of Crustacea—Brachyura, Macroura, Isopoda, and Amphipoda—the most highly developed species are extra-tropical. The largest species of the Macroura are found in temperate seas, and though the largest Brachyura are tropical, yet the Maioids—the highest group of Brachyura and of all Crustaceans—reach their largest dimensions in the temperate zone. Mr Spence Bate adduces the curious fact that in the cosmopolite sub-family *Lysianassina*, the largest species are found in Arctic and Antarctic latitudes, while a species from the Straits of Magellan so closely resembles one from Spitzbergen that they may even be identical; and in the family *Caprellidæ* the same species often occurs in both the northern and southern hemispheres. Mr Dana lays great stress on similar cases of wide and discontinuous distribution, which (he considers) necessitate the adoption of the theory of special creations. Thus, two species (*Kraussia rugulosa* and *Galene natalensis*) are found at the Hawaian islands and Natal, but in no intermediate localities. Other identical species occur in the Japan seas and Natal. The same species (*Plagusia tomentosa*) occurs in South Africa, New Zealand, and Valparaiso; and another (*Cancer Edwardsii*) at New Zealand and Valparaiso. The same species and several identical genera (*Latreillia, Ephyra, Sicyonia*) are found in the Mediterranean Sea and Japan, but in no intermediate districts. Closely allied species (of the genera *Amphiroidea* and *Ozius*) are found in Australia and Chili; but perhaps the most singular fact is the occurrence of closely allied or perhaps identical species of *Palæmon* in New Zealand and the British Seas, and also of certain British or American genera (as *Portunus* and *Cancer*) in New Zealand. Many of these cases, and more especially the last, undoubtedly offer great difficulties on the theory of transmission and specific modification. There are, however, some considerations which afford hints for a possible solution of the difficulty. We now know many cases in which the distribution of an animal or a group of animals has been rendered discontinuous by its recent extinction in intermediate localities. The tapirs, for example, exist only in tropical America and the Malay islands, and it might well be argued that no passage from one of these localities to the other is conceivable for such an animal. But we now know that the South American tapir lived in North America down to post-Pliocene times, that in Europe there were tapirs in the later Pliocene period, while in the [illegible] or Miocene period allied species inhabited North India and some parts of China. The present remotely isolated forms are therefore seen to be the remnants of a genus which once ranged over almost the whole northern hemisphere. Perhaps more to the point is the case of the genus *[illegible]* [illegible] by Mr Woodward in his *Manual of the Mollusca*. There are only 11 living species, which [illegible] in the northern seas, the Cape of Good Hope, Australia, New Zealand, and Patagonia. But of the same genus [illegible] fossil species are known, distributed over many intermediate localities, so that the [illegible] to be but relics of an ancient form of life lingering at various points on the outskirts of the a it once occupied. Such cases as these occur in es of animals where our knowledge of the extinct sufficiently extensive, and we are therefore justified ring that a large proportion of the existing instances nalous and discontinuous distribution are to be d in a similar way. In the case of the Crustacea ; also take into account our comparative ignorance parts of the globe, and especially our ignorance powers of dispersal of the ova, and of the young during their earlier larval condition. This disay systematically occur to a far greater extent than ret aware of; though only in rare and exceptional s may a species succeed in maintaining itself the normal limits of its race. The certainty we are quiring of the long duration and wide-spread e of the glacial period must also materially affect estions as these; for although the equatorial lowy never have suffered from its influence, it is highly that during the period of greatest cold the ture of the entire ocean may have been lowered, certain directions cold currents may have afforded e for temperate forms of marine animals from the to the southern hemisphere. While admitting, e, that the distribution of Crustacea presents to us oblems of extreme difficulty, we must deny that e such as to justify us in resorting to a solution "special creation," which is negatived by the afforded by almost every other class of animals.

reports of the "Challenger" expedition already ed afford valuable information on the distribution tacea in the oceanic depths. The higher forms oda) have been found living at a depth of 1875 in the North Pacific, 2600 fathoms under the , and 2385 fathoms in the South Pacific. In the Atlantic, at a depth of 1900 fathoms, was found a allied to the *Astacidæ*, but deprived of even the nts of eyes, while others equally blind (from both antic and Pacific) are believed to have their nearest mong the extinct *Eryonidæ* of the Jurassic period. her Crustacea, which are most abundant at great and which have afforded the greatest variety of new eresting forms, belong to the Schizopoda. They een found at depths of more than 2000 fathoms in cific, and down to 2550 fathoms in the Atlantic Some of them are blind, but a more remarkable that many of them are brightly coloured, though in absolute and perpetual darkness. Among the halmata (sessile-eyed Crustacea) examples of the able blind family *Munopsidæ* have been found at a f 2175 fathoms in the Atlantic, and at nearly 2000 in the Southern Ocean. Other forms usually n shallow water (*Serolis*) also occurred at great —more than 2000 fathoms in the Pacific; and one , obtained near the southern ice-barrier at a depth 1900 fathoms, was of "a fine blue colour with a t over the middle of the body." Entomostraca also at great depths, the most remarkable being a Ostracod found at 1600 fathoms in the Southern At 1375 fathoms, near the Crozets, a Pycnogonoid der) was obtained, measuring 2 feet across the legs. sides these bottom-dwellers, the trawl nets at t depths showed that the ocean is inhabited by tribes of free-swimmers—principally Copepoda, oda, and Cypridinas, often of a bright orange These occurred in all parts of the Pacific to a depth fathoms, but they were never found in the surface (*United States Exploring Expedition*, vols xiii. and Spence Bate on "Geographical Distribution," in Bate and Westwood's *British Sessile-Eyed Crustacea*; dolf von Willemöes-Suhm's "Report on the Crustacea of the 'Challenger,'" *Proc. of the Royal Society*, vol. xxiv. p. 585.)

Cirrhipedia.—The barnacles are a tolerably extensive group of anomalous Crustacea, whose distribution differs somewhat from that of the more typical portion of the class. The genera are almost all widely or universally distributed, from 74° 18′ N. lat. to Cape Horn, and some of the species have an equally wide range. No genus having more than a single species is confined to the torrid zones, and only two genera are limited to the southern hemisphere. Although the temperate zones have a smaller area than the torrid, they possess rather more species of Cirrhipeds, which Mr Darwin imputes to the fact of these zones being *two*, while the torrid is but *one*. As in some groups of the higher Crustacea, large species are most abundant in the temperate zones. Owing to the wide range of the *genera* the Cirrhipedal regions can only be determined by the distribution of *species*. These, according to Mr Darwin, are as follows:—1. The North Atlantic, comprising North America and Europe down to N. lat 30°; 2. The West American, from Behring Straits to Tierra-del-Fuego; 3. The Malayan, from India to New Guinea; 4. The Australian, comprising Australia and New Zealand. The Malayan and Australian regions are the richest in Cirrhipeds. During the voyage of the "Challenger" these animals were found to inhabit the deep seas, the most remarkable being a gigantic *Scalpellum* from a depth of 2850 fathoms in the North Atlantic, while other forms occurred at almost the same depth in the Pacific. (Darwin's "Monograph of Cirrhipedia," *Ray Society*, 1854.)

Mollusca.—The marine Mollusca, from their great abundance in all seas, the ardour with which they have been collected and studied, and the frequency of their occurrence as fossils, offer an extensive field for the study of distribution. But many causes have combined to render the results yet arrived at unsatisfactory. Their classification has been for some time undergoing a progressive change, owing to the greater attention paid to the organization and development of the animals, but there is still much uncertainty as to the limits of genera and sub-genera. Owing to their being in many cases articles of commerce, either on account of their uses or their beauty, the place where they were originally obtained has often been confused with the place from which they were exported. Their numbers, too, have so rapidly increased that few persons have been found to devote themselves to the great labour of geographical tabulation. And, lastly, the genera are so often of great extent and world-wide distribution that the range of species alone has generally been attended to.

The late Dr Woodward established a series of eighteen marine provinces, founded professedly on the fact of one-half of the species being peculiar. The distribution of the genera is only casually mentioned, and it is almost certain that a large number of these provinces have no claim to rank as primary regions as regards the distribution of the Molluscan fauna. Dr Woodward himself states that his Arctic province is comparatively small and exceptional, while the three southern faunas of America, Africa, and Australia differ extremely. All the warmer provinces may, he says, be naturally grouped into three great divisions—the Atlantic, the Indo-Pacific, and the West American; and these are perhaps the only true Molluscan regions. The Indo-Pacific extends from the Red Sea and east coast of Africa to the easternmost Pacific islands, and exactly corresponds to Mr Dana's Oriental region for Crustacea. About 100 species are said to range over nearly the whole of this vast area. The Atlantic region unites the fauna of the east coast of America with that of West Africa and South Europe, but it also has considerable affinity for that of West America, since about 60 genera are common to both. Several important genera appear to be restricted to the north temperate zone, which should perhaps form a distinct region. About 30 important genera are confined to the Indo-Pacific region; and nearly 20 are peculiarly tropical. The Atlantic coasts have few peculiar genera of importance, and the west coast of America hardly any, its difference from the Atlantic fauna on the one side and the Pacific on the other being chiefly specific. There is said to be not a single species common to the east and west coasts of tropical South America; while the corresponding coasts of North America have more than 50 species in common, and many others so closely representative as to be almost equivalent to identical species.

The shells of the Mediterranean were once supposed to be very peculiar, but recent dredgings have proved that most of them exist also in the Atlantic, and it is now doubted if any are really confined to that sea. A small number (about 70 or 80 species) are identical with Red Sea shells. The marine-shells of Australia and New Zealand are exceedingly unlike those of Britain,—exactly the reverse of what obtains among the Crustacea.

The influence of temperature on the distribution of Mollusca is very marked, the warmer regions presenting a greater variety of forms, with a greater proportion of large and finely-coloured species. Yet in some cases the largest species are extra-tropical, a striking example being found among the volutes, which abound in tropical seas, yet attain their largest size in New Zealand. In temperate and even in Arctic seas Mollusca are perhaps as abundant individually as in the tropics, but the number of species and genera is far less, and they are generally dwarfed in size, and of obscure colours.

Till a comparatively recent period very few shells had been obtained at a greater depth than 200 fathoms. These were mostly of small size and obscure colours, belonging to groups of wide range and great geological antiquity. *Dentalium*, *Cryptodon*, *Leda*, and *Arca* were the most important, and it was generally believed that the zero of Molluscan, if not of all but the very lowest forms of life, would be found at a depth of 300 or 400 fathoms. The recent development of deep-sea dredging has, however, completely changed our ideas on this subject, and the Mollusca as well as most other groups of Invertebrata are found to be capable of existing in the profoundest depths of the ocean. Off the coast of Norway Professor Sars has obtained Mollusca from a depth of 450 fathoms; and near Florida, Agassiz found them at 500 fathoms. During the cruise of the "Porcupine" Professor Wyville Thomson obtained species of *Pleurotoma* and *Dentalium* from the enormous depth of 2500 fathoms in the Bay of Biscay. During the recent voyage of the "Challenger" many other groups have been discovered in the deepest seas. In the North Atlantic, 500 miles west of Teneriffe, three small living Mollusca belonging to the genera *Arca*, *Limopsis*, and *Leda* were dredged from a depth of 2740 fathoms; while in the Central Pacific, from a depth of 2425 fathoms, species of *Arca*, *Neæra*, *Pleuronectia*, *Trochus*, *Fusus*, *Dentalium*, and some others have been obtained. All are small obscurely-coloured forms, resembling Arctic rather than tropical shells, due no doubt to the fact that in these profound depths the water is permanently at a temperature very little differing from that of melting ice. Equally interesting is the fact ascertained by the naturalists of the "Challenger," that the waters of the ocean down to the enormous depth of 1500 fathoms abound with true pelagic Mollusca belonging to the orders Pteropoda, Heteropoda, and Gasteropoda, while below this limit they appear to be absent (Woodward's *Manual of the Mollusca*; "'Challenger' Reports," *Proc. Royal Society*, vol. xxiv. pp. 536, 578; Letters of Sir Wyville Thomson, *Nature*, vols. 7–10.)

Fishes.—The distribution of marine fishes appears to agree generally with that of the Mollusca and Crustacea; their greater powers of locomotion, leading to a wider dispersal, being to some extent compensated by the more recent origin of most of the species, genera, and families. There are about 80 families of marine fishes, and no less than 50 of these are almost universally distributed. Several other families range over all tropical seas. About 5 families are found only in the Arctic and temperate seas of both hemispheres, while two (*Discoboli* and *Accipenseridæ*) are found in the north temperate seas only. The best marked region is undoubtedly (as in the Mollusca and Crustacea) that which extends from the Red Sea and east coast of Africa to the Sandwich Islands and Australia. About ten families are confined to this region (which may be termed the Oriental or Indo-Pacific marine region); many genera of other families equally characterise it, while there are even a number of species which range over the greater part of its vast area. On the other hand, no family of importance seems to be confined to the Atlantic, or to the coasts of Eastern or Western America, the differences of these provinces, as of the European and American shores of the Atlantic, being confined to generic and still more largely to specific forms. Many species of fish have enormous ranges, extending from the North Atlantic to Australia, from the Red Sea to the Sandwich Islands, and from New Zealand to South America. Some species range over almost the whole Atlantic Ocean, and a considerable proportion of those inhabiting the Atlantic and Pacific coasts of Central America have been found by Dr Günther to be identical.

It has long been known that a considerable number of fishes inhabit very deep water, never coming to the surface when alive; but the researches of the "Challenger" expedition have added greatly to our knowledge of these curious forms. A large number of genera and species, many of them new, and belonging to ten distinct families, have been obtained in the nets and trawls from a depth of 200 to 2400 fathoms in all the great oceans. These often come up greatly inflated by the expansion of the internal gases; some were transparent, several were blind, and some had curious phosphorescent organs on the head. These deep-sea forms generally have a wide range. The greater number of the new and remarkable forms obtained during the voyage of the "Challenger" belong to the *Scopelidæ*, a family known to inhabit the deep waters of all the warmer seas. The size attained by marine fishes appears to have no relation to latitude or temperature. (Günther's *British Museum Catalogue of Fishes*; Mr J. Murray's "Preliminary Report on Vertebrates collected by the 'Challenger,'" *Pro. Roy. Soc.*, vol. xxiv. p. 537.)

Marine Turtles.—These reptiles, forming the family *Cheloniidæ*, are too few in number and too widely distributed to afford any indications as to oceanic regions.

Cetacea.—The whales and dolphins form the only group of truly oceanic Mammalia. They are very widely distributed, but their classification is too unsettled, and their history too imperfectly known, to throw much light on the general question of oceanic distribution. Two of the families—*Balænidæ* and *Balænopteridæ*—seem to be confined to the cold and temperate seas of both hemispheres. The *Catodontidæ* (comprising the sperm whales), on the other hand, are more especially tropical and sub-tropical. The *Hyperoodontidæ*, or beaked-whales, are widely distributed in northern, southern, and tropical seas; while the largest family—the *Delphinidæ*—are universally distributed. The largest whales inhabit the cold northern and southern seas. (Dr J. E. Gray's *British Museum Catalogue of*

Whales and Seals ; Mr Andrew Murray's *Geographical Disribution of the Mammalia.*)

General Relations of Marine with Terrestrial Zoological Regions.—The general facts of distribution of marine nimals now adduced accord very well with what we know f those terrestrial changes which have led to the actual istribution of land animals. The great Indo-Pacific region —so well marked in every important group of marine nimals—probably owes its individuality to the fact that ustralia has been isolated during the whole of the Tertiary, nd probably during much of the Mesozoic epoch, while umerous islands in the Indian and Pacific oceans have lways afforded an extensive shore-line favourable to the evelopment of aquatic forms of life. The Atlantic has robably been for long periods even more inclosed than it s now, owing to the greater southward extension of South Africa and South America; while the profound depths of ts central channel have served as a barrier between the nhabitants of the shallow waters of its eastern and western shores. In like manner the great trough of deep water which separates the most eastern groups of the Pacific slands from the west coast of America has necessarily led to the establishment of distinct oceanic faunas in these regions; while this very fact—the remarkable distinctness of the Pacific and West American faunas—tells us plainly that this barrier of deep ocean is one of the ancient features of the earth's surface.

We shall find, too, that many of the details, and not a few of the anomalies, of the distribution of marine animals become intelligible from our knowledge of past geographical changes. The considerable affinity between the Crustacea, Mollusca, and fishes of the eastern and western coasts of America exactly corresponds to the fact, clearly established by a consideration of the distribution of living and extinct land animals, that these oceans have been united, at several distinct periods, by two or more channels over what is now Central America, the final union of the two continents being comparatively recent. The fact that the uniting channels were always situated within the same limited area sufficiently explains the considerable amount of generic and specific difference of two faunas ranging over coast-lines running north and south for many thousand miles on the opposite sides of great continents. The curious fact (only recently established) that so deep and extensive an inland sea as the Mediterranean contains but few peculiar marine animals, becomes quite intelligible when we consider that till middle or late Tertiary times it consisted of two inland seas or lakes. Such inland seas are always very poor in animal life; and it is therefore not surprising that the Mediterranean should now contain hardly any forms but such as it has received from the Atlantic, or from the Red Sea during a submergence of the Isthmus of Suez. The numerous allied or even identical forms in the northern and southern oceans, which are not found in the intervening warm regions, are more difficult to explain. Mr Darwin believes that such facts are due to the action of the glacial period, which at its height may have cooled certain racts of the tropical ocean sufficiently to allow temperate orms to cross from the northern to the southern hemiphere or the reverse. Perhaps, however, the agency of ebergs may have been sufficient without any permanent ooling of the equatorial ocean; for even now these huge oating glaciers often reach to 40° N. lat. and 35° S., nd, Captain Maury assures us, sometimes even reach he tropics. We may therefore well suppose that during he height of the glacial period icebergs would not only gularly reach the tropics, but, carried on by currents in efinite lines, might often pass across the equatorial zone, arrying with them a girdle of cold water in which many nhabitants of the Arctic or Antarctic seas might safely make the passage to another hemisphere. The fact that many forms of plants peculiar to cold or temperate regions are found scattered on isolated mountain summits in the tropics is, as Mr Darwin has shown, to be explained only by the influence of an extreme glacial period, and this must have produced analogous effects on the inhabitants of the ocean. (*Origin of Species*, 6th ed. p. 330.)

DISTRIBUTION OF ANIMALS IN TIME.

This subject will necessarily be treated in some detail under the articles GEOLOGY and PALÆONTOLOGY. Here we shall only sketch its outlines and general principles.

The past history of living things as revealed by geology is an ever-changing panorama. At each successive stage some forms disappear, while new ones take their place. The farther we go back the more unlike is the general assemblage of animals and plants to that which now exists. If we confine our attention to any one class or order of animals, we find that it makes its first appearance at some definite epoch, and, under successively changing forms, either continues till the present time, or reaches a maximum, diminishes, and finally disappears. Thus some groups are altogether modern, others extremely ancient; some have run through all their phases in a comparatively short period, others have lived from the earliest epochs of the earth's history of which we have any record and still survive. If we could be sure that the numerous fossils yet discovered gave us anything like an adequate idea of all the varied forms of life that had ever lived upon the globe, and the order in which they had appeared, we should be in a position to decide as to the truth and value of the development hypothesis. But the more we examine the question, the more certain it becomes that the "geological record," as it is termed, is extremely imperfect, and that the whole of the extinct animals which we have discovered do not form any fair representation of the entire series that have lived upon the earth. This is the case even with the more recent deposits and those which are richest in animal remains; but as we go back into the past the record becomes more and more imperfect, till in the Secondary, and still more in the Palæozoic formations, we only have preserved to us a few scattered fragments, equivalent perhaps to a few pages with here and there a short chapter taken at random out of a voluminous history. The causes of this necessarily imperfect record of the past have been fully discussed by Sir Charles Lyell and Mr Darwin; we need only refer here to two general causes of such imperfection. The first is, that every aqueous deposit is formed by the wearing down of previous deposits, so that the records of one age are, to a large extent, necessarily destroyed to provide the records of the next, which in its turn is destroyed in a succeeding age. The other cause of imperfection is, that extensive areas are always sinking (to allow new deposits to be formed over them), and are being subjected to subterranean heat to such an extent as to change their texture and obliterate their fossils, when they become crystalline or metamorphic rocks. The more recent deposits so acted on will rarely have had time to have become raised above the sea-level, and subsequently exposed by denudation; yet certain Eocene strata in the Alps are stated by Sir C. Lyell to be truly metamorphic (*Students' Elements of Geology*, p. 600). The older a formation is, therefore, the more frequently will it have been exposed in one area or another to this metamorphic action; and it follows that, going backward in time, we shall at last come to a period, all the formations antecedent to which will have become metamorphosed, and their fossils, if any, obliterated. We appear to have almost reached such a state of things at the base of the Palæozoic rocks; and there is good reason to believe that an extensive series of fossiliferous deposits may have once existed, whose record of the earlier stages of the history of life upon the earth has been either destroyed by denudation or obliterated by internal heat. This being the case, we must carefully distinguish between positive and negative evidence; and we may also fairly apply such principles as can be established by means of the fuller record afforded by the Tertiary deposits, to interpret the more scanty and fragmentary record with which we have to deal in the older rocks. We will now proceed to sketch very briefly the successive stages of the development of animal life as indicated by the materials at our command.

The lowest and most ancient of all the stratified rocks is the Laurentian, consisting of crystalline beds of gneiss, mica-schist, quartzite, and limestone, reaching in Canada the aggregate thickness of 30,000 feet. The whole mass was long thought to be destitute of organic remains, till in one of the beds of limestone in the lower part of the series a curious structure was discovered, which is held by Dr Carpenter and Professor Rupert Jones, who have made a special study of the Foraminifera, to be the fossilized remains of one of that group of the Protozoa. It has been named *Eozoon canadense*, and if really organic (which is denied by some naturalists of eminence) is by far the oldest trace of animal life. The Upper Laurentian deposits, 10,000 feet thick, lie unconformably on the lower, and seem to be entirely destitute of fossils.

The next formation is the Cambrian, largely developed in Wales, Scandinavia, Bohemia, and North America, and consisting of a variety of distinct deposits. But in the very lowest of these (the Longmynd group) abundant organic remains have recently been found, comprising perfectly developed brachiopodous and pteropodous Mollusca, entomostracous Crustacea, and Trilobites. In the overlying beds of the same formation similar forms abound, and are accompanied by sponges, annelids, graptolites (which are supposed to be peculiar extinct Hydrozoa), starfishes, and encrinites. Here also first appear lamellibranchiate Mollusca, belonging to the families *Arcadæ*, *Nuculidæ*, and *Atlantidæ*, and there are even some *Orthoceratidæ*, belonging to the highest order of molluscs—Cephalopoda. The Trilobites are already wonderfully varied, the smallest and largest kinds being found here (one 2 feet long), species with the least and with the greatest number of rings, blind Trilobites, and others with the most largely developed eyes. (Lyell's *Students' Elements of Geology*, pp. 483, 485, 634.)

We next come to the Silurian formation, in which we first meet with corals, of the three great divisions Rugosa, Tabulata, and Perforata,—ostracode Crustaceans, Trilobites in enormous variety, Merostomata—extinct Crustaceans of gigantic size, Echinoidea (*Palæchinus*), and true gasteropodous Mollusca. And lastly, in the Upper Silurian deposits, we find vertebrates, whose first representatives are several genera of fishes belonging to the Ganoid and Plagiostomous groups.

In the succeeding Devonian formation we find an abundance of new families of fishes, a fresh-water mussel of the living genus *Anodon*, and no less than six forms of winged insects. These have been found in the Devonian rocks of New Brunswick, and are considered by Mr Scudder to be ancient forms of Neuroptera.

The Carboniferous formation is very rich in animal as well as vegetable remains; and, along with most of the animals already met with, we find several higher types of great interest. The higher macrurous Crustacea (*Anthrapalæmon*) are here first met with, as are true air-breathing molluscs, numerous specimens of the living genera, *Pupa* and *Zonites*, having been found in the coal-fields of Nova Scotia. Along with these are insects of various orders—Myriapoda, scorpions, spiders, Orthoptera, Neuropter Coleoptera, and even Lepidoptera. Here, too, we me with air-breathing vertebrates—the Labyrinthodont ancient forms of Amphibia which occur in considerab abundance and variety. (Lyell's *Students' Elements*, 408; *Annales de la Société Entomologique de Belgiq* 1875, tom xviii., where a wing from the coal-measur closely resembling those of moths belonging to the famil *Saturniidæ*, is photographed.)

In the Permian formation, which closes the series Palæozoic rocks, we have the important addition of tru Lacertian reptiles (*Protorosaurus*), which, according Professor Huxley, differ wonderfully little from some livi groups. What are supposed to be Chelonian footprin have been discovered in the Permian sandstones Dumfriesshire. (Huxley's *American Addresses*, p. 41.)

Entering the Secondary period with the Triassic for tion, we at once meet with higher forms of life. Am Crustacea we first find traces of the brachyurous divi of Decapods (Etheridge, in Lyell's *Students' Element* 632) and many new forms of Mollusca. Among rep the Dinosauria, Dicynodontia, Plesiosauria, and Croco appear; what seem to be undoubted footprints of birds been found in the New Red Sandstone of Connecticut. figures in Lyell's *Students' Elements*, p. 371, and Nichol *Palæontology*, p. 389); and all improbability of this appearance of birds is removed by the fact that a li higher in the same formation remains of a true Mammali have been undoubtedly discovered. This is the *Micro* founded on well-preserved teeth from a bone bed in Upper Trias of Würtemberg, and since found also the Rhætic beds of Somersetshire; while in roc supposed to be of the same age in North Carolina lower jaw of an allied form (*Dromatherium*) has bee obtained. Both are believed to be Marsupials, and mo nearly allied to the *Myrmecobius* of Australia.

In the Jurassic or Oolitic period, the main forms of lif which have already appeared are further developed. Insects of all orders are found, and they can mostly be cl in existing families and even genera, as—*Locusta*, *Ne* *Sphinx*, *Termes*, *Ephemera*, *Agrion*, *Æshna*, *Agr* *Prionus*, *Libellula*. (Rev. P. B. Brodie, in *Proc. War* *shire Nat. Hist. Soc.*, 1873.) Among reptiles, *Chel* and *Ichthyosauria* are added. Of birds we have the lo tailed and feathered *Archæopteryx*; while no less than ei genera of small Mammalia have been discovered, of them Marsupials, though some may have been ance forms of Insectivora. Many living genera of shells, b marine and fresh-water, first appear; and among fishes, sharks of the existing family *Notidanidæ*.

In the Cretaceous period, we make a still furt approach to living forms. The highest Crustacea (B chyura) are tolerably abundant, and the living genus *C* appears. Mollusca (Lamellibranchiata and Gasteropo are represented by a number of living genera. Malac terous fishes now appear. Reptiles are still mostly extinct types — Pterosauria, Ichthyosauria, Dinosau &c.; but among birds we find some allied to exist waders, as well as the curious extinct group of Od tornithes, or toothed birds. (Marsh, in *American J* *of Science and Arts*, vol. x. 1875.)

When we pass over the great chasm of time wh separates the Mesozoic from the Cainozoic or Tert period, we at once come upon a host of new forms clo resembling those which now live upon the earth. majority of living genera of Mollusca now appear, wi gradually increasing proportion of living species, as we from the Eocene to Miocene and Pliocene times; highest forms of Crustacea are plentiful; Insects orders, and almost all of living genera, abound;

living genera gradually appear, and true snakes (*Ophidia*) are first met with. Among birds, all the existing orders, many families, and some living genera appear in the Miocene period. Mammalia, however, exhibit the most surprising advance. Ancestral forms of all the existing orders are found in the Eocene formation; in the Miocene, most living families are well developed; while in the Pliocene and post-Pliocene deposits we find the genera and species for the most part closely resembling those that still inhabit the earth. The following diagrammatic table will enable the reader better to comprehend the main facts which we have here endeavoured to set forth. It comprises only the larger or more important groups of animals, and of each of these the known range in time is indicated by a thick line. It has not been attempted to show the breaks which occur in our knowledge of the range of a group, since no one now doubts that where any type appears in two remote periods it must have been in existence during the whole intervening period, although we may have no record of it. Neither has it been attempted to indicate the abundance or scarcity of the group in each period, this being a detail suited only to a special treatment of science of palæontology. It must also be remembered that it is often impossible for us to determine whether the increased prevalence of fossil remains of a particular group is due to a really greater development of the animals, or only to more favourable conditions for their preservation and discovery.

TABLE SHOWING THE RANGE IN TIME OF THE MORE IMPORTANT GROUPS OF ANIMALS.

ANIMAL GROUPS.		PALÆOZOIC.							MESOZOIC.						CAINOZOIC.				
		Laurentian.	Cambrian.	Lower Silurian.	Upper Silurian.	Devonian.	Carboniferous.	Permian.	Trias.	Lias.	Oolite.	Purbeck.	Wealden.	Cretaceous.	Eocene.	Miocene.	Pliocene.	Post-Pliocene.	Recent.
PROTOZOA	Foraminifera	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Spongida		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CŒLENTERATA	Graptolitidæ		—	—	—														
	Corallaria			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
ECHINODERMATA	Crinoids		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Asteroids		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Echinoids				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
CRUSTACEA	Cirrhipedia				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Entomostraca		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Trilobita		—	—	—	—	—												
	Merostomata				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Isopoda					—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Macroura						—	—	—	—	—	—	—	—	—	—	—	—	—
	Anomoura											—	—	—	—	—	—	—	—
	Brachyura										—	—	—	—	—	—	—	—	—
ARACHNIDA							—	—	—	—	—	—	—	—	—	—	—	—	—
MYRIAPODA							—	—	—	—	—	—	—	—	—	—	—	—	—
INSECTA						—	—	—	—	—	—	—	—	—	—	—	—	—	—
MOLLUSCA	Brachiopoda		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Lamellibranchiata		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Gasteropoda Branchifera			—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Gasteropoda Pulmonifera						—	—	—	—	—	—	—	—	—	—	—	—	—
	Pteropoda		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Cephalopoda		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VERTEBRATA	Pisces				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Amphibia						—	—	—	—	—	—	—	—	—	—	—	—	—
	Reptilia							—	—	—	—	—	—	—	—	—	—	—	—
	Aves								—	—	—	—	—	—	—	—	—	—	—
	Mammalia								—	—	—	—	—	—	—	—	—	—	—

On considering the successive phases of animal life presented to us by the fossil remains preserved in the rocks, we cannot help perceiving that there has been on the whole a steady advance in organization and an increase in variety and complexity, from the earliest geological periods to the present day. Thus the oldest known fossil belongs to the lowest type of animal life—the Protozoa. Then we have the lower forms of Mollusca,—Brachiopoda and Pteropoda—followed by the Cephalopoda and Gasteropoda.

The Entomostraca, Trilobites, and Phyllopods, come before the higher Decapod Crustacea, and of these the highest form—the Brachyura—appears much the latest. Again, all the aquatic classes of invertebrates appear in abundance before the earliest of the aquatic vertebrates—fishes—make their appearance. These are followed by Amphibia, and later still by true reptiles. The more highly organized birds and mammals appear later, and almost simultaneously.

There are, it is true, many anomalies, the higher and more complex organisms in some of the minor groups appearing before the lower; but these cases generally occur in the oldest (Palæozoic) formations, where, on the principles already laid down, the record must be necessarily more imperfect. In the Mesozoic and Tertiary formations the succession is more regular, and accords better with the grade of organization of the several groups, and the best examples of this are to be found among the Mammalia of the Tertiary period, the series of which is, in some groups, tolerably complete. Thus, among the Ungulata we find in the Eocene deposits the remains of a number of generalized types, such as the *Palæotherium*, allied to the horse, tapir, and rhinoceros; *Lophiodon*, an ancestral form of tapir; *Anoplotherium*, intermediate between pigs and ruminants; *Pliolophus*, allied to the tapir and horse; and the North American *Orohippus*, a remote ancestor of the horse.[1] This last-named animal, Professor Marsh tells us, had four toes in front and three behind, and was no larger than a fox; yet an almost perfect series can be traced, in succeeding deposits, of animals with smaller and smaller lateral toes, the size and speed increasing, the head and neck becoming longer, the canine teeth decreasing in size, the bones of the fore-arm consolidating, and other modifications successively taking place till we come, by almost imperceptible gradations, to an animal so completely unlike the one we started from as our existing horse. In like manner we have the extinct families of the *Anoplotheridæ*, *Anthracotheridæ*, *Oreodontidæ*, and many groups of doubtful affinities, which seem to be ancestral forms from which sprung the swine, hippopotami, and all our ruminants. These become more specialized in the Miocene; but it is only in the later Miocene and Pliocene that we find true deer, camels, oxen, and antelopes. So, the oldest form of the Carnivora, found in the very lowest bed of the Eocene formation, is the *Arctocyon*, one of the generalized types which cannot be referred to any existing family. A little later the *Canidæ* and *Viverridæ* appear, while the more specialized and highly organized *Felidæ* are not found till the Miocene period. To exhibit in detail the succession and affinities of extinct forms is the province of palæontology; we can here only give the chief facts in outline, which however are sufficient to render intelligible the great principle which almost all palæontologists have arrived at, viz.—that extinct animals exhibit more generalized structures, as compared with the more specialized structures of recent animals. (Owen's *Palæontology*, p. 406.)

Having now laid before our readers a sketch of the more important facts of the distribution of animals in time, we will conclude this branch of our subject with a brief discussion of its bearing on the theory of evolution, and on the imperfection of the geological record. The abruptness with which animal remains in considerable variety first appear in very ancient deposits is undoubtedly a most remarkable phenomenon. With the exception of the still somewhat doubtful *Eozoon*, the vast series of Laurentian rocks have produced no fossils. But the moment we enter the Cambrian formation we at once meet with a somewhat extensive series of complex and varied organisms. Besides the Brachiopoda we have Pteropoda, a by no means low form of Mollusca; while the Trilobites and Phyllopods exhibit a considerable amount of specialization. Almost as early, we have sponges, annelids, star-fishes, encrinites, lamellibranchiates, and Orthoceratidæ,—a variety of divergent and complex types, which, on any theory of development, indicates a very long succession of ancestral forms. But we must also bear in mind that the few fossiliferous deposits of this early age cannot possibly have made us acquainted with more than a minute fraction of the organisms which then existed on the whole earth. We are therefore compelled to believe that the absence of all remains of more ancient forms of life in the pre-Cambrian rocks is fallacious, and due solely to no record of them having been preserved, or, if preserved, to their not having been discovered by us. This conclusion is supported by analogous facts which occur and recur in every succeeding formation. The highly specialized corals and fishes of the Silurian rocks must have had ancestors in Cambrian times of which we know nothing; and the sudden appearance of perfectly developed winged insects in the Devonian formation, plainly tells us that during countless unrecorded ages various lower forms of terrestrial Annulosa must have been gradually developing into these marvellously specialized types,—yet these lower forms (Myriapods, &c.) only appear as fossils in the succeeding Carboniferous formation. Such highly organized insects also imply the existence of vegetation, and, by analogy, of other terrestrial animals of an equally high grade of development. Hence the discovery of these winged insects (which can, with great probability, be classed in one of our existing orders—the Neuroptera) opens up to the imagination of the evolutionist a wonderful picture, far removed from the dreary waste of waters which was once thought to characterize the epoch of the early Palæozoic formations. Geologists, indeed, have long taught us that the vast piles of sedimentary rocks of the Silurian, Cambrian, and even the Laurentian period necessarily implied the co-existence of extensive continents or islands whose denudation could alone produce them; and now the theory of evolution enables us to clothe these ancient lands with vegetation and people them with animal life, since it is only thus that we can find space and time sufficient for the development of the wonderful insects, the land shells, the Amphibia, and the reptiles,—all of which appear suddenly, in perfect and completely organized forms, in some parts of the Palæozoic series. When we consider that we have indications of the existence during the Carboniferous age of such diversified and highly specialized types of Annulosa as myriapods, spiders, cockroaches, locusts, dragon-flies, ephemeras, lamellicorn-beetles, and bombyciform moths,—so that it is highly probable that no fresh ordinal type of insects has originated during all succeeding ages, and when we further consider that all these are specialized modifications of simple Annulosa, we shall be forced to conclude that, whatever time may have elapsed from that epoch to the present day, a far longer time is required, antecedent to the Carboniferous period, to allow of the development of such varied terrestrial forms of life.

As bearing upon this question it is important to consider how scattered and fragmentary are the few indications of mammalian life older than those of the Tertiary period. Sir Charles Lyell tells us, that up to the beginning of the present century it was a generally received dogma in geology that the Mammalia had not been created before the Tertiary period; and the first discovery of the jaw-bone of a small Marsupial in the lower Oolite caused as much sensation as would now be excited by our finding a

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[1] A still more remote ancestral form *Eohippus* has since been discovered in the Lower Eocene deposits of West America. See Huxley's *American Addresses*, p. 90.

Secondary monkey, or (we may add) a Silurian bird or mammal. The following table is abbreviated from that in the *Students' Elements* (p. 315), as it is well calculated to show how scanty and accidental is our knowledge, and how necessarily imperfect must be the geological record in still earlier periods.

Number and Distribution of Fossil Mammalia from Strata older than the Tertiary.

SECONDARY STRATA.	Number of species.	Locality.	First Discovery.
Maestricht chalk	0	...	...
White chalk	0	...	...
Chalk marl	0	...	...
Upper Greensand	0	...	..
Gault	0	...	...
Neocomian (Lower Greensand)	0	...	...
Wealden	0	...	...
Upper Purbeck Oolite	0	...	...
Middle Purbeck Oolite	25	Swanage	1854
Lower Purbeck Oolite	0	...	...
Portland Oolite	0	...	...
Kimmeridge clay	0	...	...
Coral rag	0	...	...
Oxford clay	0	...	...
Great Oolite	4	Stonesfield	1818
Inferior Oolite	0	...	...
Lias	0	...	...
Upper Trias (Somerset, N. Carolina)	4	Würtemberg.	1847
Middle Trias	0	...	...
Lower Trias	0	...	...
PRIMARY STRATA.			
Permian	0	...	...
Carboniferous	0	...	...
Devonian	0	...	...
Silurian	0	...	...
Cambrian	0	...	...
Laurentian	0	..	...

For an account of the characteristics of these small animals, and for some details of their history, we refer the reader to Sir Charles Lyell's work; it is here only necessary to state the circumstances under which these remains have been preserved and discovered. Fossil remains of land animals are, of course, rarely found except in lacustrine or estuarine deposits; and these are often entirely wanting throughout extensive geological formations. But even where such fossiliferous beds occur, the conditions favourable to the preservation of small Mammalia are exceedingly rare,—the entire series of fresh-water Wealden beds having yielded no trace of them, although we are quite certain that they were then both varied and abundant. Even more remarkable is the fact that the whole 25 species of Purbeck mammals, belonging to 10 genera, were obtained from a single stratum only a few inches thick, and from an area of less than 500 square yards. Yet these small animals must have abounded at this period; and it is impossible to believe that anything but a most imperfect and fractional representation of the mammalian fauna of the country could have been gathered into this narrow graveyard. But this thin stratum occurs amid a mass of fresh-water deposits 160 feet thick, the whole of which have been thoroughly and systematically examined by the officers of the Geological Survey of Great Britain; and though many of the layers contain remains of land organisms—plants, insects, and land-shells—no other part of the whole series has yielded a single fragment of mammalian remains! Having this striking example of the worthlessness of negative evidence, it behoves us to be cautious of rejecting any legitimate conclusions from the facts in our possession, on account of the absence of the direct evidence of fossil remains. The varied and highly-developed Mammalia of the Eocene period really necessitate (to the evolutionist) the long-continued previous existence of this class of animals; and the discovery of isolated species in the Oolite and Trias would (had it been delayed to our time) have been but a confirmation of theoretical deductions.

In his anniversary address to the Geological Society in 1870, Professor Huxley adduces a number of special cases showing that, on the theory of development, almost all the higher forms of life must have existed during the Palæozoic period. Thus, from the fact that almost the whole of the Tertiary period has been required to convert the ancestral *Orohippus* into the existing horse, he believes that, in order to have time for the much greater change of the ancestral Ungulata into the two great divisions of Perissodactyles and Artiodactyles (of which change there is no trace even among the earliest Eocene Mammals), we should require a large portion, if not the whole, of the Mesozoic period. Another case is furnished by the bats and Cetacea, which occur fully developed in the Eocene formation; and these would have required still more time for their modification out of ancestral Insectivora and Carnivora. The Marsupials of the Trias, again, were already differentiated into herbivorous and carnivorous forms; so that on the lowest estimate we must place the common ancestor of the Mammalia very far back in Palæozoic times. Reptiles furnish evidence of the same character. Professor Huxley says, "If the very small differences which are observable between the *Crocodilia* of the older Mesozoic formations and those of the present day furnish any sort of approximation towards an estimate of the average rate of change among the *Sauropsida*, it is almost appalling to reflect how far back in Palæozoic times we must go before we can hope to arrive at that common stock from which the *Crocodilia*, *Lacertilia*, *Ornithoscelida*, and *Plesiosauria*, which had attained so great a development in the Triassic epoch, must have been derived." And if to these indications we add the appearance of two orders of fishes—Elasmobranchs and Ganoids—in the Silurian period, we shall be compelled to place the origin of the whole vertebrate stock at an epoch far beyond that of the lowest fossiliferous rocks of the Cambrian series.

If, then, we bear in mind the very early appearance of so many highly complex organisms, representing all the great types of animal life—almost all the great invertebrate groups in the Cambrian and Lower Silurian, with many Vertebrata and almost all forms of Insecta in the Devonian and Carboniferous periods,—while a large number of these have hardly increased in complexity of organization down to our times, we shall be prepared to admit the extreme probability of Mr Darwin's view, that "before the lowest Cambrian stratum was deposited, long periods elapsed, as long as, or probably far longer, than the whole interval from the Cambrian age to the present day; and that during these vast periods the world swarmed with living creatures" (*Origin of Species*, 6th ed p. 286.)

Professor Ramsay has recently expressed analogous views, founded on an extensive survey of the whole series of geological formations. In a paper "On the comparative value of certain Geological Ages (or Groups of Formations) considered as items of Geological Time" (*Proceedings of the Royal Society*, 1874, p. 334), he says—speaking of the abundant and well-developed fauna of the Cambrian period, a sketch of which we have given at p. 282:—"In this earliest known *varied* life we find no evidence of its having lived near the beginning of the zoological series. In a broad sense, compared with what must have gone before both biologically and physically, all the phenomena connected with this old period seem, to my mind, to be of quite a recent description; and the climates of seas and lands were of the very same kind as those the world enjoys at the present day."

It thus appears that the general geological principle with which we started, of the more complete destruction by denudation and metamorphism of the earlier as compared with the later records of life upon the earth, receives ample support in the apparently sudden appearance of whole groups of complex and specialized forms in some of the earliest rocks; while the general imperfection of the geological record is made manifest by such facts as the very few and isolated remains of Mammalia in the Mesozoic rocks, although we know they must have existed in abundance throughout the whole Secondary and much of the Palæozoic periods. The great lesson we have to learn from the facts of palæontology is, that its negative evidence is at the best of but little value; but when this negative evidence is opposed to general principles established upon a wide basis of physical and biological research, it becomes absolutely worthless. Just in proportion as the series of fossiliferous deposits is more complete, and the fossil remains more abundant and varied, does the evidence for evolution and progressive development become more powerful. The difficulties are almost wholly dependent on incomplete knowledge, and on the assumption (which we have endeavoured to show is entirely unfounded) that the earliest traces of the fossil remains of any animal type which have been discovered can give, even approximately, the period of its first appearance upon the earth.

We find, then, that just as a study of the distribution of animals in space enables us to learn much of the immediately preceding condition of the earth's surface, and especially of the recent changes of land and water,—so a study of the distribution of animals in time, when aided by the modern theory of evolution, gives us some knowledge of the physical condition and life of the earth in times beyond the reach even of geological history. (A. R. W.)

DISTRIBUTION OF VEGETABLE LIFE.

The literature in which the immense multitude of distinct kinds of plants which are dispersed over the earth's surface and form its vegetation has so far been described has necessarily been adapted to the divisions of political geography. The causes which have brought about the formation of such divisions have rarely, however, had anything in common with those which have determined the characteristic features, whether superficial or profound, of the floras of different countries. The great mass of catalogues and descriptive enumerations of the plants of such countries, the boundaries of which are for the most part quite artificial, are therefore ill adapted for bringing out any general conclusions as to the mode in which plants are distributed. It is only by making some kind of analysis of the often heterogeneous contents of such catalogues, and piecing together the results obtained from different sources, that any clue can be obtained to the approximate lines of demarcation of floras which are really naturally limited and characterized. The process is, however, enormously laborious, and, even apart from that, must for a long time to come be exceedingly imperfect in its application, owing to the immense tracts of land—and those with the most varied and copious vegetation—of the natural products of which our knowledge is still most defective.

Numerous attempts have, however, been made, notwithstanding the difficulty of the task, to map out the earth's surface into "regions of vegetation." The real significance of these regions will, of course, entirely depend upon the principles which have been relied upon in forming them. And in this respect the progress of geographical botany has been exactly similar to that of classification. The characteristic distinctions which were first seized upon in either case proved on closer scrutiny to be superficial, and to bring about merely artificial and arbitrary assemblages. The doctrine of evolution has in fact effected the same revolution in both; it has shown in the one that community of descent is the real meaning of a natural classification, it has shown in the other that community of origin is the real key to geographical distribution.

Most of the writers on geographical botany have been content to set aside all considerations of origin and history in attempting to define the limits of botanical regions. They have not attempted to see in the peculiar features which such regions may possess anything more than adaptations to physical conditions working on plants created in great measure where they are found. Although, therefore, the literature of geographical botany has been useful in enabling the reader to realize the local features—the colouring, if one may so express it—of particular countries, the facts have hitherto been presented in a form void of any true significance. And these remarks apply to the system of Schouw (1833), which has been much employed, partially to that of De Candolle, and conspicuously to that more recently published by Grisebach. It is to the writings of Darwin, Hooker, Asa Gray, and Bentham that we must look for a real insight into the origin and dispersion of floras, and for the real causes of the existing distribution of plant life.

The first attempt to review the whole subject of plant-distribution from the modern point of view afforded by evolution is due to Bentham, who made it the subject of a presidential address delivered to the Linnean Society in 1869. Bentham's conclusions are based upon the experience of a long life devoted to systematic botany, and will probably always hold a fundamental position in the study of the subject; at any rate for some time to come, until the distribution of a large number of subordinate groups has been carefully worked out, the main points established by him are not likely to be materially modified.

The general *facies* of vegetation is obviously largely affected by purely physical causes. In the polar regions, arboreal and even shrubby plants become incapable of existence, and only small perennials which are safely covered up by snow during the long winter are able in the brief summer to expand their flowers and ripen their seeds. Putting aside for the moment the severances effected by large bodies of water and mountain chains, it is easy to see that the vegetation of the earth must have always been separable into three great latitudinal zones, two belonging to the north and south hemispheres respectively, and one dividing them lying between the tropics. The constitutents of the vegetation of these zones must always have had a certain homogeneity; very considerable divergences, however, have grown up within the zones themselves, owing to circumstances of geographical isolation. Even without these, distance alone, independently of isolation, would in time be sufficient to effect it. It is also obvious that the precise northern and southern limitations of such hypothetical zones must have varied with secular changes in the earth's climate, and when these changes have taken place over a broken configuration of land and sea, the intermixture of diverse floras must necessarily have become very complicated.

Underlying, however, the tangled fabric of the earth's existing floral covering, we may agree with Bentham[1] in recognizing the existence of three tolerably ancient floras—the Northern, the Tropical, and the Southern.

I. The Northern is characterised by its needle-leaved Coniferæ, its catkin-bearing *Amentaceæ* and other forest trees deciduous in winter, and its vast assemblage of herbaceous types, *Ranunculaceæ*, *Cruciferæ*, &c. These spread over Europe, northern and central Asia, and great part of North America.

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[1] Presidential address to Linnean Society, 1869, p. 12.

II. The Southern is broken up into numerous divergent floras. Their original connection is now traceable only in the common possession by two or more of them of large characteristic groups, such as *Restiaceæ*, *Proteaceæ*, *Diosmeæ*, &c., the subordinate divisions of which have been locally specialized. To this belong the floras of extra-tropical South America, South Africa, and Australia with New Zealand, to which must probably be added an area borrowed from the northern hemisphere in Mexico and California.

III. The Tropical is characterized by the predominance of mostly evergreen arborescent *Polypetalæ* (*Anonaceæ*, *Meliaceæ*, *Leguminosæ*, &c.), and gigantic Monocotyledons, of which Palms, *Scitamineæ*, and *Bambuseæ* amongst grasses are especially striking.

I. THE NORTHERN FLORA.—This has been long divided into that of Old and New World by the severance of North America from Northern Asia, and by the barrier to an interchange of vegetation in the upheaval of the Rocky Mountain range. Nevertheless its marked continuity (with only a gradual east and west change in the arctic regions, but an increased divergency southwards) requires it to be treated as a whole. The Old and New World divisions of this flora, which, no doubt, began to diverge from the mere influence of distance, have now had that divergence immensely increased by isolation. According to Lesquereux,[1] the essential types of the present arborescent flora of North America are indicated in the Cretaceous rocks of that country, and become more distinct and numerous in the Tertiary; and he believes that the origin of the existing American flora is American. The analogy between the Miocene flora of Central Europe and the present North American flora is unquestioned, and is greater than between the same fossil flora and that now existing in Europe. Lesquereux's conclusion is that the American element in the vegetation of Miocene Europe was derivative, and this is one of many illustrations of the curious observation of Asa Gray that plants have in general a greater tendency to migrate from east to west than from west to east. This Miocene flora was, however, gradually driven back again, and it is only as we travel from Europe to the East that we gradually find its traces getting stronger and stronger. Thus, as Oliver[2] has pointed out, in passing from the Mediterranean to the Levant, the Caucasus, and Persia, we meet with living representatives of the Miocene genera *Chamærops*, *Platanus*, *Liquidambar*, *Pterocarya*, *Juglans*, &c. Along the Himalayas and through China we trace other Miocene genera, Japan forming part of the same botanical region as Eastern Asia. Among the remarkable existing North American types which may be mentioned as reappearing in the Himalayas and Japan are *Aralia quinquefolia*, *Phryma leptostachya*, and *Trillium erectum*. One of the most interesting additional facts which has recently come to light is the occurrence of a species of tulip tree (*Liriodendron*) in Central China, which genus, though a member of the European Miocene flora, has in recent times been regarded exclusively characteristic of America.[3] With respect to other American genera which are not necessarily part of the Miocene flora, the same general principle holds good. Bentham remarks, that while some, like *Astragalus*, have multiplied largely in both continents, "other genera, like *Eupatorium*, *Aster*, *Phlox*, *Solanum*, &c., very numerously represented in America, have transmitted or produced a smaller number in Eastern Asia, gradually diminishing westward till they disappear altogether or attain Western Europe in single species but little altered from American ones."[4] The Europeo-Asiatic genera, on the other hand, such as *Cruciferæ*, *Umbelliferæ*, &c., which are so dominant a feature in the existing Old World Northern flora, appear "to have left but few representatives in America, and those much more modified than the American races left in Asia."

Besides the internal migrations of the various constituents of the great Northern flora, its boundaries have been changed longitudinally under the influence of secular variations of climate alluded to above. The nature of these cannot be better summed up than in the words of Bentham:—[5]

> "Where the chief portion of this great northern flora originated, and whether it may be best termed Scandinavian, or North Asiatic, or Caucasian, is a question for the determining of which we have little or no data; but, as observed by Hooker, it is probably one of the most ancient and widest spread, having at different epochs travelled over a great part of the globe. Shown by the researches of Lesquereux, as well as by the recent ones of Heer and others, to have extended far north during the warmer preglacial times, it must have been slowly driven southwards as the glacial epoch came on, and either then, or at some one or more other periods, have been for a time continuous, in two lines at least, into the southern hemisphere; for it has left traces still discernible, especially in its herbaceous and mountain forms, in the mountains of tropical Asia, down at least to the Indian peninsula, and westward to the Abyssinian and Cameroons mountains of Africa, and, again, down the Andes to the extreme south of America, where it is still luxuriant, and in a less degree in New Zealand, Tasmania, and Victoria. In all these migrations, whilst retaining a general identity, the flora must have undergone continual changes, losing species or other races of limited areas and propagation as their habitations became unfit for them, and gradually forming new ones when favoured by long-continued isolation or other requisite conditions."

The Northern flora has further undergone a specialization into three secondary floras, due to the combined influence of physical and genetic causes.

1. The *Arctic-alpine* flora ("consisting chiefly of plants of small stature, slow growth, and limited means of dispersion, compensated by long lives and great powers of endurance") is perhaps the most interesting of the three subdivisions, both because in its arctic aspect it reduces the divergence of the Old and New World divisions of the Northern flora to a minimum, and more especially on account of the great interest which attaches to the problem of its scattered alpine outliers. With regard to the first point, Hooker found that estimating the whole Arctic flora at 762 species, Arctic East America possessed 379, of which 269 were common to Scandinavia. Of the whole flora 616 species are found in Arctic Europe, and of these 586 are Scandinavian, and this leads Hooker to the striking observation that "the Scandinavian flora is present in every latitude of the globe, and is the only one that is so."[6] Christ objects to Hooker's giving the title of Scandinavian to the Arctic flora, but we must agree with Bentham[7] that Scandinavia "would, according to older rules, have been regarded as the centre of creation for the arctic lands, and may now be termed the chief centre of preservation within the arctic circle, owing perhaps partly to its more broken conformation, and partly to that warmer climate which, while it now admits species which Christ objects to being included in the Arctic flora, was during the glacial period a means of preservation of some colder species which were everywhere else expelled or destroyed."

Just as at present the Arctic is more homogeneous than the more southern divisions of the Northern flora, so we may infer that towards the close of the Tertiary epoch the continuous circumpolar land was covered with a vegetation also largely composed of identical plants but adapted to a warmer climate. As the climate became less warm there would commence a migration southwards, which would result in the modified descendants of these plants being now blended with the vegetation of Central Europe and the United States. As the glacial period gradually advanced, "the tropical plants and animals will have retreated from both sides towards the equator, followed in the rear by the temperate productions, and these by the arctic."[1] When the climate of the earth again ameliorated, the migration took place in the reverse direction, and in this way mountain ranges became the havens of refuge of fragments of the original arctic floras which were exterminated on the lowlands. Even the equatorial region ceased to be a barrier during the glacial period, and to migration at that time must be attributed the survival of arctic forms in the south temperate zone. The southern migration of the Arctic flora does not appear to have taken place in one continuous wave. Thus, as Bentham points out,[2] "many facts showed separate communications between the north and each of the three chains of the Pyrenees, the Alps, and the Himalayas, whilst these three gave little evidence of any lateral communication of their respective alpine vegetations."

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[1] *Geological Survey of Montana*, 1871, p. 314.

[2] *Nat. Hist. Rev.* 1862.

[3] Moore, *Journ. of Bot.* 1875, p. 225.

[4] Presidential address, 1869, p. 18; see also Bentham in *Journ. Linn. Soc. Bot.*, xiii. p. 500.

[5] Presidential address, 1869, p. 19.

[6] Hooker, on the "Distribution of Arctic Plants," *Trans. Linn. Soc.*, vol. xxiii. p. 253.

[7] Presidential address, 1869, p. 21.

The fact that the migration southwards and remigration northwards of the Arctic flora took place along parallels of longitude, accounts for some of its existing peculiarities. Hooker explains in this way the comparative poverty of the Greenland flora.[3]

> "If it be granted that the polar area was once occupied by the Scandinavian flora, and that the cold of the glacial epoch did drive this vegetation southwards, it is evident that the Greenland individuals, from being confined to a peninsula, would be exposed to very different conditions to those of the great continents. In Greenland many species would, as it were, be driven into the sea, that is exterminated; and the survivors would be confined to the southern portion of the peninsula, and not there being brought into competition with other types, there could be no struggle for life amongst their progeny, and consequently no selection of better adapted varieties. On the return of heat, these survivors would simply travel northwards unaccompanied by the plants of any other country.
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> "In Arctic America and Asia, on the other hand, where there was a free southern extension and dilatation of land for the same Scandinavian plants to occupy, these would multiply enormously in individuals, branching off into varieties and sub-species, and occupy a larger area the further south they were driven; and none need be altogether lost in the southern migration over plains, though many would in the struggle that ensued when they reached the mountains of those continents and were brought into competition with the alpine plants, which the same cold had caused to descend to the plains. Hence, on the return of warmth, many more Scandinavian species would return to Arctic America and Asia than survived in Greenland; some would be changed in form, because only the favoured varieties could have survived the struggle; some of the alpine Siberian and Rocky Mountain species would accompany them to the arctic zone; while many arctic species would ascend those mountains, accompanying the alpine species in their reascent."

The Arctic-alpine flora is obviously in its present condition a composite one. Portions of the Northern flora, probably originally very distinctly characterized, became adapted to the peculiar physical conditions of high mountain ranges and of the extreme north. The gradual deterioration of the climate brought the alpine flora to the lowlands and the arctic flora southwards till they intermingled. When they again returned to their original territories they were so far changed that each gave the other some new members, while both had experienced many losses.

A. de Candolle has very ingeniously applied the general principles laid down above to the detailed explanation of the distribution of the flora of the Alps themselves. The following is a brief summary of his conclusions:—[4]

> The valleys and groups of mountains which have at present a maximum of rare species and the most varied flora belong to districts on which the glaciers disappeared earliest. On the other hand, where the duration of snows and glaciers has been most prolonged, the existing flora is poor. From a variety of causes which A. de Candolle enumerates, it seems probable that the southern and eastern glaciers of the Alps were of smaller extent than the northern, and would consequently be the soonest to retreat. We have consequently the curious fact that some of the most ancient fragments of the alpine flora are now only to be found on the *southern* slopes of the Alps. This is the case with species of *Primula*, *Pedicularis*, and *Oxytropis*, which exist neither in the interior of Switzerland, nor in the north of Europe. But it is easy to see that, like the other members of this flora, they were driven south during the glacial period, returning as the mountains reappeared from underneath their snowy covering, while on the northern side they were in great measure exterminated. A. de Candolle points out as a fact in further confirmation that the Alpine species of *Campanula*, peculiar to Mont Cenis and the Simplon and neighbouring valleys, are not related to the Arctic species, but find their nearest allies in Greece, Asia Minor, and the Himalaya.

A further indication of the great antiquity of the Arctic-alpine flora is afforded by the fact of its absence in the comparatively modern volcanic mountains of France. "The Monts d'Or and Cantal, at an elevation of 6000 feet, offer scarcely any of those alpine and sub-alpine plants which abound at the same or lower elevations in the Pyrenees on the one side, and in the Alps on the other, as well as in the British and Scandinavian mountains to the north."[5] Hooker, however, points out that the absence of the alpine-arctic flora in Auvergne may be due to severe glaciation rather than to its absence (see *Nature*, Nov. 11, 1875, pp. 31, 32).

2. The *Intermediate* or *Temperate* flora is best described in the words of Bentham as

> "A mongrel vegetation of mixed origin, including a large proportion of species of the most extended geographical range, with a very few local ones, and those chiefly in the extreme west. The majority, whether trees, shrubs, or herbs, are plants of comparatively rapid growth, very prolific, endowed with great facilities for dispersion, and constitutions capable of adapting themselves to a great variety of physical and climatological conditions. They are great travellers, and soon take possession of any district left denuded by the abandonment of cultivation. To the great majority of them no primeval antiquity can be ascribed in Central or Western Europe;[6] they appear to have come from the east, a considerable number perhaps from Western Asia, where their types appear to be more varied, but many also must have made half the tour of the globe. Large American genera have sent out offsets into Eastern Asia, which gradually diminishing in number of species, and sometimes slightly modifying their character, have spread over the whole of Asia, and invaded almost every part of Europe. These plants are, moreover, generally continuous, that is, interrupted only by intervals which under present condition they have means of crossing; and they are abundant in individuals, ascending in latitude and elevation, or descending to the south, until checked in their career by competing species, better enabled to endure the increasing rigour or the searching drought of the respective climates. Many of them will even assume slight modifications suited to their exceptional circumstances, and it is then as difficult to separate them from the genuine northern or southern floras as in many cases to give plausible grounds for establishing the precise origin of individual species."[7]

The peat deposits of Denmark tell an unmistakable tale of the gradual advance of successive waves of vegetation from the south-east. The Scotch fir was once abundant within

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[1] Darwin, *Origin of Species*, 4th ed. p. 447.

[2] Presidential address, 1869, p. 21.

[3] Hooker, *l. c.* p. 254.

[4] These are given in greater fulness in *Nature*, April 27, 1876, p. 516.

[5] Bentham, *Nat. Hist. Rev.*, 1864, p. 370.

[6] Martins, however, considers that many of the plants of the existing south of Europe flora are of great antiquity in their present situations; thus the Oleander (*Nerium Oleander*) has been found in deposits from the Eocene upwards (*Mém. de l'Acad. d. Sc. de Montpellier*, ix. p. 95).

[7] *Nat. Hist. Rev.*, 1864, pp. 370, 371.

man period in the Danish islands, but is now
; it was succeeded by the sessile-fruited oak, to be
supplanted by the pedunculated form of the same
ociated with the alder, birch, and hazel. The oak
almost supplanted by the beech.[1] According to
ng, the original post-glacial flora of Scandinavia has
d to the north, and is probably still retreating, while
of central and south Scandinavia consists of "an
and north-eastern vegetation, which spread into
after the glacial period and before the beech tree
aded Sweden, with the admixture of more southern
which, with the beech, have since penetrated into
through Denmark."[2] The beech and the chestnut
Japan, and, as far as Europe is concerned, there is
ason to regard their origin as Eastern.

lready pointed out, the American element in the
n flora suffered severely during the glacial period,
never since recovered itself. Japan, however,
d to have been a great centre of preservation, and
he numerous points of contact which its flora
with that of the North American continent. In
World itself, the continuity of the pre-glacial and
cial temperate floras has been better preserved.
owing passage from an address of Asa Gray's may
ed as giving its history in a concise form :—

> considered that the present vegetation or its proximate
> must have occupied the arctic and sub-arctic regions in
> times, and that it had been gradually pushed southward
> mperature lowered and the glaciation advanced, even be-
> present habitation ; that plants of the same stock and
> probably ranging round the arctic zone as the present
> ecies do, made their forced migration southwards upon
> ifferent longitudes, and receded more or less as the climate
> mer ; that the general difference of climate which marks
> rn and western sides of the continents,—the one extreme,
> mean,—was doubtless even then established, so that the
> cies and the same sorts of species would be likely to secure
> n foothold in the similar climates of Japan and the Atlantic
> tates, but not in intermediate regions of different distribu-
> heat and moisture ; so that different species of the same
> in *Torreya*, or different genera of the same group as red-
> xodium and *Glyptostrobus*, or different associations of forest-
> ght establish themselves each in the region best suited to
> cular requirements, while they would fail to do so in any

west of Europe possesses the remains of a local and
y more ancient flora of very great interest,
rized by Gorse, and allied shrubby *Leguminosæ*,
Lobelias, Sibthorpias, &c. These are closely
in any tendency towards eastern dispersion by the
of the winter climate away from the ameliorating
e of the sea. The probability of a southern extra-
connection of this peculiar element in the Nor-
ra will be adverted to hereafter.

flora of the British Isles is in many respects
ng ; it is in its main features an extension of the
c area of the temperate flora with the presence of
ern element above alluded to distinctly marked on
h western coasts. *Eriocaulon septangulare* is an
s constituent, being limited to Ireland and a few
the western side of North Britain, and being
e an American and not a European species.[4] Its
can hardly be explained except by the agency of
y birds

Mediterraneo-Caucasian flora, like the Arctic-
contrasts in the most marked way with the
e.

> r the richest and most diversified in species [it comprises
> hs of the European flora], it is also remarkable for the
> great variations centering round individual types, as well as for the very restricted areas occupied by a number of the most marked species ; the limits are not to be accounted for by any physical peculiarities we are acquainted with, nor perhaps to be otherwise explained than by a supposition of very great antiquity."

Eastward of the Caucasus this remarkable flora dies away, reaching its eastern limit in Scinde, and the temperate flora of Asia is only separated from the tropical by the Himalayas. Southwards its progress is arrested by the arid zone formed by the African and Arabian deserts.[5] As in the case of the Arctic flora, traces still exist of its former southern extension under the influence of a colder terrestrial climate. *Adenocarpus*, a characteristic Mediterranean genus, is represented by an identical species on Kilima Njaro, near the equator, and on the Cameroons mountains, 2000 miles distant on the opposite and western side of the African continent.[6]

II. THE SOUTHERN FLORA.—The Southern flora exhibits relations much more complex than those presented by the Northern. Instead of extending over large continental areas it is now dismembered into isolated groups scattered over the southern hemisphere, and in both the New and Old World sending northern extensions across the equator.

Five types may be briefly described, the definition of all but the first being taken from Bentham :—[7]

1. The *Antarctic-alpine* flora is the complement of the *Arctic-alpine*. It consists mainly of some widely distributed northern genera such as *Carex*, *Poa*, *Ranunculus*, &c., with alpine types of strictly south temperate genera characteristic of the respective localities. Hooker describes it as possessing "decided Australian representatives in *Centrolepideæ* and *Stylidieæ*, commencing in Fuegia, the Falklands, and Lord Auckland's and Campbell's groups, reappearing in the Alps of New Zealand, Tasmania, and Australia, and disappearing under the equator, on the Alps of Borneo."[8]

2. The *Australian* flora is "almost endemic, showing some slight connection with the New Zealand, and a few remains of former ramifications northward to some parts of the Indian Archipelago, a very few species, perhaps of modern introduction, extending to China and Japan." Bentham[9] conclusively dismisses Unger's theory of the former extension of the Australian flora into Europe in Eocene times.

3. The *Andine* flora, characterized by a large number of distinct genera, *Fuchsia*, *Gaultheria*, *Calceolaria*, ranges more or less along the whole chain, "penetrating far northwards in Western America, throwing off a few branches into Eastern Asia, and at its southern extremity crossing over to New Zealand, and in smaller numbers to Tasmania, and the mountains of Victoria."[10]

4. The *Mexico-Californian* flora is "represented at great distances by closely allied species of small distinct genera —in Mexico and California, in the Argentine states, and in S. Africa or Australia."[11]

5. The *S. African* flora is "perhaps the richest known in proportion to its extent, and remarkably varied within its narrow limits." Its connection with other floras is very slight. That with Australia, alluded to at the commencement, does not extend beyond groups of the highest order (in the *Proteaceæ* not merely the species but the genera

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[1] Lyell, *Antiquity of Man*, p. 9.
[2] Bentham, *l. c.* p. 22.
[3] *Darwiniana*, pp. 224, 225.
[4] Watson, *Compendium*, p. 31.
[5] Bentham, *Nat. Hist. Rev.*, 1864, p. 373.
[6] Hooker in *Journ. Linn. Soc. Bot.*, xiv. p. 144.
[7] Presidential address, 1869, pp. 24, 25.
[8] *Introductory Essay to the Flora of Tasmania*, p. 104.
[9] Presidential address, 1870, pp. 12-67.
[10] On the extra-tropical southern connection between America and the Old World as illustrated by the *Compositæ*, see Bentham in *Journ. Linn. Soc.*, xiii. p. 561.
[11] See also Asa Gray, *Darwiniana*, pp. 218, 219.

[illegible] geographical); and, as mentioned above, there are a few scattered species, representing the South African flora, in extra-tropical South America. There are, however, two offshoots in a northern direction. The remarkable West European flora, already referred to, possesses species of *Erica*, shrubby *Leguminosæ*, *Lobelia*, *Gladiolus*, &c., "more nearly added to corresponding Cape species than they are to each other." The other extension is to Eastern Africa. The sub-alpine vegetation of Kilima Njaro is distinctly South African, and Hooker suggests "the probability of the South African flora being represented all along the highlands of Eastern Africa, from Natal to Abyssinia; and further, seeing that most of the South African plants found in the Cameroons are also natives of Abyssinia, it would appear probable that the migration of these to the Cameroons was by and through Abyssinia."[1] The further suggestion that this may have been the path travelled by the West European extension of the South African flora is sufficiently obvious.

The amount of agreement amongst these scattered fragments of a great flora points necessarily to a state of things when the lands they now occupy were at one time or other in more or less of intimate connection. The amount of differentiation between the floras, and the fact that agreement has to be sought in groups of high rather than of small rank, points equally to the fact that such connections must have been far from recent.[2] The detailed study of separate groups leads by another path to the same result, and, as a good instance of the new phase into which taxonomic botany is entering in the light of the study of geographical distribution, reference may be particularly made to Bentham's important investigation into the past history and migrations of the *Campanulaceæ*.[3]

III. THE TROPICAL FLORA.—This is still perhaps too imperfectly known to admit of any very plausible generalization. It obviously presents three great subdivisions.

1. The *Indo-Malayan* extends from the Himalayas to north-east Australia and Japan. In the latter country it [illegible] the northern temperate flora, from which in India [illegible] sharply divided by the Himalayas.

2. The *American* is still a perfect mine of unexplored botanical wealth. Bentham remarks—"No general comparison of Asiatic and American tropical vegetation can [illegible] be made without immense labour of detail. As [illegible], however, the resemblance between them [illegible] of the races of a higher grade, natural [illegible] representative genera, the smaller genera and [illegible] even of the higher ones, are totally [illegible] are identical, they are gene- [illegible] and may have travelled [illegible] present configuration, or if [illegible] still more likely to be species [illegible].[4] There [illegible] extraordinary points of connection [illegible] the Old and New World [illegible] any clue. [illegible] as to be [illegible]

[illegible] tropical flora is probably the most imperfectly known of any. Bentham considers it as of great antiquity, and as having preserved large numbers of persistent types from which races "have widely diverged in Asia or America, or in both." He further remarks that "as our knowledge of the vegetation of tropical Africa has increased, we have discovered a greater number of Asiatic types; but still there are, even in the interior, a certain number of American ones, offering a problem the solution of which has scarcely been attempted."[5]

In *Compositæ* American genera are represented in east tropical Africa, and Bentham is led on various grounds to regard this as the principal area of preservation of the most ancient tropical flora of the Old World.[6] A well-marked eastern element in the African tropical flora is generally accepted. Madagascar, whose flora bears the marks of long isolation, contains Malayan and even Australian types; and it is a problem worth future inquiry whether the connection between the floras of tropical America and Africa may not have taken place south of the tropics, and by similar (though more northern) paths to those which once united the scattered members of the great Southern flora.

As might have been expected, during the Tertiary period the tropical flora extended much beyond its present limits. De Saporta, who has studied with great caution the fossil flora of the gypseous beds (Eocene) of Aix in Provence, arrives at the following conclusions:[7]—The principal families were such as characterize tropical vegetation, especially Indian—*Ebenaceæ*, *Anacardiaceæ*, *Sapindaceæ*, *Sterculiaceæ*, *Leguminosæ*. The affinities of the ancient vegetation of Aix in respect of generic types, general facies, and composition with that of India and the Indian archipelago, China, the Philippines, and Japan at the present day, are in perfect accordance with the theory that these regions formed the shores of our ancient nummulitic sea, extending from Morocco to Japan, and entirely comprised in the tropical zone of the Eocene world, which extended to the 55th parallel. Besides its relation to South-Eastern Asia, the Aix flora exhibits, according to De Saporta, a strong affinity with that of Africa, lying between Abyssinia and the Cape, of which, however, it must be confessed, but little is as yet known.

Here this outline of the present state of a most important and rapidly developing branch of biological science must be concluded. The writer has availed himself very freely of the kind permission of Mr Bentham—perhaps the greatest living master of the subject—to make use of his scattered but invaluable papers, not scrupling to borrow from them all that seemed most important and suggestive, but has generally thought it fairer both to the subject and to Mr Bentham to do so in his own words. For two heads of the subject it must suffice merely to give references. On the remarkable phenomena of insular floras, the reader should consult Sir Joseph Hooker's well-known lecture delivered before the British Association in 1866, and printed in the *Gardeners' Chronicle* for January 1867, or, in default of this, the summary given in Lyell's *Principles of Geology*, 10th ed., vol. ii. pp. 417–421. On the means of dispersion of plants, reference may also be made to Lyell's work already quoted, vol. ii. pp. 386–400; Darwin's *Origin of Species*, 4th ed., pp. 425–442; Bentham, Presidential Address, 1869, pp. 7, 8. (W. T. T. D.)

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[1] [illegible] *Origin of Species*, 4th ed. p. 474.

[2] [illegible] 146.

[3] [illegible] p. 11.

[4] Pres. [illegible] p. 24.

[5] *Journ. Linn. Soc. Bot.*, xiii. 545.

[6] [illegible] p. 24.

[7] *Annales des Sciences Naturelles*, Sept. 1, 1872.

DITHMARSCHEN, or **Ditmarsh**, in the oldest form of the name *Thiatmaresgaho*, Dietmar's Gau, a territory between the Eider and the Elbe, forming the western part of the old duchy of Holstein, and now included in the Prussian province of Schleswig-Holstein. It was originally colonized mainly from Friesland and Saxony,—the Frisian kindred of the Vogdemans settling on the coast and giving rise to the two marks of Norderstrand and Süderstrand, and the Saxon kindred of the Woldersmen settling inland and forming the two marks of Norderhamme and Süderhamme. The district was subjugated and Christianized by Charlemagne in 804, and ranked as a separate *Gau*, included perhaps in the countship of Strade, or *Comitatus utriusque ripæ*. From the same century, according to one opinion, or from the year 1180, when the countship was incorporated with their see, according to another, the archbishops of Bremen claimed supremacy over the land: but the inhabitants, who had developed and consolidated a systematic organism for self-government, made obstinate resistance, and rather attached themselves to the bishop of Schleswig. The Danish king Björn Svendsön succeeded in defeating them; and Ditmarsken, to use the Scandinavian form of the name, continued part of the Danish dominions till the disastrous battle of Bornhöved in 1227, when its former independence was regained. The claims of the archbishop of Bremen were now so far recognized that he exercised the royal rights of *Heerbann* and *Blutbann*,[1] enjoyed the consequent emoluments, and was represented first by a single *advocatus*, or *vogt*, and afterwards by one for each of the five Döffts, or marks, into which the land was divided after the establishment of Meldorp. The community was governed by a landrath of forty-eight elective consuls, or twelve from each of the four marks; and even in the 14th century the power of the episcopal vogts was so slight that a chronicler of that date, quoted by Maurer, says, *De Ditmarschen leven sunder Heren und Hovedt unde dohn wadt se willen*, "the Ditmarschen live without lord and head, and do what they will." In 1319 and in 1404 they succeeded in defeating the invasions of the Holstein nobles; and though in 1474 the land was nominally incorporated with the duchy by the emperor Frederick III., the attempt of the Danish king Hans and the duke of Gottorp to enforce the decree in 1500 resulted only in their complete rout in the marshes of the Dussend-Düwels-Warf. During the early part of the century which began with such prestige for Ditmarsh, it was the scene of violent internal conflict in regard to the religious questions of the time; and, thus weakened, it was obliged in 1559 to submit to partition among its three conquerors—King Frederick II. of Denmark and Dukes John and Adolphus. A new division took place on Duke John's death in 1581, by which Frederick obtained South Ditmarsh, with its chief town of Meldorp, and Adolphus obtained North Ditmarsh, with its chief town of Heide; and this arrangement continued till 1773, when all the Gottorp possessions were incorporated with the Danish crown.

See Dahlmann's edition of Neocorus, *Chronik von Dithmarsen*, Kiel, 1827, and *Geschichte Dänemarks*, 1840–44; Michelsen, *Urkundenbuch zur Geschichte des Landes Dithmarschen*, 1834, *Sammlung altdithmarscher Rechtsquellen*, 1842, and *Dithmarschen im Verhältniss zum Bremischen Erzstift*; G. L. von Maurer, *Einleitung zur Geschichte der Mark-, Hof-, Dorf-, und Stadt-Verfassung*, 1854; Nitzsch, *Das alte Dithmarschen*, 1862; Kolster, *Geschichte Dithmarschens, nach F. R. Dahlmanns Vorlesungen*, 1873.

DITTON, Humphry (1675–1715), an eminent mathematician, was born at Salisbury, May 29, 1675. In compliance with the wishes of his father rather than by his own inclination he entered on the study of theology, and was for some years a dissenting minister at Tunbridge, where he married. On the death of his father, however, he was induced to relinquish the clerical profession; and at the persuasion of Whiston and Dr Harris he devoted himself to the more congenial study of mathematics. Through the influence of Sir Isaac Newton, he was elected mathematical master in Christ's Hospital, where he continued till his death in 1715.

Ditton was the author of the following treatises:—*Of the Tangents of Curves*, &c., *Phil. Trans.* vol. xxiii.; *A Treatise on Spherical Catoptrics*, published in the *Phil. Trans.* for 1705, from which it was copied and reprinted in the *Acta Eruditorum*, 1707, and also in the Memoirs of the Academy of Sciences at Paris; *General Laws of Nature and Motion*, 8vo, 1705, a work which is commended by Wolfius as illustrating and rendering easy the writings of Galileo and Huyghens, and the *Principia* of Newton; *An Institution of Fluxions, containing the First Principles, Operations, and Applications of that admirable method, as invented by Sir Isaac Newton*, 8vo, 1706. In 1709 he published the *Synopsis Algebraica* of John Alexander, with many additions and corrections. In his *Treatise on Perspective*, published in 1712, he explained the mathematical principles of that art; and anticipated the method afterwards elaborated by Dr Brook Taylor. In 1714 Ditton published his *Discourse on the Resurrection of Jesus Christ*; and *The New Law of Fluids, or a Discourse concerning the Ascent of Liquids in exact Geometrical Figures, between two nearly contiguous Surfaces.* To this was annexed a tract to demonstrate the impossibility of thinking or perception being the result of any combination of the parts of matter and motion,—a subject much agitated about that time. There was also added an advertisement from him and Whiston concerning a method for discovering the longitude, which it seems they had published about half a year before. Although the method had been approved by Sir Isaac Newton before being presented to the Board of Longitude, and successfully practised in finding the longitude between Paris and Vienna, the board determined against it. This disappointment, aggravated as it was by certain unquotable lines written by Dean Swift, affected Ditton's health to such a degree that he died in the following year

DIU, an island and small seaport on the south coast of the Káthiáwár peninsula, in the province of Guzerat, in India. The Portuguese obtained possession of the island in 1515, and have held it ever since. Diu town is situated at the eastern extremity of the island, in 20° 42′ N. lat. and 71° 0′ E. long. The anchorage is fairly protected from the sea, but the depth of water is only 3 to 4 fathoms, and is said to be decreasing. The channel between the island of Diu and the mainland is navigable only by fishing boats and small craft. The town is well fortified on the old system, being surrounded by a wall with towers at regular intervals.

DIURETICS (from διά, through, and οὐρέω, to pass urine) are remedies which, under certain conditions, produce an increased flow of urine. Their mode of action is various. Some, as turpentine and cantharides, are absorbed into the blood, are carried to the secretory organs (the kidneys), and stimulate them directly, causing an increased flow of blood to them; others act as stimulants through the nervous system. A second class act in congested conditions of the kidneys by diminishing the congestion; this is supposed to be one of the modes of action of digitalis. Another class, such as the saline diuretics, are effectual by virtue of their osmotic action. A fourth class are diuretic by increasing the blood pressure within the vessels in general, and the Malpighian tufts in particular,—some, as digitalis, by increasing the strength of the heart's contractions, and others, as water, by increasing the amount of fluid circulating in the vessels. Some remedies, as mercury, although not diuretic themselves, when prescribed along with those which have this action, increase their effect. The same remedy may act in more than one way, *e.g.*, alcohol, besides stimulating the secretory organs directly, is a stimulant to the circulation, and thus increases the pressure within the vessels. It is stated above that remedies have a diuretic action under "certain conditions." These relate to—1st, the state of the kidneys themselves; 2d, the condition of other organs; 3d, the surroundings of the patient; 4th, the dose and mode of administration of the remedy. In illustration of each of these—1st, a dose of cantharides, which in a patient with the kidneys healthy would be diuretic, would in one with the kidneys acutely congested have the reverse effect; 2d, if there were much irritation of the gastro-intestinal tract, acid tartrate of potash, instead of producing diuresis, would probably cause diarrhœa, squills would induce vomiting, digitalis either diarrhœa or vomiting; 3d, Mindererus spirit, if taken by one exposed to an elevated temperature, would probably produce sweating, but if the temperature were low and the patient cool its action would be diuretic; 4th, many salines which in small doses are diuretic in larger doses are laxative; digitalis if too long continued diminishes the flow of urine, irritant diuretics in too large doses diminish or altogether arrest it. Diuretics are indicated, when the quantity of urine is much diminished, or when, although the quantity may be normal, it is wished to relieve some other organ or set of organs of part of their ordinary work, or to aid in carrying off some morbid product circulating in the blood, or to hasten the removal of inflammatory serous exudations, or of dropsical collections of fluid.

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[1] That is, the right of claiming military service, and the right of bringing capital offenders to justice.

DIVAN, The, or privy council of the Sublime Porte, is presided over by the sadri-azam, grand vizier (*porter*), or minister of the interior, who communicates its deliberations to the sultan. It also contains the mufti, sheikh-ul-islam, chief of the ulema, also called principal of the court of cassation, and minister of justice and ecclesiastical affairs, whose *fetva* is nominally required for the firmans of the Government. Among other members we may mention the seraskier, or war-minister; the capudan pasha, or minister of marine; the foreign minister (called, until the reforms of Mahmoud, *reis effendi*); the grand terftardar, or finance minister; the mustechar, or assistant vizier, who comes in place of the ancient kiaya bey, abolished by Mahmoud; the tchiaous bashi, or intendant general of police; and the intendant of vakufs, or church-lands. The divan meets twice a week; on emergencies an Ajaik Divani, including the provincial pashas, the beys, aijams, and chief military officers, is summoned. On its advice in cases of popular tumult the sultan used to show himself at a window and promise reforms. But the word divan was applied by Turks, Persians, and Arabs to many kinds of assembly. Thus the Abbaside caliphs had a "Divan of Oppression," which inquired into charges of tyranny against officers of state. A woman is said to have been president of this divan in the reign of Moctader, at the beginning of the 10th century. The Diwan-i-humayun was the imperial court of Persia; while in modern Turkey diwan-khane is any large room or hall in which people meet. Hence the word has been applied to the vizier, or head of the assembly; to the bags in which the judicial records of the kazi were kept; and to the court-hand in which the firmans were written. (See Freytag's *Lexicon Arabico-Latinum*, ii. p. 37; De Sacy *Gramm.*, i. p. 76.) It was also the name given by the East Indian Company in Bengal to the principal native officers under them. The origin of the word is not clear. One form of it, said to be connected with the adverb دون = below or inferior, has the meanings of the desert, the upper end of a chamber, anything on which one leans, a sofa formed in masonry, a pillow, a frame. Another form has the meanings of a list, a register of the several classes of officers and servants regulating the amount of royal gifts and salaries, in particular a muster-roll or military pay book, an album or ledger, an almanack. (Lane's *Arabic Dictionary*, ed. 1874, i. pp. 878-9.) It has been suggested by Fakhreddin Razi that the first of these meanings was really derived from the second; that in the reign of caliph Omar, a Persian marzban, or satrap, introduced a military pay-book, the Persian name of which (diwan) was transferred to a financial board, and subsequently to other boards and to the places where they met. One interesting application of the second meaning is to the selection of several poems by one author in the alphabetical order of the rhyming syllables; for instance, rhymes of the first class ending in ا (Alif = A); of the second, in ب (Ba = B); of the third, in ت (Ta = T), and so on. The most important diwans are those of Ghassani, Sa'uti, and Zamrani among the Arabs; and of Hafiz, Saadi, and Jami among the Persians. The plan has been imitated by Goethe in his *West-östlicher Divan* (see the notes appended to vol. iii. of the Stuttgart ed. of 1828), and Goethe was imitated by Rückert. A few meanings of the word divan remain which it is hard to reconcile, *e.g.*, a game or dance of the magians, which consisted in turning round in a circle so as to imitate the motions of the heavenly bodies; the expression "by your leave," used in entering a Turkish house where there may be unveiled women; a copper cooking pot wide at the bottom and contracted at the mouth. "Diwan durnak" is the Turkish army phrase for "order arms." In modern Europe divan often means a café.

DIVER (*Colymbidæ*), a family of natatorial birds closely allied to the grebes, but differing from them in having the front toes entirely webbed, and in their much greater size. Their legs are placed at the further extremity of the body, and both wings and tail are short. This family contains only four species, three of which are common to the northern regions of both hemispheres, while the fourth is exclusively North American. The largest species is the Great Northern Diver (*Colymbus glacialis*). It measures about 30 inches in length; and in its full adult plumage, the male especially is an exceedingly handsome bird. The greater part of its upper surface is black, beautifully marked with numerous rows of white spots; the head and throat are also black, the latter relieved by two collars of white, spotted with black, while the greater part of the under surface is white. The Great Northern Diver lives chiefly on the ocean, feeding on the smaller fish, as herrings and sprats, in pursuit of which it dives beneath the surface with a facility to which it owes its common name. It can remain a long time under water, and by means of its feet and wings makes extraordinary progress beneath the surface, and while thus submerged it is sometimes taken with a baited hook, and has often been caught in herring and salmon nets. It has great difficulty in rising on the wing, but once aloft its flight is both vigorous and swift; when in danger, however, it always resorts to diving in preference to flying, and from its exceeding watchfulness, and the great distance it can swim beneath the surface of the water, specimens of the Great Northern Diver are difficult to obtain. During the breeding season it retires to inland lakes, where it builds its nest within a few feet of the water's edge, and lays two, sometimes three eggs, of an olive brown colour, sparingly spotted with a darker brown The young do not attain their perfect plumage till the end of the third year. It remains in Britain during the greater part of the year, but there is no sufficiently satisfactory evidence of its ever breeding in this country; from the shortness of its absence, however, its breeding ground is probably not further off than Iceland and Greenland. The Black-throated Diver (*Colymbus arcticus*), a remarkably handsome species, and the Red-necked Diver (*Colymbus septentrionalis*) also occur in Britain, where, unlike the former species, they remain to breed.

DIVIDIVI, the commercial name for the astringent pods of *Cæsalpinia coriaria*, a leguminous shrub of the sub-order *Cæsalpinieæ*, which grows in low marshy tracts in the West Indies and the north of South America. The plant is between 20 and 30 feet in height, and bears white flowers. The pods are flattened, and curl up in drying; they are about ¾ inch broad, from 2 to 3 inches long, and of a rich brown colour. Dividivi was first brought to Europe from Caracas in 1768. Its value in the manufacture of leather is due to the large amount of tannin contained in the yellow resinous matter exterior to the seed husks. It may be employed in dyeing as a substitute for galls or sumach. Maracaibo, Rio Hacha, and Sabanilla are the ports from which it is principally shipped.

DIVINATION. This term is used to mean the obtaining knowledge of secret or future things by revelation from oracles or omens. The derivation of the word points to *divine* influence communicated through the soothsayer, much as the equivalent Greek term *mantike* refers to the utterances of the spiritually inspired or possessed seer, *mantis*. It is well seen from Cicero's treatise *De Divinatione* that in classic times theology not only included in its system all revelation by oracles, which clearly belongs to it, but also claimed possession of a variety of diviner's arts, such as augury and astrology, on the ground that their signs were sent by the gods. On the side of the Stoics, it is there argued that if divination is a real art, then there must be gods who gave it to mankind, which proposition is met by the counter-suggestions that signs of future events may be given by nature without any god, or that there may be gods and yet they not have bestowed on man any such art as divination. The real point of the relation of divination to religion is touched in the division of it into two kinds,—*artificial divination*, by haruspication, prodigies, lightning, augury, astrology, and lots, as contrasted with *natural divination*, by dreams and prophetic oracles. On a general survey of such arts among mankind, it appears that oracles, &c., being taken as revelations made directly by spiritual beings, fall to be considered under headings treating of religion (see, *e.g.*, DEMONOLOGY); but divining by such signs as the flight of birds or the falling of lots does not necessarily depend on the notion of intervening demons or deities. One part of its position is well stated in the argument by which Cicero makes his Stoic defend it:—If frogs by croaking, and oxen by snuffing the air, can give us signs to foretell the weather, why should there not be omens in the fibres of a victim's entrails, or in thunderstorms? But the religious view which regards omens as divine signs seems to have been from very early ages blended with the naturalistic view, so that in a great part of the cases it is impossible to disentangle them, or even to say which is the original one. This will appear in the following brief summary of the principal methods of divination. Now that the diviner's art has all but perished, we moderns are able to look back upon its history, to see how its futile proceedings were suggested by mistaken analogy, and how the experience of ages, which ratifies true inferences and destroys false fancies, is now reducing them to curious antiquarian relics.

The various "artificial" modes of divination for the most part rest evidently on the association of ideas in analogy and symbolism (see evidence in Tylor, *Early Hist. of Mankind*, p. 132; *Primitive Culture*, vol. i. p. 117, &c., 78.) A tree planted at a child's birth, or any other plant mentally associated with a person, gives a sign by its flourishing or withering as to that person's health or death (Ploss, *Das Kind*, vol. i. p. 71.) So with the sticks set up by Polynesians to see if the warriors they stand for will fall in battle, or with the cocoa-nut that is spun like a teetotum to point out a thief (Polack, *New Zealanders*, vol. i. p. 270; Mariner's *Tonga Islands*, ch. xx.) This kind of fanciful association appears in *sortilege*, or casting of lots, a proceeding remarkable not only for its antiquity but for the frequency with which religions have adopted it as a means of obtaining divine guidance, from the ages when classic poets sang of Homeric heroes praying to the gods when they cast lots in Agamemnon's leather cap, or of Mopsus the soothsayer divining with sacred lots when the Argonauts embarked on their voyage (Homer, *Il.*, vii. 175; Pindar, *Pyth.*, iv. 338), and on until modern times, when the Moravians still resorted to solemn religious lots to determine difficult questions, such as the choice of wives. Dice or astragali (hucklebones) have been used for the purposes of sortilege (see Suetonius, *Tiberius*); and *cartomancy*, or fortune-telling by means of playing-cards, is still common. In ancient times omens were drawn from poets' verses, fixed on by chance, a practice well known as *Sortes Virgilianæ*, from Virgil being often so consulted (see Smith's *Dic. Gr. and Rom. Antiq.*, art. "Sortes"); and the Bible came to be afterwards so used for drawing texts, or "pricking for texts;" this practice is still very usual in Germany (see Wuttke, *Deutsche Volksaberglaube*, 2 ed., p. 227.) The *haruspication*, or examination of entrails, by which Roman statesmen were (or pretended to be) guided in public affairs (see Cicero, *De Div.*, ii. 12; Plin. *H. N.*, xi. 73); and *scapulimancy*, or the Tatar mode of divining by the cracks and lines in a shoulder blade (Lubbock, *Origin of Civilization*, p. 230), formerly known in England as "reading the speal-bone" (Brand, *Popular Antiquities*, vol. iii. p. 339), depended on imaginary symbolic associations, such as that cracks in opposite directions meant good and ill fortune, that the course of particular lines indicated the course of the consulter's life, &c. This sort of false analogy may be well understood by any one who will have the similar art of *palmistry*, or divining by the lines of the hand, applied to his own future by a fortune-teller at a fair. Omens obtained by *augury*, or divining by the sight and cries of animals, especially birds (as the name indicates), are as familiar among uncivilized races as they were in ancient Rome; their symbolism is apparent in such rules as that a hawk means victory, an owl's hoot is unlucky, and that a beast or bird on the right hand portends good, but on the left hand evil (Tylor, *P. C.*, vol. i. p. 119). Another class of arts depend on the unconscious or half-conscious action of some person, often the diviner himself. Among these is the use of the well-known divining-rod, which when held in the hands, dips to indicate a hidden spring of water, a vein of ore, or a buried treasure (Brand, vol. iii. p. 332; see Chevreul, *De la Baguette Divinatoire*, &c.) The use of this instrument remains in some districts of England; it is locally known as "dowsing," whence no doubt the name of Dousterswivel in *The Antiquary*. Similar in principle is the ancient *coscinomancy*, or divining by a sieve held suspended, and giving its indications by turning. In later times this gave place to the ordeal by the Bible and key, where the book is suspended by a key tied in with its wards between the leaves and the key supported on two persons' forefingers, and the whole turns round to prove guilty some servant maid accused of theft (Brand, vol. iii. p. 351). In such cases, where the culprits' fears are apt to betray them, the process of divination really serves as a practical test. Dreams are not only considered visits from ghosts, but often also as supernatural signs to be interpreted symbolically, as when a Kamtschatkan dreaming of dogs or lice would take it as foretelling a visit from Russians (Steller, *Kamtschatka*, p. 279). Of such interpretations the ancient art of *oneiromancy* consists, as may be seen in such rules as that if a woman dreams of kindling a fire, she will bear a male child; if one dreams of white clouds it means joy, but if black clouds trouble (Brand, vol. iii. p. 132; Tylor, *l.c.*). It remains to mention in few words *astrology*, the branch of divination whose importance in the world has exceeded that of all the rest together. Researches into the ancient writings of Chaldæa have now shown how fully historians were justified in treating that country as the principal among the sources whence the star-gazers received their precepts (see Sayce, "Astronomy and Astrology of the Babylonians," in *Trans. Soc. Bibl. Arch.*, vol. iii.; Maury, *La Magie et l'Astrologie.*) The rules in such comparatively modern works as Sibly's *Occult Sciences* and Lilly's *Astrology* fairly enough represent the ancient traditions, and show their still intelligible symbolism,—how the stars rising at a child's birth are made in the horoscope to typify its destiny, and the planets and signs of the zodiac exercise "influences" often plainly drawn from their natures or names. Thus Mars has to do with soldiers, Venus with lovers, and Mercury with prattlers; the solar man is grand and generous, the lunar man unsteadfast and inclined to change his dwelling, the sign Leo presides over places where wild beasts abound, but Aries over pastures. At the courts of Asiatic rulers, the state astrologer still nominally holds a position like that of his predecessor in the ancient empires of the world, but it is evident that the last twenty years have shaken, even in the barbaric East, the power of the occult sciences over the human mind. (E. B. T.)

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iving.

DIVING. The art of diving to considerable depths under water to bring up pearls, corals, and sponges has been practised in the Indian seas from very early times, and if we may believe the accounts that have come down to us, the feats of early divers are truly remarkable—some of them, it is said, having been able to prolong their submarine descents for periods varying from two to three minutes. It is obvious, however, that not having the aid of any artificial appliances for supplying air, the powers of these bold adventurers, both as regards the depth to which they could descend and the length of time they could remain submerged, were comparatively limited.

At an early period, therefore, the attention of philosophers and mechanics was turned to the discovery of a contrivance for aiding the diver in prosecuting his daring but useful calling, which was rendered all the more important from its being no longer confined to the acquisition of Eastern luxuries, but to the raising of treasure from sunken vessels. It is not considered expedient to occupy space by further reference to the feats of the early divers, but rather to pass at once to the history and construction of the diving apparatus of modern times, as illustrated by the Diving Bell and the Diving Dress at present in use. And here it may be stated that in addition to the sponge and coral trade of foreign lands, which has been greatly advanced by the use of modern appliances, there are the works of the naval engineer, and more particularly of the civil engineer, in which diving apparatus is so extensively employed and so essentially necessary as to place the art of diving on a wider basis, and to give it an importance only fully developed within the present century.

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Diving Bell.—The most useful of ancient contrivances is the diving bell, which, introduced at an early period and gradually improved, is now the well-known apparatus used by engineers in the present day; and it may be interesting to trace the successive improvements that have brought it to its present state of perfection and usefulness in conducting submarine works.

The conception of the diving bell is very simple. The air contained in an inverted jar sunk in a vessel of water excludes the water from the interior, and if the vessel be made of sufficient size to contain persons within it, it may be sunk without their being wetted, and they may continue to be submerged so long as the air within the bell continues pure enough to support animation. Such were the "diving-chests" of the first makers, which, though they differed in
form and details, were constructed on the same pri
the modern bell, and were generally formed of woo
with iron hoops, like a barrel.

It will be obvious that if such a vessel were su
in shallow water, having a depth of say one foot
a large supply of air would be inclosed in the bell,
bottom on which it rested would, from the small
water upon it, be easily reached for any operati
performed on it. But if we conceive the same b
lowered further below the surface, the air being
sible will be reduced in volume, and the water wi
the bell to fill its place. The result would be th
depth of about 33 feet the air would be compre
about one-half its original bulk, and the bell itsel
be half filled with water; and the bottom of th
which it rested would no longer be so convenientl
as when the water was only a few inches above t
the bell. Moreover, the air by repeated in
becomes unfit to support life, and the ancient bel
be raised to the surface at very short intervals of
fresh air might be supplied to the men
Although, therefore, the *original* diving bell wa
towards the perfect appliances afterwards intro
will readily be seen that its use in diving operat
very limited indeed.

Dr Halley, the secretary of the Royal Society, w
to have taken an interest in diving and divers,
passionated their want of fresh air, communicated
the Royal Society in which, to use his own
proposes a plan "for carrying the *pabulum vitæ*
the divers, who must without being supplied
return very soon to the surface or perish." The
is the description of his arrangements for this
After describing the bell itself, which was of woo
form of a truncated cone, with a capacity of 60 c
and was suspended by a sprit from the mast of a
says—

"To supply air to this bell when under water, I caus
of barrels, of about 36 gallons each, to be cased with lea
sink empty, each of them having a bung-hole in its lowe
let in the water, as the air in them condensed on their de
to let it out again when they were drawn up full from bel
to a hole in the uppermost part of these barrels I fixed
hose, long enough to fall below the bung-hole, being ke
a weight appended, so that the air in the upper part of
could not escape, unless the lower ends of these hose
lifted up.

"The air-barrels being thus prepared, I fitted them
proper to make them rise and fall alternately, after the
two buckets in a well; and in their descent they were
lines fastened to the under edge of the bell, which pass
rings on both sides of the leathern hose in each barrel
sliding down by these lines, they came readily to the
man, who stood on purpose to receive them, and to take u
of the hose into the bell. Through these hose, as soo
ends came above the surface of the water in the barrels,
that was included in the upper parts of them was blown
force into the bell, whilst the water entered at the bung-h
and filled them, and as soon as the air of one barrel had
received, upon a signal given that was drawn up, and a
time the other descended, and, by an alternate succession,
air so quick, and in so great plenty, that I myself have b
five who have been together at the bottom, in nine to te
water, for above an hour and a half at a time, without a
ill consequence, and I might have continued there so
pleased, for anything that appeared to the contrary. I onl
that it was necessary to be let down gradually at first, a
feet at a time; and then to stop and drive out the air the
by receiving 3 or 4 barrels of fresh air before I descende
But being arrived at the depth designed, I then let out
the hot air that had been breathed as each barrel would
with cool, by means of the cock at the top of the bell, thro
aperture, though very small, the air would rush with so muc
as to make the surface of the sea boil, and to cover it wi
foam, notwithstanding the weight of the water over us.

"Thus I found that I could do anything that required
just under us, and that I could, for a space as wide as the
the bell, lay the bottom of the sea so far dry, as not t

> om. And, by the glass window, so much light was that when the sea was clear, and especially when the could see perfectly well to write or read, much more to y hold on anything under us that was to be taken up; return of the air barrels, I often sent up orders, written a pen on small plates of lead, directing how to move up to place as occasion required. At other times when the bled and thick, it would be as dark as night below; cases I have been able to keep a candle burning in the as I pleased, notwithstanding the great expense of air maintain flame. This I take to be an invention appli-ous uses, such as fishing for pearls, diving for coral or the like, in far greater depths than has hitherto ht possible; also for the fitting and placing of the found-les, Bridges, &c., in rocky bottoms, and for cleaning and ships' bottoms when foul, in calm weather at sea. I ntimate that, by an additional contrivance, I have found racticable for a diver to go out of an engine, to a good om it, the air being conveyed to him with a continued small flexible pipes; which pipes may serve as a clue to back again when he would return to the bell."

an account of Dr Halley's apparatus, which un- effected an important improvement; but it the sending down of constant relays of air vessels, reat loss of time and interruption which attended eans of supply. It remained for Smeaton to these objections. In repairing the shoeing of the ns of Hexham Bridge, in 1778, there being but a th of water, to work in, he contrived a bell to the hich he attached a force pump in lieu of Dr ir-barrels, and as the bell, in consequence of the th of water, did not require to be wholly sub- he supply of air for the divers was forced directly ell, being the first application of the force pump purpose.[1] Subsequently to this, in 1748, having o remove stones in clearing the foundations for a amsgate, he applied an air-pump placed in a ship and pumped air into the bell at any depth under means of a hose screwed into an air-hole in the bell. The following is Smeaton's description of nprovement:—

> d of the usual form of a bell, or of a conical tub of wood eights (externally applied), this for convenience was a t of cast iron, which being 50 cwts. was heavy enough to and being 4½ feet in height, 4½ feet in length, and 3 afforded room sufficient for two men at a time to work But it was *peculiar* to this machine that the men there-pplied with a constant influx of fresh air without any theirs, that necessary article being amply supplied by *ir-pump* in a boat upon the water's surface."[2]

thus be seen that Smeaton's Ramsgate bell con- the elements of the present appliances, which, as in details, and constructed by Messrs Rennie, has xtensively employed in harbour works.

ll as now used is shown in plan and section in d 2. It is a cast-iron chest weighing about 5 is suspended and tackle. p of the bell 8 apertures with very s for admit- ; and in the the passage *b*, h the hose is for admitting pply. The interior is fitted with two seats *e*, which moved to make room when the men are at work; e centre is a lifting chain *c*, to which stones are o facilitate their being lifted and properly adjusted ls on which they are to be laid. The bell is used to two different systems, depending on the nature of the work to be performed. In building masonry under water it is suspended from a staging of timber, but in excavating rock or removing boulders, scattered over a considerable area, where a staging would be inapplicable, it is suspended from a barge or lighter.

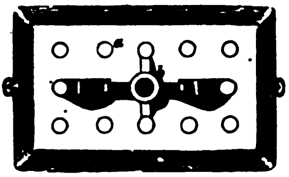

FIG. 1.—Plan of Diving Bell.

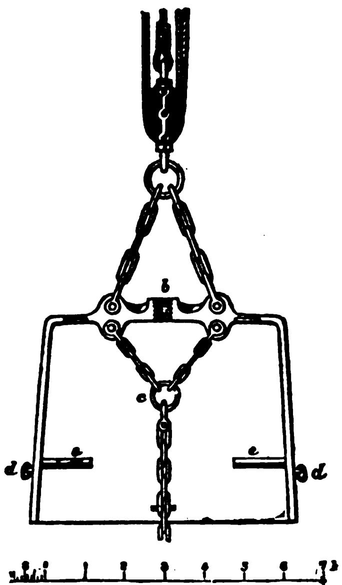

FIG. 2.—Section of Diving Bell.

Bell-staging

Fig. 3 shows the arrangement as employed in laying stones or blocks of concrete. It represents a cross section of the staging, bell framing, and bell carriage, in which *a*

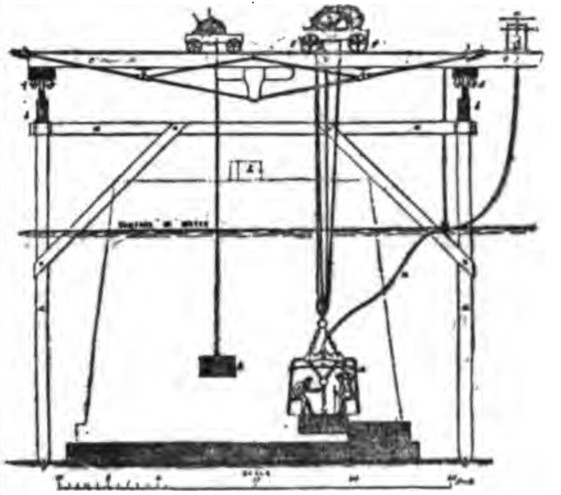

FIG. 3.—Block-laying by Diving Bell.

is the staging, *b* longitudinal beams on which the bell-framing *cc* traverses on the wheels and toothed racks *d*. The diving bell *e* is suspended from the bell carriage *f*, which traverses on the bell framing by the wheels and toothed rack *g* across the whole breadth of the pier. The stones *h* are brought along the surface of the finished part of the pier, and lowered down by the travelling crab-winch *l*. The force-pumps by which the bell is supplied with air are shown at *m*, and the air-hose at *n*. It will be understood from this description that the bell framing *c*, moves freely *along* the staging, while the bell carriage has a motion at right angles across the work, so that the position of the bell can be altered with the greatest ease so as to bring it over any spot within the area of the staging.

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[1] n's *Reports*, vol. iii. p. 279.

[2] al *Report on Ramsgate Harbour*, by John Smeaton, 91, p. 70.

In proceeding to work, the men take their seats in the bell from a boat, and the bell is then lowered to the required depth. If the work be that of building a wall a stone is lowered at the same time. The changes in the position of the bell are all made according to signs given by the divers by strokes of a hammer on the bell, which experience has shown can be heard at any depth at which the diving bell has been employed. The signals are—*one* stroke, more air; *two*, hold on; *three*, raise; *four*, lower; *five*, north; *six*, south; *seven*, east; *eight*, west. These signals are narrowly observed by a watchman stationed in a boat, and reported to the men working the bell carriage. The rule for the supply of air both to the bell and diving dress is to give it so freely that there shall be a constant escape of air rising to the surface in air-bubbles all the time the men are under water. After being lowered, the bell is first moved over the stone to be laid; the divers then unhook the lowering chain from the lewis in the stone, and at the same time make fast the stone to the tackle within the bell, which is at once signalled to be raised, and carries the stone with it. The bell is then moved over the site on which it is to be placed; it is then lowered until it has nearly reached its bed, on which it is finally deposited. The lewis is then removed and the bell raised for another stone; and with trained workmen it is surprising how expeditiously the bell is moved from place to place, and stone after stone is built in the walls. The staff of men required to work the bell is two divers, one watchman, four men working the air-pump, and four working the bell carriage, besides the men required to bring forward and send down the stones. The men engaged generally work in shifts of from 3 to 6 hours according to the depth, and the diving work may be continued as long as in ordinary day-work, as in clear water the light is good to the greatest depth at which the bell is used in harbour building.

When engaged in blasting, the bore is made in the ordinary way, and charged with a shot inclosed in a water-tight canvas case, to which is attached a length of 6 or 8 feet of patent fuse. The bell is then moved from above the bore, and the fuse ignited, and when the shot is fired the smoke rises to the surface clear of the bell.

When employed for removing rock or boulder stones—for example, in a river navigation,—it is of advantage that the bell be capable of being easily transported, and in that case it is swung from a barge or lighter, which contains the machinery for working the bell and air-pumps, and a crane for raising the boulders as the divers sling them. It is of course attended with greater trouble and risk to the divers to work the bell from a lighter than from a stage; but, on the other hand, the convenience in being enabled to transport it from place to place, in a river navigation, is a great advantage.

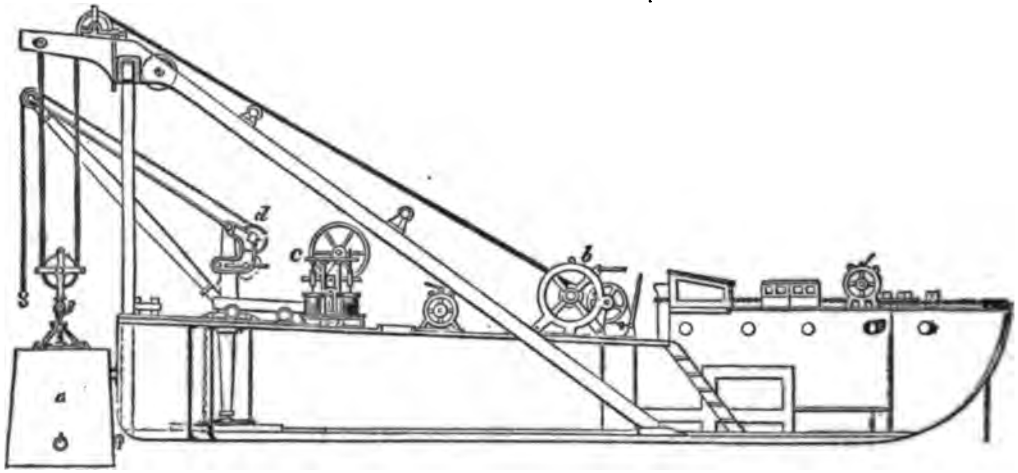

FIG. 4.—Longitudinal Section of Diving Bell Lighter (56 feet long and 24 feet beam).

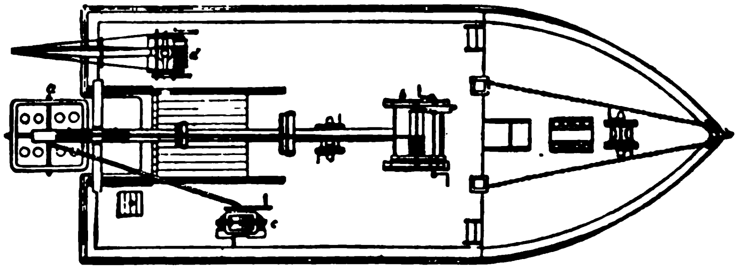

FIG. 5.—Plan of Bell Lighter (56 feet long and 24 feet beam).

Figs. 4 and 5 show the disposition of the various appliances in the most recent bell-lighter built by Messrs

Simons of Renfrew for the River Clyde, which was communicated by Mr Deas, the engineer, to the Clyde Trustees. Fig. 4 is a longitudinal section, and fig. 5 a plan in which *a* is the bell, *b* the bell crab, *c* the air-pumps, and *d* the crane for lifting stones, &c., slung by the divers.

The large cost of a diving bell limits its use to works of magnitude, especially as many submarine works can be done better by the diving dress, which is much less expensive; but there are certain operations, such as the clearing and levelling of foundations, for which the bell is peculiarly well adapted, that still enable it to take its place as one of the most useful appliances of the marine engineer. Mr B. B. Stoney has, in an interesting paper in the *Minutes of Proceedings of the Institution of Civil Engineers*,[1] described a diving bell, or chamber, 20 feet square, with which he successfully built the foundation of the quays of Dublin. Mr Stoney's apparatus does not come under the article diving, but belongs more properly to the subject of the compressed air cylinders used in bridge building, which are described under the article BRIDGE.

Diving Dress.—The diving dress is peculiarly well fitted for such works as the repair or overhaul of rollers and sluices of lock-gates, cleaning or repairing ships' bottoms, descending into the hatches of wrecks to recover property, and, in short, everything that cannot be done from the interior of a bell. The inexpensiveness also of the diving dress, dispensing with all costly staging, and its ease of transport and appliance, are much in favour of its use. It is, indeed, so convenient in the repair of propellers, examining ships' bottoms, recovering anchors, &c., that all ships in Her Majesty's navy of sufficient size to be commanded by captains are now supplied with a diving dress or apparatus, and bear a certain number of divers in their complements; and all sea-going flagships and iron-clads on foreign stations carry two sets of diving apparatus, and are allowed a suitable number of trained divers.

The invention of the diving dress, like that of most useful appliances, was gradual, and the work of many minds. Some early proposals, such as that already referred to in the quotation from Dr Halley's paper in 1721, and others of more modern date, were made for providing the diver with a dress to enable him with safety to carry on his work, for an account of which the reader is referred to a paper by Mr J. W. Heinke in the *Minutes of Proceedings of the Institution of Civil Engineers*.[2] But to Mr A. Siebe is due the credit of being the first to introduce a dress which was supplied with a constant stream of fresh air, and may be said to have been the precursor of the dress now in use. We allude to what was called the "open dress" invented in 1829, which consisted of a helmet and waterproof jacket, under which, and fitting more closely to the body, were worn trousers reaching to the arm-pits, and between the jacket and trousers the air pumped in at the helmet was allowed to force its way and escape to the surface as in the diving bell, and hence it was called "open." Although some divers of the old school are said still to give a preference to the open dress, its danger became manifest; for if a diver stumbled and fell on his face or side, the water entered his dress, and unless quickly brought to the surface he was in danger of being drowned —a necessary requirement of the open dress being that he should remain in an upright or gently stooping position. To meet this defect, Mr Siebe, in 1837, introduced the "close" dress, which is now almost universally used. Various minor improvements were introduced between 1839 and 1843 connected with the removal of the wreck of the "Royal George" ship of war, conducted by the late Sir Charles Pasley, which will be found fully described in the *Minutes of Proceedings of the Institution of Civil Engineers*.[3] The long continued experience gained in diving while these operations were in progress suggested improvements and alterations which had a great effect in bringing the diving dress to its present perfection as now manufactured by Siebe, Heinke, Barnett, and other makers.

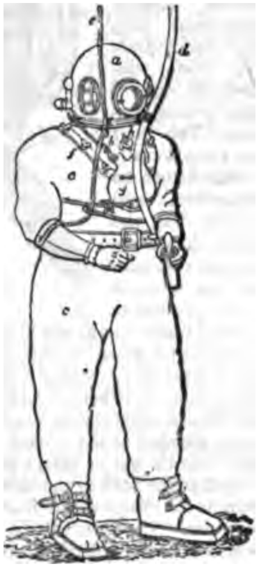

FIG. 6.—Diving Dress.

The diving dress, as will be understoood from fig. 6, envelops the whole body of the diver, the upper portion *a* being the "helmet," the intermediate portion *b* the "breast-plate," and the lower portion *c* the "dress." The hose by which the air is supplied is shown at *d*, and *e* is the "life" or "signal" line, which is attached to the diver's waist, and by which he makes signals and is hauled to the surface. The water-proof material of which the dress is made is very generally sheet india-rubber covered on both sides with tanned twill to protect the india-rubber from injury. The cuffs fit tightly round the wrists, leaving the hands free, and india-rubber bands slipped over them render the joint water-tight. The breast-plate *b* is made of tinned copper with an outer edge of brass, which has screws fitted to it projecting upwards and passing through corresponding holes in the collar of the dress. On the top of this, and with holes in it corresponding to the screws, four pieces of a metal band are firmly screwed down by wing nuts, nipping the soft material of the collar between the metal of the breast-plate and band, and thus ensuring a water-tight joint. On the front of the breast-plate two studs are fastened for securing the back and front weights *g*. Some makers put a valve *h* on the front of the breast-plate, by means of which the diver can regulate the pressure inside his dress at will, and in this way has the power, by simply inflating his dress more or less, of making himself of any specific gravity, so as to float at any desired depth or rise to the surface without the assistance of the attendant. This arrangement in the hands of a skilled diver is undoubtedly a great convenience. But it is still a matter of difference of opinion whether it is not safer to trust to being hauled up by the watchman on the surface, whose duty it is to hold the *life* or *signal* line in one hand, and the air hose in the other, while the diver is at work, and to attend to whatever signal he may give by pulling the life line. The inconvenience of the air bubbling up in front of the bulls' eyes, and the danger of inexperienced divers becoming giddy and turning the valve the wrong way, have induced some makers to do away with this useful valve, and to substitute at the back of the helmet a valve which the diver can regulate by the pressure of his hand, but which rights itself the moment his hand is removed. The neck of the breast-plate is fitted with a "segmental screw bayonet joint" (introduced by Messrs Siebe), and to this the helmet, the neck of which is fitted with a corresponding screw, can be attached or removed by one eighth of a turn. The helmet, a side view of which is given in fig. 7, is made of tinned copper, and fitted in front with three strong plate-glass windows, or bulls' eyes, in brass frames protected with guards. Messrs Heinke introduced sliding covers to draw over these windows in case of their getting broken. The front eye piece is made so that it can be unscrewed, and in this way the diver on ascending can rest himself for a short time or give orders without removing the rest of his dress. Messrs Barnett have introduced instead of this a hinged glazed frame, which fits tightly into a conical vulcanized india-rubber seat like the ordinary port hole of a ship, so that it can be opened by the diver himself the moment his head is above water, and being attached to the helmet it cannot be dropped accidentally into the sea or otherwise mislaid. An outlet valve *a* is fixed at the back of the helmet, which, opening outwards, permits the escape of the foul air but prevents the entrance of water. The inlet valve *b* to which the hose is attached is also fixed at the back of the helmet, and is so constructed as freely to admit the air from the force pump; but should anything occur to the hose or pumps the valve at once shuts, inclosing a sufficient supply of air in the dress to support the diver till he can be hauled to the surface. The air after entering by the inlet valve is conducted in tubes *c* to the front of the helmet, so that the diver has the advantage of inhaling fresh air, and the front glasses are kept free from the condensation of his breath which would otherwise take place. On each side of the helmet is a hook over which the cords pass which carry the front and back weights, and a brass stud to one of which the life line, and to the other the air tube, are attached; *d d* is the joint by which the helmet is screwed upon the breast-plate. The back and front weights weigh about 40 ℔ each, and are held close to the diver's body by means of a lashing passing under his arm-pits. The boots are made of stout leather, with leaden soles, secured by two buckles and straps, each boot weighing about 20 ℔.

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[1] Vol. xxxvii. p. 339.

[2] Vol. xv. p. 309.

[3] Vol. xv. p. 323.

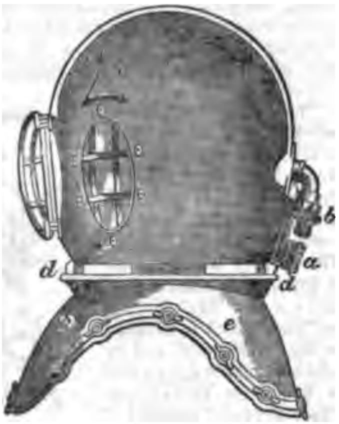

FIG. 7.—Diver's Helmet.

The cost of a diving dress, with all its appliances, is about £140.

The sponge, pearl, and coral fisheries, originally carried on only by naked divers, as already noticed, are now conducted to a great extent by the help of artificial aids; and, according to Mr Siebe, upwards of 300 sets of diving dresses are employed in the Mediterranean sponge fisheries alone, and they are being introduced in the Bahamas, Bermudas, Ceylon, the West Indian Islands, and on the coast of Australia.

Depth at which diving can be prosecuted.

As already stated, at moderate depths not exceeding 30 to 40 feet, and with clear water, sufficient light is transmitted to enable the diver to perform any ordinary work, and in working in turbid water with the diving bell candles are employed. Mr Siebe has also constructed an electric lamp and an oil lamp which can be employed where light requires to be used by divers at great depths.

Captain Eads[1] states that at the Mississippi bridg
were at first employed, which, under a pressure of
were found to be burnt down in about three-fift
time required in the open air; under a pressure of
was found that a candle if blown out by the brea
immediately reignite; and at the depth of 10
candle was blown out thirteen consecutive tim
course of half a minute, and each time exceptin
was reignited.

The depth at which diving can be safely cond
question of importance. The ordinary depth at
diving bell has been employed in harbour works i
to 35 feet, and it has been used in 60 feet at Do

With the diving dress much greater depths
attained. Mr Siebe relates that in removing th
the ship "Cape Horn," wrecked off the coast
America, a diver named Hooper made 7 descents
of 201 feet, and at one time remained 42 min
posed to be the greatest diving feat ever achie
Frendenberg states that in the repair of a pu
Scharley zinc mines in Silesia two divers went
pump well to a depth of 85 feet, remaining fro
varying from 15 minutes to two hours.[2] In the
of the author the greatest depth at which the diving
used in the open sea was in the Firth of Forth.
Commission "on the Operation of the Acts relat
Trawling for Herring on the Coast of Scotland"
to obtain the herring spawn from various portio
exposed parts of the firth, and this duty was s
accomplished in depths of from 14 to 16 fathoms,
deck of the "Princess Royal" cutter, under the
of Mr Macdonald.

The writer is indebted to Mr P. J. Messent, the
of the Tyne piers, for the following notes of his
at that work. "On the Tyne Pier works helmet
divers are employed simultaneously—the former f
ing for and fixing the feet of the piles of which t
is formed, the bell divers for levelling the founda
fixing the blocks of which the pier is compo
helmet diver has greatest power in lifting. He
but a few pounds of force in pulling downwards (
can fasten himself down) on account of his buoy
for the same reason he cannot pull or push ho
with much force unless he has a fulcrum or st
feet or body. Thus, in boring an augur hole in
would have to lash himself to it, unless there
jecting rock or stone that he could get his foo
In the use of a hammer and other tools for stri
restricted by the water," but Mr Messent has kn
men do fair work with a hammer and chis
difficult for them to walk against even a moderate
men who by accident get on the (lee) tide side
work, generally have to be hauled up to their
lowered down again in order to get on the (
tideward side of it; again experience enables man
difficulties to be met or modified, but it is advant
bear them in mind in arranging work for divers.
the divers at the Tyne have been made or instruct
works, and of the men who have tried helmet di
more than one out of three or four succeed
divers, the failure being sometimes from physic
but more often from *want of head*. There is less
in making bell-divers, probably on account of th
ing in company, there being always two men in a
the same amount of self-reliance is not needed.

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[1] Reports by Captain James B. Eads to the President an
of the Illinois and St Louis Bridge Company.

[2] *Minutes of Proceedings of Inst. of Civil Engineers*,
343.

of diving obliges the diver to conduct his
ressure greater than that of the atmosphere
f the earth. All diving work is done under
nospheric pressure, which increases with the
the diver is submerged in water. This
he is submerged to the depth of 33 feet, is
he normal superficial atmospheric pressure.
hs the pressure is proportionately increased,
becomes so great that life could not
To descend even to the moderate depth
t, which is about the maximum required for
eering sea works, demands some practice
the part of the diver, but when greater
be explored, in raising sunk vessels, for
ergy and power of endurance of the diver
severely taxed, and it seems not uninterest-
luding this article, to refer to the effect which
the health of the diver, as well as on some
cts of interest in general science.

s experienced in a diving bell are common,
o all divers. According to the writer's ex-
soon after the lips of the bell have touched
he water pain is felt in the ears and above
continues with greater or less intensity
e rate of descent until the bell has attained
o long as the bell continues *there* no pain is
eeling being that of depression due to the
the diver is submerged. As soon as the
ent commences the pain in the ears and
returns, and continues till the surface is
notion of the bell is very gradual, sometimes
feet per minute, but even at that slow rate
not accommodate itself to the increase of
o avoid inconvenience. Aeronauts do not
e extent in their ascents in balloons, because
f pressure is much more gradual in passing
mosphere than through a medium having
vater.

stions have been offered as accounting for
which are experienced in diving, and the
nation, which the author has submitted to
r of Edinburgh, is believed to afford the

ordinary atmospheric conditions, the air
on the surface of the body, but into every
e body which communicates with the sur-
pressure, both externally and internally, is
d. In passing into a denser atmosphere
ressure operates externally more rapidly
ernally, more especially if the communica-
nal cavities with the surface is by tortuous
so long as this inequality in the pressure
reeable sensations in the ears and above the
ue. The pain in the ears arises from the
condensed air acting externally on the
rane of the ear, before the air within the
has acquired the same density to counter-
e tympanic membrane stretches across the
passage or meatus, which leads from the
he side of the head (see ANATOMY, fig. 80.)
in direct communication with the atmo-
ure of which, therefore, acts instantaneously
nic membrane. But on its inside the
rane bounds the tympanic cavity, which
cation with the external air, excepting by
tube, which leads from the cavity into the
iately behind the nose. Through this tube,
ndensed air must pass from the pharynx to
necessary within the cavity for restoring
librium within and without. But the Eustachian tube is a long and narrow passage; at its commencement in the ear it has a bony structure, but towards its termination in the pharynx behind the nostrils, it becomes soft, so that its walls can be forced together. It admits an easy passage from the ear to the pharynx; but when any pressure arises in the opposite direction, it acts in some degree like a valve, shutting the passage, until the increasing pressure again forces it open. Some time then elapses before all this can be accomplished; and during this time the external air, pressing with full force on the tympanic membrane, produces the pain which is felt. When the Eustachian tube opens, it is generally all of a sudden, and with a slight explosion or pop, which is followed by instant relief from the pain. This relief may often be produced by filling the mouth, or gulping the air and passing it into the tube.

That the above is what really takes place may be shown experimentally by shutting the mouth and nostrils, and exhausting the air from them by the action of the lungs. The air in the tympanic cavity immediately rushing through the Eustachian tube into the mouth, the external air acts on the tympanic membrane and produces a slight sensation of deafness, such as is felt in the bell. But if, instead of exhausting the air, we attempt to compress it, and force it through the tube into the tympanic cavity, at first no effect is produced; but after exerting a considerable pressure a slight pop is felt, and a little pain in the ear which is just the sudden opening of the tube.

The pain above the eyes is doubtless due to the inequality between the pressure of the air on the surface of the forehead and that of the air in the frontal sinuses, or air spaces in the frontal and other bones which form the boundaries of the orbits. The return of the disagreeable sensations during the upward ascent of the bell is due to the pressure on the outer surface of the tympanic membrane and of the forehead being diminished, before the air within the tympanic cavity and the air spaces in the bones of the orbits has accommodated itself to the diminished external pressure.

It may further be interesting to notice that any *upward* motion is accompanied by a thick mist within the bell, which disappears when it is stationary or moving *downwards*. The explanation is that the air inside the bell, when it is ascending, being relieved of pressure, expands, and its temperature is lowered; and as the air inside is about the point of saturation, the fall of temperature produces condensation, which becomes visible in the form of vapour or mist. An analogous phenomenon takes place in commencing to exhaust the receiver of an air-pump.

Effect of diving on the health of the divers.

The question of the effect produced on the health of the men employed in diving is of interest and importance. So far as the author's experience goes, he is not aware that divers suffer from prosecuting their submarine work under the pressure of one or two atmospheres to which they are subjected in ordinary harbour works, the men selected for such duty being generally healthy young men of athletic make. Indeed, it is well known that to some constitutions, and in some forms of disease, subjection to moderate increase of atmospheric pressure proves beneficial. But when greater depths and high pressures have to be sustained the case may be very different.

Mr Siebe, who states the greatest depth to which a diver has descended to be 201 feet, with a pressure of 87 ℔ on the square inch (but who states 150 feet as the limit for safe work), has given various directions, the result of his experience, as to the selection of men for deep diving, and advises that men should not be employed who are of full habit of body, who suffer from headache or deafness, who have at any time had spitting of blood or palpitation of the heart, who are pale and whose circulation is languid.

or who are of intemperate habits. He also says that the rate of descent and ascent must depend very much on the constitution and experience of the diver, about 2 feet a second for a strong man for depths not exceeding 80 feet, and for descending to greater depths additional care must be used. The greatest pressures to which men are subjected in engineering works are experienced in the compressed air cylinders used in bridge building (see article BRIDGE). At Saltash bridge it was found that the men could not work long shifts at the depth of 86 feet without serious inconvenience—some of them, after working seven hours, being slightly paralyzed, but in two or three days they quite recovered. With three hours' shifts the men could work for several months consecutively.

At Londonderry bridge, where the men wrought under a pressure of 75 feet, or about two atmospheres, Sir John Hawkshaw found that there was considerable difference in the relative ability of men to stand the pressure. He had found Irishmen less able to stand the work than Englishmen, one of the effects being that the joints began to swell. In other cases no evil resulted.

Captain Eads, the engineer of the St Louis bridge, built across the Mississippi in 1870, gives some interesting information, in his reports to the directors of the Illinois and St Louis Bridge Company, on the effect of working under high pressure on the men. The maximum depth to which the cylinders had to be sunk was 110½ feet below summer water level, and the greatest pressure under which the men worked was 50 or 51 ℔ on the square inch. When the depth of 60 feet had been reached some of the men were affected by paralysis of the lower limbs, which usually passed off in a day or two. At greater depths the symptoms were more severe. The duration of working in the air chamber was gradually shortened from four hours to one hour. The total number of men employed in working under pressure was 352, of whom 30 were seriously affected and 12 cases proved fatal. (D. S.)

DIVISION. See LOGIC.

DIVORCE is the dissolution of the relationship of marriage. Few social questions are surrounded with greater difficulty than this. For what causes divorce should be granted, and whether complete divorce should be granted at all in the sense of authorizing the spouses to contract new marriages, are points on which civilized societies have arrived at very different conclusions. Modern practice and opinion are to be traced mainly to two sources of principle, viz., Roman law and the Christian religion. The effect of the spread of Christianity was to reinvest marriage with the religious character from which in the later law of Rome it had completely escaped; and the history of divorce in modern times has been the gradual decay of the restrictions which were thought appropriate to the religious character of the institution of marriage. At the same time these restrictions have nowhere disappeared. The opinion of society visibly fluctuates between the belief that marriage is a civil contract only and the belief that it is a contract of a peculiarly sacred character, the dissolution of which must not be lightly, if at all, permitted by human legislation. Again, divorce appears to be regarded sometimes as a penalty against the offending spouse, sometimes as a right to which the innocent spouse is entitled. It will be granted only if a matrimonial offence is proved to have been committed, but it will not be granted if such an offence has been committed on both sides. Hence a certain amount of inconsistency in legislation about divorce, which is in no system more remarkable than in our own, founded as it is on the doctrines of the canon law, modified by the opinions of secular judges, and altered by Acts of Parliament.

In Roman law marriage was regarded as a voluntary union which might be terminated at any time by the consent of the parties. No legal process was requir although the abuse of the power of divorce was sometim punished. If a wife had not passed under the *manus* her husband, her father might withdraw her from the uni against the wishes of both parties. A constitution Antoninus Pius limited this power. Until the time Justinian divorce by consent of both parties does n appear to have been subject to any restriction. Justinia however, allowed it only in three specified cases, viz., for i potency, or when either party desired to enter on a monast life or was for a long time in captivity. "At a later peri Justinian enacted that persons dissolving a marriage b mutual consent should forfeit all their property and be co fined for life to a monastery, which was to receive a thi of the forfeited property, the remaining two-thirds going the children of the marriage. This severity, so much variance with the Roman spirit, indicates the growi power of the clergy (*ut non Dei judicium contemnatur*) (Hunter's *Roman Law*, p. 500.) These prohibitions we repealed in the next reign. Divorce by the husba against the wish of his wife was a power much more lik to be abused than that of dissolving marriage by mutu consent. Although the legal right was recognized, it said not to have been acted on for a period of 500 yea and Spurius Carvilius is said to have been the first w put away his wife for barrenness. Harshness in t exercise of the power was condemned by public opinion, a sometimes punished by the authority of censors. Antonius, a senator, was expelled from the senate for harsh divorce of a young wife. The wife who had n come under the *manus* of the husband had the same pow of repudiating the marriage at will. Later legislati curbed this excessive licence. By the lex Julia et Pa Poppæa, a husband divorcing a wife for adultery might tain one-sixth of her dowry; for any smaller offence, o one-eighth. When a husband was guilty of adultery had to repay the dowry at once; if the fault were serious, in six months. Constantine allowed the wif divorce the husband in the following cases:—1, for murd 2, for being a preparer of poison; 3, for violating to Just causes for repudiation by the husband were— adultery; 2, preparing poisons; 3, being a procuress. wife divorcing her husband for other than the spec grounds forfeited the dowry, and might be punishe deportation. Similarly a husband lost his interest in dowry of his wife by an injurious divorce. Similar visions are to be found in the legislation of Honorius Theodorus (421 A.D.), of Theodosius and Valentinian (A.D.) Justinian settled the grounds of divorce as fol —The wife could divorce her husband—1, for conspi against the empire; 2, attempting her life; 3, attempti to induce her to commit adultery; 4, wrongfully accus her of adultery; 5, taking a paramour to his house or f quenting any other house in the same town with paramour. On a divorce for these reasons a wife recover her dowry, and obtained the husband's portion as well. I she divorced for other reasons she forfeited her dowry, and could not marry for five years, as in the legislation of Theodosius and Valentinian. So a husband might justly divorce his wife for—1, concealment of plots against the empire; 2, adultery; 3, attempting her husband's life, or concealing plots against him; 4, going to baths or banquets with other men; 5, remaining from home against her husband's wish; 6, going to circus, theatre, or amphitheatre against his wish. In such cases the husband retains the dowry for life, or if he has no children absolutely. In other cases penalties as fixed by previous legislation of Theodosius and Valentinian apply. The grounds for divorce specified in these various enactments are an interesting commentary on contemporary manners.

These experiments in divorce legislation display anxiety to regulate the relationship of marriage as a purely civil institution, with a view mainly to public decorum and the comfort of individuals. When marriage had manifestly failed it was no longer worth preserving, and it had failed when either of the parties showed a desire to withdraw from the alliance. At the same time an innocent party must be protected against the caprices of an unjust spouse, and such protection was sought by the device just described. It is a remarkable illustration of the Roman view of marriage that, in view of what must have been the great social evil of capricious divorce, the right of either party to dissolve the marriage was never successfully questioned. From the pure Roman to the canon law the change is great indeed. The ceremony becomes sacred, the tie indissoluble. Those whom God hath joined let not man put asunder, was the first text of the new law of marriage, and against such a prohibition social convenience and experience pleaded in vain. While marriage once created became indissoluble, the impediments to marriage also multiplied. The canon law annulled a marriage *ab initio* for causes which we should now consider wholly inadequate. The tie of consanguinity was extended to the eighth generation; and affinity, it was held, might be established by adulterous intercourse without marriage. The power of dispensing with canonical disabilities, and the power of annulling marriage on the ground of such disabilities, belonged to the church, and were important aids to its influence in society. In countries which have embraced the doctrines of the Reformation, a relaxation of the law of divorce has generally followed the changes of religion—whether immediately, as in Scotland, or indirectly, as in England. In Roman Catholic countries the theory of the canon law still rules.

The history of divorce in English law is particularly interesting. Down to the passing of the Divorce Act of 1858, the theory of the law of England was the same as the theory of the Roman Church. There were attempts during the period of the Reformation to introduce a greater licence of divorce, and in the *Reformatio Legum Ecclesiasticarum* (a code of ecclesiastical law projected by a royal commission, but never enacted) the leaders of the Reformation sanctioned principles which would even now be considered liberal. Divorce was to be granted for adultery, and the innocent spouse was to be permitted to marry again. Other grounds for divorce were specified, such as desertion and continued absence, and savageness of temper. Separation *a mensa et thoro* was to be superseded by this more complete remedy. And the more advanced Reformers advocated even greater liberty of divorce. The nature of their proposals, and the arguments by which they reconciled them with the language of Scripture, may be studied in Milton's tractate on the *Doctrine and Discipline of Divorce*, addressed to the Parliament of England. But the law remained unchanged. The constitution of marriages belonged to the jurisdiction of the ecclesiastical courts. The tie was indissoluble. The marriage, indeed, might be declared null and void in certain cases, *e.g.*, where the parties were within the prohibited degrees of consanguinity or affinity. This proceeding was not a dissolution of marriage so much as a declaration that no real marriage had taken place between the parties. Divorce *a mensa et thoro* was granted for adultery and cruelty. Here the marriage, being originally good, was not dissolved, but a separation was ordered either for a limited or an indefinite time. The spouses were not permitted to marry again. But while the law remained unchanged, the practice of granting complete divorces by private Acts of Parliament had come into existence. The legislature did in particular cases that which it refused to do by a general law. Two conditions were in general necessary to satisfy Parliament. 1st, A divorce a *mensa et thoro* had to be obtained from the ecclesiastical court. 2d, An action for damages had to be brought against the adulterer in the civil court for criminal conversation. The latter was not absolutely necessary, and appears to have been regarded as a safeguard against divorce being granted to persons who had connived at the acts of adultery, or had themselves been guilty of misconduct in the marriage state. The passing of these Acts through Parliament became a matter of as much formality as a proceeding in an ordinary law court. The two Houses passed standing orders on the subject, under which bills on divorce were argued before the law lords by professional advocates, and generally neither the House of Commons nor the lay lords interfered. By this characteristic evasion, the law of England completely changed its practice while still maintaining its ancient theory of divorce. Probably the anomalous character of the remedy might not have brought about a change but for the great practical evil of the expense attending the proceedings. Three suits—ecclesiastical, civil, and parliamentary—were necessary. Divorce became a remedy for the rich. The poor were driven to bigamy.[1] Yet it was not until 1857—and not then without determined resistance—that this disgraceful state of things was changed. A commission appointed in 1850 recommended the establishment of a regular court for divorce, and that divorce should be granted for the wife's adultery but not for the husband's unless aggravated by other offences. Bills constructed on these principles were introduced into Parliament, and successively abandoned or lost, until in 1857 the ministry of the day by great exertions carried the bill which is now the Act of 20 and 21 Vict. c. 85. Notwithstanding the hostility it excited, the bill proposed little more than a consolidation of jurisdictions; and proceedings in the Divorce Court have now, with few exceptions, the same object and result as the former proceedings in Parliament and in the civil and ecclesiastical courts. The action for damages for crim. con. is represented by the adulterer being made a party to the husband's suit. Full divorce is granted on the principles usually recognized by the House of Lords; and the other remedies are such as might formerly have been granted by the ecclesiastical court.

The following statement embraces the most important provisions of the Act:—

All jurisdiction in matters matrimonial (*i.e.*, in respect of divorces *a mensa et thoro*, suits of nullity of marriage, of jactitation of marriage, for restitution of conjugal rights, &c.), shall cease to be so exercisable, and shall in future be exercised by a new court, to be called the "Court for Divorce and Matrimonial Causes." The Lord Chancellor and other judges are named as members of this court, along with the judge of the new constituted Court of Probate, who is to be the judge ordinary of the new court. Divorce *a mensa et thoro* is under that name abolished, but a new remedy called judicial separation is introduced, which shall have the same effect, and such other legal effect as in the Act mentioned. This remedy may be obtained by either husband or wife, on the ground of adultery or cruelty, or desertion without cause for two years and upwards. At the same time it is provided that a wife deserted by her husband may apply to a police magistrate or justice of the peace for a protection order, by which her earnings and property acquired since the commencement of the desertion may be protected from her husband and his creditors, and belong to herself as if she were an unmarried woman. In all cases except dissolution of marriage, the divorce court shall act on "principles and rules which in the opinion of the said court shall be as nearly as may be conformable to the principles and rules on which the ecclesiastical courts have heretofore acted," subject of course to the rules and orders under the Act. Where a decree of separation has been obtained, in the absence of the husband or wife, as the case may be, it may be reversed on proper cause shown. In the case of judicial separation, the wife shall be treated in respect of any property she may acquire as if she were an unmarried woman; on her death it will descend as it would have done if her husband were dead; and should she again cohabit with her husband, any property she may be entitled to shall be held to her separate use, subject to any agreement she may have made with her husband when separated. So also a judicially separated wife should be treated as an unmarried woman for purposes of contract and in civil proceedings generally. The most important section of the Act is that under which a marriage may be dissolved. "It shall be lawful for any husband to present a petition to the said court praying that his marriage may be dissolved on the ground that his wife has since the celebration thereof been guilty of adultery; and it shall be lawful for any wife to present a petition to the said court, praying that her marriage may be dissolved, on the ground that since the celebration thereof her husband has been guilty of incestuous adultery, or of bigamy with adultery, or of rape, or of sodomy, or bestiality, or of adultery coupled with such cruelty as, without adultery, have entitled her to a divorce *a mensa et thoro*, or of adultery coupled with desertion without reasonable excuse for two years and upwards." Incestuous adultery includes adultery committed with a woman within the prohibited degrees of consanguinity and affinity. On a husband's petition for divorce the alleged adulterer must be made a co-respondent, unless the court permits otherwise, and one of the parties may insist on trial by jury. And the court is to take special care to satisfy itself, not only as to the fact alleged, but as to the existence of anything like connivance or condonation on the part of the petitioner; and it shall inquire at the same time into any counter charge made against the petitioner. When the court is not satisfied as to the facts, or finds connivance or condonation or collusion, the petition must be dismissed. If the court is satisfied on these points, a decree dissolving the marriage may be pronounced; but the court shall not be bound to produce such decree, if it finds that the petitioner has been guilty of adultery, or unreasonable delay in prosecuting the suit, or of cruelty, or desertion, or such neglect and misconduct as has conduced to the adultery. The court may decree the payment of alimony by the husband to the wife. The husband may in his petition claim damages against the co-respondent, and such claim shall be tried according to the same or like rules and regulations as actions for criminal conversation at common law, and the damages shall in all cases be ascertained by a jury; but the court has power to direct the application of the damages, in whole or part, to the benefit of the children of the marriage, or the maintenance of the wife. And the co-respondent, if the case is established against him, may be ordered to pay the whole or any part of the costs. In proceedings for judicial separation, or nullity or dissolution of marriage, the court may make interim or final orders as to the custody and maintenance of the children. Questions of fact may be tried before the court itself or a jury, or issues of fact may be directed by the common law court. Every petitioner in a case of judicial separation, nullity, dissolution, or jactitation of marriage, must file an affidavit verifying his petition, and stating that there has been no collusion. In any case of divorce or judicial separation for wife's adultery, the court may order the settlement of any property to which the wife may be entitled, for the benefit of the innocent party or the children of the marriage. Appeals may be made from the judge ordinary, within three months, to the full court, and from that court to the House of Lords. By the 57th section, after a dissolution of marriage, "it shall be lawful for the respective parties thereto to marry again, as if the prior marriage had been dissolved by death." Here follows a singular compromise, marking the conflict of opinions through which the Act had to pass. No clergyman of the United Church of England and Ireland shall be compelled to solemnize the marriage of any person whose former marriage has been dissolved on the ground of his or her adultery, or shall be liable to any penalty for refusing to do so. But any minister of a church or chapel so refusing to solemnize the marriage of persons who would otherwise have been entitled to have the service performed in such church or chapel shall permit any other clergyman of the same diocese to perform such marriage in such church or chapel. The common law action for criminal conversation is abolished.

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[1] The satirical address of Mr Justice Maule to a poor man convicted of bigamy, in 1845, put the absurdities of the existing law in a way not likely to be forgotten. The prisoner's wife had robbed him and run away with another man. "You should have brought an action," he told him, "and obtained damages, which the other side would probably not have been able to pay, and you would have had to pay your own costs, perhaps a hundred or a hundred and fifty pounds. You should then have gone to the ecclesiastical courts, and obtained a divorce *a mensa et thoro*, and then to the House of Lords, where, having proved that these preliminaries had been complied with, you would have been enabled to marry again. The expense might amount to five or six hundred or perhaps a thousand pounds. You say you are a poor man. But I must tell you that there is not one law for the rich and another for the poor.'

Acts amending the Divorce Act were passed in 1858, 1859, 1860, 1864, 1866, 1868, and 1873. The Amendment Act of 1859, by a most unhappily worded section, gives power to the court, after a decree of nullity or dissolution, to revise the marriage settlements, and apply the property to the benefit of the "children of the marriage or their respective parents." It has been held that the court has no power to alter settlements unless there are children of the marriage alive at the date of the order. This Act also makes husband and wife competent and compellable to give evidence touching cruelty or desertion in a wife's petition for dissolution of marriage.

The Act of 1860 contains the following important clause (§ 7). "Every decree for a divorce shall in the first instance be a decree *nisi*, not to be made absolute till after the expiration of such time, not less than *three months* from the pronouncing thereof, as the court shall by general and special order from time to time direct, and during that period any person shall be at liberty to show cause why the said decree should not be made absolute, by reason of the same having been obtained by collusion, or by reason of material facts not having been brought before the court; and on cause being so shown, the court shall deal with the case by making the decree absolute, or by revising the decree *nisi*, or by requiring further inquiry or otherwise as justice may require; and at any time during the progress of the cause, or before the decree is made absolute, any person may give information to her Majesty's proctor of any matter material to the due decision of the case, who may thereupon take such steps as the attorney-general may deem necessary or expedient; and if from any such information or otherwise the said proctor shall suspect that any parties to the suit are, or have been, acting in collusion for the purpose of obtaining a divorce contrary to the justice of the case, he may, under the direction of the attorney general, and by leave of the court, intervene in the suit, alleging such case of collusion, and retain counsel and subpœna witnesses to prove it." This clause is a most important addition to the securities against collusive suits provided by the earlier Acts. The period of three months has been extended to six by the Act of 1866. These sections have been extended by the Act of 1873 to cases of nullity of marriage. The other provisions of the various amending Acts do not call for notice here.

One or two points in the above summary may be further explained. The greater favour shown to husbands' petitions for divorce than to wives follows with tolerable closeness the principles on which the House of Lords acted in passing private bills. The reason why the adultery of the husband is considered a less serious offence than the adultery of the wife will be obvious to every one. As a matter of fact, wives' bills for divorce before Parliament were comparatively few, and some circumstance of aggravation was required. The first divorce granted to a wife by Parliament was in Addison's case in 1801, and the decision was mainly brought about by the masterly speech of Lord Thurlow. It may be added that Parliamentary bills for divorce were not common until the 18th century. After the accession of the house of Hanover they became frequent.

The right to a divorce or separation on any of the grounds mentioned may be avoided by conduct on the part of the petitioner amounting to what is called condonation, or forgiveness, *e.g.*, if after the offence complained of the parties résume cohabitation. But the offence condoned may be revived, that is, the original right to sue thereon may be restored by a repetition of the offence. Thus a new act of adultery will revive a condoned adultery. So with an act of cruelty. It was also held in the ecclesiastical courts, and appears to be the law, that cruelty would revive adultery, and *vice versa*. The question then arose whether an act of cruelty could revive an old condoned act of adultery, or *vice versa*, so that the two might be pleaded together by the wife in support of her petition for dissolution of marriage. The remedy may also be barred by the *connivance* of the petitioner, *i.e.*, his consent, express or implied, to the adultery of the spouse; and also by *collusion*, *i.e.*, a conspiracy between the parties, or between one of them and a third party, to obtain a sentence of divorce or separation. The mere fact that both parties desire the same end is not of itself collusion. But where they combine to bring about the offence, or to produce evidence from which the offence may be inferred, or to deceive the court by the ession of material facts or otherwise, they are guilty of collusion. Recrimination under the old ecc y is where the respondent retorts by imputing to the petitioner conduct similar to that complained of. He must come into court with clean hands; and if he has himself been guilty of adultery he cannot obtain a sentence against his wife for adultery. Recrimination ought strictly to be of an offence of the same nature as the one complained of; the petitioner is said to have *compensatio in eodem delicto*. But under the 31st section of the new Act above referred to, adultery, cruelty, unreasonable delay, desertion, and misconduct conducing to adultery are made discretionary bars to divorce,—that is, if they are proved, the court is not bound to pronounce the sentence of dissolution which would otherwise follow on proof of the respondent's adultery. In a recent case, where the respondent had previously obtained a decree of judicial separation on the ground of desertion, the husband's petition for dissolution of marriage on the ground of the wife's adultery was rejected by the court.

The matrimonial suits inherited by the Divorce Court from the old ecclesiastical courts are those for nullity of marriage, for restitution of conjugal rights, and for jactitation of marriage. These suits must be decided according to the principles of the canon law as administered in the English ecclesiastical courts. A marriage will be declared null *ab initio* when the requisites of a legal marriage have not been complied with. The alleged defect must have existed at the time of the celebration of the marriage. The formal requisites are (1) that the marriage should be celebrated in pursuance of a special licence, ordinary licence, publication of banns, superintendent-registrar's licence or certificate, in the presence of a person in holy orders, or a registrar; and (2) in a parish church or public chapel, or superintendent-registrar's office, or in some building registered for the solemnization of marriages, except when solemnized by special licence (see MARRIAGE.) These rules only apply to marriages in England, and a marriage is void only when the requisites are deficient, and known to both parties to be deficient, at the time of the ceremony. The two other requisites apply to all marriages, and if they are wanting the marriage is absolutely void:—(1), The marriage must be between single persons, not being within the prohibited degrees of consanguinity and affinity, and who are (2) consenting and of a sound mind, and able to perform the duties of matrimony. The "prohibited degrees" are those set forth in the common prayer book, and extend to illegitimate as well as legitimate relations. The ecclesiastical courts had been in the habit of annulling such marriages previous to the 5 and 6 Will. IV. c. 54, and until so annulled, in the lifetime of the parties, they were regarded as voidable only, and not void. That enactment, however, while ordering that marriages already celebrated "between persons within the prohibited degrees of affinity" shall not be annulled for that cause only by the ecclesiastical courts, goes on to declare that all marriages which shall thereafter "be celebrated between persons within the prohibited degrees of consanguinity and affinity shall be absolutely null and void to all intents and purposes whatever." As to the second requisite, fraud, force, or duress, showing the absence of consent, will make void the marriage. Insanity at the time of the marriage has the same effect. A marriage may also be annulled for bodily incapacity existing at the time of the marriage, and proved to be incurable.

In a petition for restitution of conjugal rights, the marriage must be proved, and it must be shown that the respondent has withdrawn without reasonable cause from cohabitation with the other spouse. The court can only order husband and wife to live under the same roof. The petitioner will be refused a decree for restitution if he has himself committed any matrimonial offence which would be a ground for judicial separation.

Jactitation of marriage is when "one party boasts or gives out that he is married to the other, whereby a common reputation of their marriage may ensue." Suits for jactitation are not now common. The only remedy of the court is to decree perpetual silence against the jactitator.

Scotch Law.—Divorce for adultery has been recognized in Scotland since the Reformation. It appears not to have been introduced by any statute, but to have been assumed by the post-Reformation judges as the common law. In another point the law of Scotland is in advance of the law of England. Divorce for adultery is competent to either spouse. Malicious desertion is also a ground for divorce. This was enacted by a statute of 1573, c. 55. A previous action of adherence was formerly necessary, but is now abolished by the Conjugal Rights Act 1861 *infra*. Recrimination is no bar to an action for divorce in Scotland, but any ground which would satisfy a decree of judicial separation would have been a defence to the old action for adherence. Judicial separation is granted for cruelty and adultery; the party injured by the adultery of the other spouse may choose either judicial separation or divorce. The cruelty required to justify judicial separation must, as in England, be of a somewhat aggravated character. Divorce in Scotland had the effect of remitting the parties to the status of unmarried persons. The law, however, made one exception. A divorced person was not allowed to marry the paramour, at all events if the paramour was named in the decree, and for this reason the name of the paramour is sometimes omitted, so that the parties may be allowed to marry if they wish.

By the Conjugal Rights (Scotland) Amendment Act 1861, provisions similar to those of the English Divorce Acts were established. A deserted wife may apply to the Court of Session for an order to protect any property which she has or may acquire by her own industry, or may succeed to; and such order of protection, when made and intimated, shall have the effect of a decree of separation *a mensa et thoro* in regard to the property rights and obligations of the husband and of the wife, and in regard to the wife's capacity to sue and be sued. When a wife obtains a decree of separation *a mensa et thoro*, all property she may acquire shall be considered as property belonging to her, in reference to which the husband's *jus mariti* and right of administration are excluded; she may dispose of it in all respects as if she were unmarried, and if she dies intestate it will pass to her heirs and representatives, as if her husband had been dead. A wife so separated shall be capable of entering into obligations, and of suing and being sued, as if she were not married, and the husband shall not be liable for her obligations, &c., except when separation aliment has been ordered to be paid to the wife, and remains unpaid, in which case he shall be liable for her necessaries. In a husband's action for adultery, the alleged adulterer may be cited as co-defender, and the expenses of process taxed as between agent and client may be charged upon him if the adultery is proved. The co-defender may be examined as a witness, and he may be dismissed from the cause, if the court is satisfied that such a course is conducive to the justice of the case. The Lord Advocate may enter appearance in any action of nullity of marriage or divorce. In any consistorial action, the summons shall be served personally on the defender when he is not resident in Scotland, but if the court is satisfied that he cannot be found, edictal citation will be sufficient, provided that the pursuer shall also serve the summons on the children and the next of kin of the defender other than the children, when they are known and resident within the United Kingdom, and they, whether they are cited or so resident or not, may appear and state defences to the action. By sect. xi. it shall not be necessary prior to any action of divorce to institute against the defender any action of adherence, nor to charge the defender to adhere to the pursuer, nor to denounce the defender, nor to apply to the presbytery of the bounds or any other judicature to admonish the defender to adhere. Proofs in consistorial actions are in future to be taken before the Lord Ordinary. Consistorial actions are defined in the Act as including actions of declaration of marriage, of nullity of marriage, and of legitimacy and bastardy, actions of separation *a mensa et thoro*, of divorce, and of adherence and of putting to silence, and actions of aliment between husband and wife instituted in the court of session.

United States.—The matrimonial law of England, as at the time of the declaration of independence, forms part of the common law of the United States. But as no ecclesiastical courts have ever existed there, the law must be considered to have been inoperative. There is no national jurisdiction in divorce, and though it is competent to Congress to authorize divorces in the Territories, still it appears that this subject like others is usually left to the territorial legislature. In the different States, as in England, divorces were at first granted by the legislatures, whether directly or by granting special authority to the tribunals to deal with particular cases. This practice has, it appears, fallen into general disrepute, and by the constitution of some States legislative divorces are expressly prohibited. Apart from such express prohibitions, it has been contended that legislative divorces are debarred by general clauses in the constitution of the United States, or in the constitution of particular States. Thus the constitution of the United States says that no State shall pass a law impairing the obligation of contracts, and it has been argued that this clause prohibits legislative divorces. Bishop states that it "is settled law that legislative divorces are not invalid as impairing the obligation of contracts." Again, some States forbid their legislatures to pass any retrospective laws; and legislative divorce, it has been said, is of the nature of a retrospective statute, and authority on that point seems to be divided. Again, in some States it is contended that a legislative divorce is an infringement of the judicial power, and therefore unconstitutional. The judicial practice throughout the States is to confer jurisdiction in divorce on the courts of equity, to be administered in general accordance with the ordinary rules of equity practice. Each State of course determines for itself the causes for which divorce may be granted, and no general statement of the law can be made. In most States it appears to be allowed, not only for adultery, but for cruelty, wilful desertion, and habitual drunkenness. In New York divorce is allowed only for adultery; in South Carolina not for any cause; in some other States for causes to be determined by the court in the exercise of its discretion. South Carolina, says Bishop (*Marriage and Divorce*, 1878), is the only State in which no divorce, legislative or judicial, has ever for any cause been granted; and he quotes judicial testimony to show that the effect of this state of things is to bring about a partial recognition of concubinage. The proportion of his goods which a married man may leave to his concubine has in fact been fixed by statute. Among the less usual grounds for divorce which have been recognized in particular States, habitual drunkenness has been mentioned above, which has been defined to be a fixed habit of drinking to excess, to such a degree as to disqualify a person from attending to his business during the principal portion of the time usually devoted to business. In Kentucky the offence must be accompanied with a wasting of his estate, and without any suitable provision for the wife and children. Gross neglect of duty, and more particularly neglect or refusal to maintain his wife on the part of a husband having ability to do so, are in some States grounds of divorce. In New Hampshire, if either spouse joins a society believing the relation of husband and wife to be unlawful, and accordingly refuses cohabitation for three years, that is a sufficient ground of divorce, and "the Shakers" have been held to be such a society. In the same State "to be absent and not heard of" for three years is ground for divorce. Conviction for crime is a tolerably common ground. "Gross misbehaviour and wickedness," and "offering indignities to the wife so as to render her condition intolerable and her life burdensome," are also specified causes of divorce in some States. In Missouri and North Carolina it has been held under such a clause that a false accusation of adultery brought by the husband against the wife was a valid ground for divorce; and in Missouri, where the court subsequently held that the statute contemplated indignities to the person only, and not to the mind (as in the case of a false charge), the State legislature amended the statute by specifying as a cause for divorce "the offering such indignities to the other as to make his or her condition intolerable." The effect of this diversity of jurisdictions in producing a conflict of laws is noted below.

France.—Freedom of divorce was one of the short-lived results of the French Revolution. The code civil (1803) allowed divorce and judicial separation, although then the advocates of free divorce appear to have desired the exclusion of the latter remedy. The husband might demand divorce for adultery; the wife for adultery when the husband has kept his paramour in the conjugal residence. Either party might demand divorce for outrage, cruelty, or grave injuries (*excès, sévices, ou injures graves*), or on account of condemnation to an infamous punishment. Divorce by mutual consent was also allowed, but under close restrictions as to the age of the parties, the duration of the marriage, the consent of relations, the protection of the children, &c. No new marriage could be made by either party within three years of this divorce. Separation was also allowed as an alternative remedy, but not by consent. When sentence of separation has been pronounced against the wife for adultery, she shall be condemned, on the requisition of a public officer, to confinement in a house of correction for a period of not less than three months, and not more than two years. In 1816 the divorce clauses of the code civil were abolished, but judicial separation was retained. Subsequent attempts to restore freedom of divorce have been unsuccessful.

The law of divorce being thus different in different countries, while people are constantly moving from one country to another, there arises the juridical difficulty of the conflict of laws. A man born in one country, married in a second, and domiciled in a third, may there sue for a divorce on account of a matrimonial offence committed in a fourth. How is such a case to be decided, and what will be the effect of the decision in other countries than that in which it was pronounced? It is in the jurisprudence of England and Scotland, as Story points out, that [illegible] questions have been most satisfactorily discussed. On [illegible] Continent the prevalence of the canon law, and the difference of domestic tribunals to the opinion of foreign countries, have made these questions of less importance than they have been with us. England and Scotland stand to each other legally in the relation of foreign countries, while socially and politically they are one country. On the fundamental question whether marriage can be dissolved or not they took, until the passing of the English Divorce Act, different sides. When an English marriage was brought before the Scotch courts on a matrimonial complaint, they dissolved the marriage, while the English courts after such a dissolution held that the marriage still subsisted in full force and effect. The House of Lords, which was at once the highest court of appeal in Scotch and in English law, may almost be said to have decided the same question in two different ways,—holding that by the Scotch law the dissolution was good for Scotland, and not denying that by the English law it was bad for England. The two cases on which this opposition of views was most distinctly brought out were Lolley's case (1 Russell and Ryan) and Warrender *v.* Warrender (2 Clark and Finnelly). In the former case a man was convicted for bigamy for marrying again after having had his English marriage dissolved by the Scotch courts for his wife's adultery. The latter was an appeal to the House of Lords from the Court of Session asserting jurisdiction to decree divorce from an English marriage, and in the result it was held that the House of Lords in a Scotch case was bound to administer the law of Scotland, and that by the law of Scotland the jurisdiction was well founded. But the judgment in Lolley's case was not overruled; and although English marriages are no longer indissoluble, it may be presumed that the principle of that case would be applied when an English marriage had been dissolved in a foreign country for an offence not recognized as a valid ground of divorce in England. The following more recent cases may be noted as illustrating the attitude of English law towards foreign divorces. When the marriage took place in England, but the parties never lived together, and the husband committed adultery, and afterwards by arrangement went to Scotland for the purpose of founding a jurisdiction against himself, and the Scotch court pronounced a decree of divorce,—it was held that a Scotch marriage duly celebrated between the divorced wife and an Englishman did not give to the children of the marriage the character of lawfully begotten so as to enable them to succeed to property in England. So when A, an Englishwoman, married B in Scotland, and was again married to him in Belgium, and afterwards a Belgian court pronounced a decree of divorce by mutual consent, it was held that A's subsequent marriage to C in England was null and void, and that the Scotch marriage was still valid and subsisting. Again, a petitioner whose original domicile was English, and who married in England, resided two years and a half in one of the United States, and then obtained a divorce from a competent court there for grounds recognized in England, but without personal notice to the husband, who had never been within the State, and whose domicile continued to be English;—it was held that her re-marriage in America during the lifetime of her husband was invalid in England. Had the petitioner been legally domiciled in the State which granted the divorce it appears that the English courts could have recognized the decree. In this class of questions may be placed those which have arisen as to the jurisdiction of the court. Here four points are mentioned in the English text-books as material, viz., allegiance, the place of marriage, the place of domicile, and the place of the delictum (see DOMICILE.) The court asserted its jurisdiction in the following cases:—when allegiance and the place of marriage were English, the *us delicti* and domicile foreign; when the allegiance and nicile were English, and the *locus contractus et delicti* eign. It has been held that the court can inquire into validity of a marriage in England between foreigners miciled abroad at the time of the marriage. And when marriage had been solemnized between foreigners in a eign country, and the wife committed adultery abroad, court held itself entitled to dissolve the marriage on petition of the husband then domiciled in England. id in an Irish case it was held that the domicile of the sband will sustain the jurisdiction of the court over the fe though married abroad, always after marriage resident road, and accused of adultery committed abroad.

Questions of this sort have frequently arisen in American risprudence. The different States are to each other in the atter of divorce as foreign countries. The learned writer whom we have already referred (Bishop, *Marriage and ivorce*) formulates the following propositions:—1. The ibunals of a country have no jurisdiction in divorce, herever the offence may have occurred, if neither of the arties has an actual *bona fide* domicile within its territory; . It is sufficient for one of the parties to be domiciled in he country; both need not be, neither need the citation vhere the domiciled party is plaintiff be served personally n the defendant, if such personal service cannot be made; 3. The place where the offence was committed is immaterial; 4. The domicile of the parties at the time of the offence is mmaterial; 5. It is immaterial under what system of livorce laws the marriage was celebrated. The author holds that the foregoing doctrines are not in conflict with the United States constitution, but that they are made binding by that constitution on the tribunals of all the States. It has been pointed out, however, that the fourth proposition has been denied by the courts of Pennsylvania and New Hampshire, which hold that only the courts of that country where the parties were domiciled when the offence was committed have jurisdiction to dissolve marriage for such offence. Bishop finally holds that "if a court has jurisdiction in a divorce cause, valid according to the law of the State in which it is taken, and not obnoxious to principles of inter-State comity, and it pronounces a divorce, it is binding on all the other States of the Union. If there was the domicile necessary to give the jurisdiction, and the defendant appeared to the suit, then the judgment would be everywhere in our country of absolute force, both as to the status of marriage and as to alimony and other like property rights. If the plaintiff only had a domicile, and there was no notice to the defendant within the jurisdiction, then the decree could affect only the plaintiff's status of marriage." (E. R.)

DIXMERIE, Nicolas de la. See La Dixmerie.

DIXON, George (1755–1800?), an English navigator, born in 1755. He served under Captain Cook in his third expedition, during which he had an opportunity of learning the commercial capabilities of the north-west coast of America, and was thus prompted to the expedition in connection with which his own name is celebrated. After his return from Cook's expedition he became a captain in the royal navy. In 1785 he offered his services to the King George's Sound Company of London in making a minute exploration of the north-west coast of America. His offer having been accepted, he set sail in the autumn of that year in command of the "Queen Charlotte,"—a companion ship, the "King George," being under the command of Captain Portlock. The voyage resulted in the discovery of numerous small islands, ports, and bays, of which Queen Charlotte's Island, Port Mulgrave, Norfolk Bay, and Dixon's Archipelago may be named as the most important. From North America he sailed to China, where he disposed of his cargo. He returned to England in 1788. In the following year he published an account of his voyage, entitled *A Voyage round the World, but more particularly to the North-West Coast of America*, the bulk of which consists of descriptive letters by William Beresford, his supercargo. His own contribution to the work included valuable charts and appendices. In 1791 he published *The Navigator's Assistant*. He died about 1800.

DIZFUL, or Desful, formerly known as *Anda-el-Misk*, a town of Persia, in the province of Khuzistan, 36 miles north-west of Shuster, on the right bank of the Shat-el-Diz, or Abzal, a tributary of the Karun, and there crossed by a fine bridge of twenty arches, the lower part of which is of ancient workmanship. It is the principal market of the province, and lies in a fertile district, productive of oranges, lemons, and indigo. The whole vicinity is full of the remains of ancient canals and buildings, which afford conclusive proof of former importance; and Mr Layard identified the spot with the castle of Lethe, or Oblivion, in which Shapur imprisoned the Armenian monarch Arsaces II. The popular identification of the ruins to the east with Jundi Shapur he regarded as a mistake. Population about 15,000.

DMITRIEFF, Ivan Ivanovitch (1760–1837), a Russian statesman and poet, was born at his father's estate in the government of Simbirsk. In consequence of the revolt of Pugacheff, the family had to flee to St Petersburg, and there Ivan was entered at the school of the Semenoff Guards, and afterwards obtained a post in the military service. On the accession of Paul to the imperial throne he quitted the army with the title of colonel; and his appointment as procurator for the senate was soon after renounced for the position of privy councillor. During the four years from 1810 to 1814 he served as minister of justice under the emperor Alexander; but at the close of this period he retired into private life, and though he lived more than twenty years, he never again took office, but occupied himself with his literary labours and the collection of books and works of art. In the matter of language he sided with Karamsin, and did good service by his own pen against the Old Slavonic party. His poems include songs, odes, satires, tales, epistles, &c., as well as the fables—partly original and partly translated from Fontaine, Florian, and Arnault—on which his fame chiefly rests. Several of his lyrics have become thoroughly popular from the readiness with which they can be sung; and a short dramatico-epic poem on Yermak, the Cossack conqueror of Siberia, is well known. His writings occupy three volumes in the first five editions; in the 6th (St Petersburg, 1823) there are only two. His memoirs, to which he devoted the last years of his life, were published at Moscow in 1866.

DMITROFF, a town of Russia, in the government of Moscow, 45 miles due north of the city of that name, in 56° 21′ N. lat. and 37° 31′ E. long., near the river Yukhroma, a sub-tributary of the Volga. Besides the Cathedral of the Assumption and Paraskeue, an ancient building originally erected as a nunnery, it possesses seven churches, a monastery, a hospital, an almshouse, and factories for the manufacture of silk, wool, and cotton. The inhabitants also cultivate market-gardens for Moscow, and carry on a moderate trade in grain. The existence of Dmitroff is due to the grand-duke George Vladimirovitch, who happening, during his exile from Kieff, to receive on the spot the news of the birth of his son Demetrius, celebrated the event by founding the city and assigning it as an apanage for his child. Demetrius continued in possession till he was himself called to the grand-ducal dignity in 1177. In 1304 the town was the seat of a ducal diet; in 1656 it was visited by a terrible pestilence; and in the Polish-Lithuanian invasion it witnessed the defeat of Sapieha by Prince Ivan Karukin. Population in 1873, 8042.

DMITROVSK, a town of European Russia, in the government of Orel, near the Nerusa, a sub-tributary of the Dnieper, about 57 miles south-west of the town of Orel, in 52° 30′ N. lat. and 35° 4′ 9″ E. long. It consists of about 700 wooden houses, has four churches and a hospital, manufactures soap, and deals in grain, hemp, linseed oil, and tallow. Dmitrovsk was founded by Demetrius Cantemir, the hospodar of Moldavia, who in 1711 received from Peter I. the district in which it stands in compensation for the loss he had sustained in Moldavia; and its first inhabitants consisted of Malo Russian and Wallachian immigrants. Population, 7600.

DNIEPER, the Borysthenes of the Greeks, Danapris of the Romans, Uzi of the Turks, Eksi of the Tatars, Elice of Visconti's map (1381), Lerene of Contarini (1437), and Luosen of Baptista of Genoa (1514), is one of the most important rivers of Europe, ranking after the Volga and the Danube. It belongs to Russia, and takes its rise in the government of Smolensk, in a swampy district at the foot of the Valdai Hills, not far from the sources of the Volga and the Dwina, in 55° 52′ N. lat. and 33° 41′ E. long. Its length is about 11,000 miles, and it drains an area of 242,000 square miles, which supports a population of upwards of twelve million inhabitants. In the first part of its course, which may be said to end at Dorogobush, it flows through an undulating country of Carboniferous formation; in the second it passes west to Orsha, south through the great fertile plain of Kisheneff and Chernigoff, and then south-east across the rocky steppe of the Ukraine to Ekaterinoslaff. About 45 miles south of this town it has to force its way across the same granitic offshoot of the Carpathian Mountains which interrupts the course of the Dniester and the Bug, and for a distance of about 40 miles rapid succeeds rapid. The whole fall of the river in that space is 155 feet,—the greatest of the ten distinctly marked rapids, that at Nenasitetz, having an average of 3 inches in every 50 feet, and the smallest, or the *Leshni Porog*, about $1\frac{3}{5}$ths of an inch in the same distance. The river having got clear of the rocks continues south-west through the grassy plains of Kherson and Tauris, and enters the Black Sea by means of a considerable estuary in 46° 21′ N. lat. and 32° 20′ E. long. The navigation of the Dnieper extends as far up as Dorogobush, where the depth is about 12 feet, and rafts are floated down from the higher reaches. About the town of Smolensk the breadth is 455 feet, at the confluence of the Pripet 1400, and in some parts of the Ekaterinoslaff district as much as 7000. In the course above the rapids the channel varies very greatly in nature and depth, and it is not unfrequently interrupted by shallows, no fewer than 55 being counted in the Kieff government alone. The rapids, or *porogs*, form a serious obstacle to navigation; it is only for a few weeks, when the river is in flood, that they are passable, and even then the venture is not without risk, and can only be undertaken with the assistance of the special pilots, who to the number of 2000 or 3000 have established themselves at Lotmanskaya-Kamenka and other places in the neighbourhood. As early as 1732 an attempt was made to improve the channel, and extensive operations have since been carried on from time to time. A canal, which ultimately proved too small for use, was constructed at Nenasitetz in 1780 at private expense; blastings were employed in 1798 and 1799 at various parts by Generals Besh and Devolan; in 1805 a canal was formed at Kaindatzki, and the channel rectified at Sursk; by 1807 a new canal was completed at Nenasitetz; in 1833 a passage was cleared through the Starokaindatzki Porog; and in the period
1853 a whole series of ameliorations were
result has been not only greatly to diminish
the natural channel, but also to furnish a
cial canals by which vessels can make their
water is too low in the river. Between 18
277 vessels and 674 rafts passed the rapids a
only 4 of these vessels came to grief.
years the water in the river has been unus
it is expected that the draining of the
may remedy the evil. Of the tributaries of
the following are navigable,—the Berez
Pripet from the right, and the Merea and
Borona and Desna from the left. In the upp
river the fisheries are not of sufficient importa
tute a separate occupation; but in the estuar
a large concourse of people from the neighbo
ments, and form almost the sole means of
the Swedish colonists. At Kieff the river is
on an average 267 days in the year, at Ekat
and at Kherson from 280 to 285.

DNIESTER, the Tyras of the classical au
Turla of the Turks, a river of south-eastern
ing to the basin of the Black Sea. It takes
northern slope of the Carpathian Mountains i
circle of Galicia, and belongs for the first 3
course to Austrian, for the remaining 300 to
tory. In its excessive meandering it freq
returns to the same spot; for example, wh
distance from Turunchuk to Mayakoff
miles, the development of the river would
133. At the same time, as the average
25 to 26 inches in the mile, the current
even during low water is pretty rapid, t
per hour being calculated at 8638 feet.
width of the channel is from 560 to 70
some places it attains as much as 1400 fe
is various and changeable. The banks are
3500 feet apart, but in certain reaches a
other so as to leave room for nothing but t
their average height above the water in th
portion is 350 feet. The principal intern
navigable portion of the river, besides the so
sive shallows, is occasioned by a granitic
Carpathians, and bears the name of the Yam
or Yampol Rapids. For ordinary river-cra
of these rapids is rendered possible, but
danger, by a natural channel on the left sid
and deeper artificial channel on the right; f
they form an insuperable barrier. The river f
by several shallow arms, of which the most i
depth of only $2\frac{1}{2}$ feet near its mouth; but t
an independent stream, disemboguing in the n
has a depth of 7 or 8 feet, and is connected
channel of the Dniester by the Surovtzoff ca
after the merchant at whose expense it wa
There are two periodical floods in the river,-
greatest caused by the breaking up of the ice,
in the latter part of February or in March;
due to the melting of the snows of the Ca
consequently taking place about June. Th
raises the level of the water 20 feet, and
violent a current that large blocks of stone a
their position; towards the mouth of the riv
vineyards are submerged, and the surface
measures from four to six miles across. In
general state of the water is so low that na
sible only for three or four weeks, while in oth
high that navigation continues without inter
boat traffic was introduced in the lower reache

the government vessel "Prince Vorontzoff" began to make regular trips between Ovidiopol and Akerman; and since that date it has acquired very considerable dimensions. The fisheries of the estuary are of some importance; and the lakes which are formed by the inundations of the valley furnish a valuable addition to the diet of the people in the shape of carp, pike, and tench. The principal towns on the river are Sambor, Khotin, Mohileff, Dubossari, Grigoriopol, Bender, Tiraspol, and Akerman; its tributaries are numerous, but not of individual importance.

DOAB, or DUAB, or DOOAB, a name, like the Greek Mesopotamia, applicable, according to its derivation (*do*, two, and *ab*, river), to the stretch of country lying between any two rivers, as the Baree Doab between the Sutlej and the Ravee, or the Reechna Doab between the Ravee and the Chenab, but frequently employed, without any distinctive adjunct, as the proper name for the region between the Ganges and its great tributary the Jumna. In like manner the designation of Doab Canal is given to the artificial channel which breaks off from the Jumna near Fyzabad, and flows almost parallel with the river till it reunites with it at Delhi.

DOBELL, SYDNEY (1824–1874), a distinguished English poet, born on the 5th of April 1824 at Cranbrook, Kent, was sprung from an old Sussex family, noted for its staunch loyalty in the struggle between the Cavaliers and Roundheads. His father, John Dobell, who wrote a pamphlet on *Government*, was a wine merchant at Cheltenham; his mother was a daughter of Samuel Thompson, a famous political reformer. When Dobell was twelve years old, the family went to Gloucestershire; and the poet, ever after, with occasional breaks, kept up his connection with the district. He was educated privately, and never attended either school or university. He refers to this in some precocious lines, in imitation of Chaucer, dating from his eighteenth year. In 1844 he married Emily Fordham, a lady of an old county family in Cambridgeshire. Cheltenham was, for the most part, his home in those early years, as his father's business had to be carried on; but the summer was often spent in the country. During this period his poetic vein flowed freely. He wrote a number of minor poems instinct with a passionate desire for political reform. *The Roman* was also in progress, and was written mainly among the Cotswolds. It appeared in 1850, under the *nom de plume* of Sydney Yendys. Next year he travelled through Switzerland with his wife; and, after his return, he formed friendships with Robert Browning, Philip Bailey, George Macdonald, Emanuel Deutsch, Lord Houghton, Ruskin, Holman Hunt, Mazzini, Tennyson, and Carlyle, and conducted an interesting correspondence with Charlotte Bronte. His second large poem, *Balder*, written partly at Coxhorne, partly among the Alps, and finished at Amberley Hall, appeared in 1854. The three following years were spent in Scotland—the winters in Edinburgh, the summers in the Highlands. Here he endeared himself to an entirely new circle, including Dr John Brown, Dr Hanna, Hugh Miller, Sir Noel Paton, Sir James Y. Simpson, and Professor and Mrs Blackie. Perhaps his dearest friend at this time was Alexander Smith, in company with whom he published, in 1855, a number of sonnets on the Crimean War, which were followed by a volume on *England in Time of War*. The delivery of an elaborate lecture on the "Nature of Poetry" to the Edinburgh Philosophical Institution, in April 1857, seriously injured Dobell's chest. Accordingly he spent the winters of the four following years in the Isle of Wight; and, after 1862, the winter generally found him on the Continent, the summer in Gloucestershire. On one occasion, while near Naples, he fell through a thin crust of earth into some underground works, to a depth of about 12 feet. This accident proved injurious to his health; and in 1869, a mare, which he was trying to break, fell and rolled over with him. After this he was, more or less, an invalid, and lived in Gloucestershire, preserving his admiration for natural beauty, his keen interest in public affairs, his sunny sweetness of temper, and deep religious feeling, till his death in 1874.

As a poet Dobell belongs to the "spasmodic school," as it was happily named by Professor Aytoun, who parodied its style in *Firmilian*. The epithet, however, was first applied by Carlyle to Byron. The school includes the Rev. George Gilfillan, Philip James Bailey, Stanyan Bigg, Dobell, Alexander Smith, and, according to some critics, Gerald Massey. It is characterized by an under-current of discontent with the mystery of existence, by vain effort, unrewarded struggle, sceptical unrest, and an uneasy straining after some incomprehensible end. It thus faithfully reflects a prevalent phase of 19th century thought, and consequently is a perfectly legitimate exercise of the muse. Poetry of this kind is marked by an excess of metaphor, which darkens rather than illustrates, and a general extravagance of language. On the other hand, it manifests a freshness and originality, and a rich natural beauty, not often found in more conventional writings. In this school Dobell shares with Bailey the foremost place; and his genius received early recognition from the Rev. George Gilfillan. He is possessed by his ideal of what a poet ought to be. An intensely earnest spirit pervades all his works; and, like Milton and Wordsworth, he has no humour. We sometimes meet, in his writings, conceits and obscurities which remind us of Cowley and Donne; and still oftener his intellectual subtlety, gorgeous imagery, and exquisite lyrics recall Shelley. *The Roman*, a poem dedicated to the interests of political liberty in Italy, is marked by pathos, energy, and passionate love of freedom; and its clear vivid style enchains the reader throughout. His treatment of the Colosseum has been compared, not unfavourably, with Byron's. The faults of the work arise almost entirely from the author's embarrassment in dealing with his own riches. The drama, too, is overlaid with monologue, which is carried to such a dreary excess in *Balder*—a poem so intensely subjective as to fail utterly in human interest. The gloomy egotism of the moody hero wearies most readers, but is relieved, from time to time, by some of the finest descriptions of nature in English poetry, by Amy's exquisitely touching songs, and by grander passages than any to be found in *The Roman*. There is a distinct falling off, however, in purity of style. The purpose of *Balder* has been strangely misunderstood by many critics; and some have actually identified the hero with the author. The object of the book is to show the evil moral effects of egotism and a lust for power on a man of genius. The passage on Chamouni is unsurpassed even by Coleridge. *Balder*, still more than his other poems, manifests Dobell's wealth of thought, as well as the prodigal richness of his imagery.

England in Time of War is the most pleasing of Dobell's works, and allows his lyrical impulse full scope. The book is steeped in passion, and gives faithful and poetical, because thoroughly simple, expression to the feelings of many English hearts at the time. In all Dobell's poems a great fondness for alliteration is observable.

His chief prose writings have been collected and edited with an introductory note by Professor Nichol (*Thoughts on Art, Philosophy, and Religion*. London: Smith, Elder, and Co., 1876.) The lecture on the "Nature of Poetry" is an elaborate disquisition, in which a perfect poem is defined as "the perfect expression of a perfect human mind." In his pamphlet on *Reform*, he maintains "that a just national representation is such as represents the nation at its efficient durable best." In his memoranda for a projected play, the character of the cardinal is finely conceived. He is to have "no element *not* common to all men and no element *as* common to all men,—a life such as every man *might* lead but no man *does* lead,—in which the things done are *not* those which men do rarely, but the common acts of men done in a rare spirit." Dobell's prose writings are studded with such suggestive sentences as we have quoted. The singular truth of his observations of nature is well seen in his description of the "Symptoms of the Dissolution of Night" (*Thoughts*, p. 83.) His prose style lacks simplicity, both in the individual words used and in the structure of the sentences. The classical element is much too prominent in his vocabulary. In his religious views, Dobell was a Christian of the Broad Church type. Socially he was one of the most amiable and true-hearted of men. He will long be remembered as an admirable song-writer, a suggestive and original thinker, and an ardent lover of political liberty. The standard edition of his poems is edited by Professor Nichol of Glasgow University, who has prefixed to the work a beautifully written life. (T. GI.)

DÖBELN, a town of Saxony, in the circle of Leipsic, and 35 miles to the south-east of that town, standing partly on an island formed by the Mulde. It is the centre of a considerable corn trade. The manufactures are cloth, cordwain and other leather, shoes, hats, belts, lacquered tin ware, agricultural and weighing machines, and cigars. Population, 10,969 in 1875.

DOBERAN, or DOBBERAN, a market town of Northern Germany, in the grand duchy of Mecklenburg-Schwerin, about two miles from the shores of the Baltic, and seven west of Rostock. Besides the ruins of a Cistercian abbey founded by Pribislav II. in 1173, and secularized in 1552, it possesses a church of the 14th century, which ranks as one of the finest in Northern Germany, a grand-ducal palace, a theatre, an exchange, and a concert-room. In 1793 Duke Frederick Francis caused the first seaside watering-place in Germany to be established on the neighbouring coast, at the spot where the Heiliger Damm, a great bank of rocks about 1000 feet broad and 15 feet high, stretches out into the sea and forms an excellent bathing ground. Though no longer so popular as in the early part of the century, it is still frequented. In the immediate neighbourhood of the town three mineral springs were discovered in 1820—one sulphurous, a second saline, and the third chalybeate. Population in 1875, 3866.

DÖBRENTEI, GABOR (*i.e.*, GABRIEL) (1786–1851), an Hungarian philologist and antiquary, was born at Nagyszöllös in 1786. He completed his studies at the universities of Wittenberg and Leipsic, and was afterwards engaged as a tutor in Transylvania. At this period he originated and edited the *Erdélyi Muzeum*, which, notwithstanding its important influence on the development of the Magyar language and literature, soon failed for want of support. In 1820 Döbrentei settled at Pesth, and there he spent the rest of his life. He held various official posts, but continued zealously to pursue the studies for which he had early shown a strong preference. His great work is the *Ancient Monuments of the Magyar Language* (*Régi Magyar Nyelvemlékek*), the editing of which was intrusted to him by the Hungarian Academy. The first volume was published in 1838 and the fifth was in course of preparation at the time of his death. Döbrentei was one of the twenty-two scholars appointed in 1825 to plan and organize, under the presidency of Count Teleki, the Hungarian Academy. In addition to his great work he wrote many valuable papers on historical and philological subjects, and many biographical notices of eminent Hungarians. These appeared in the Hungarian translation of Brockhaus's *Conversations-Lexikon*. He translated into Hungarian *Macbeth* and other plays of Shakespeare, several of Schiller's tragedies, and Molière's *Avare*, and wrote several original poems. His article on "Magyar Literature" in the *Conversations-Lexikon* was translated into English. Döbrentei does not appear to have taken any part in the revolutionary movement of 1848. He died at his country house, near Pesth, March 28, 1851.

DOBRIZHOFFER, MARTIN (1717–1791), a Roman Catholic missionary, whose fame is preserved by the historical interest and the literary character of his narrative. Born at Gratz, in Styria, he joined the Society of Jesus in 1736, and in 1749 proceeded to Paraguay, where for eighteen years, first among the Guaranis, and latterly among the Abipones, he continued with steadfast devotion and easy cheerfulness to discharge the difficult and hazardous duties of his profession. Returning to Europe on the expulsion of the Jesuits from South America, he settled at Vienna, obtained the patronage, or rather the friendship, of Maria Theresa, survived the extinction of his order, composed the history of his mission, and died on July 17, 1791. His history appeared at Vienna in 1784, in the author's own Latin, and in a German translation by Professor Krail of the university of Pesth. Of the contents of the work some idea may be obtained from its extended title:—*Historia de Abiponibus, Equestri Bellicosaque Paraquariæ Natione, locupletata Copiosis Barbararum Gentium, Urbium, Fluminum, Ferarum, Amphibiorum, Insectorum, Serpentium præcipuorum, Piscium, Avium, Arborum, Plantarum aliarumque ejusdem Provinciæ Proprietatum Observationibus.* The "lively singularity" and garrulous quaintness of the style could only be displayed by lengthened quotation. In 1822 there appeared in London an anonymous (not altogether complete) translation, which has not unfrequently been ascribed to Southey, but was really the work of Sara Coleridge, who, while still in her teens, had undertaken the task to defray the college expenses of one of her brothers. To the youthful translator a delicate compliment was paid by Southey in the third canto of his *Tale of Paraguay*, the story of which was derived from the pages of Dobrizhoffer's narrative:—

> "And if he could in Merlin's glass have seen
> By whom his tomes to speak our tongue were taught,
> The old man would have felt as pleased, I ween,
> As when he won the ear of that great Empress Queen."

DOBROWSKY, JOSEPH (1753–1829), one of the earliest and greatest of Slavonic philologers, was born of Bohemian parentage at Gjermet, near Raab, in Hungary. He received his first education in the German school at Bischofteinitz, made his first acquaintance with Bohemian at the Deutschbrod gymnasium, studied for some time under the Jesuits at Klattau, and then proceeded to the university of Prague. In 1772 he was admitted among the Jesuits at Brünn; but on the dissolution of the order in 1773 he returned to Prague to study theology. After holding for some time the office of tutor in the family of Count Nostitz, he obtained an appointment first as vice-rector, and then as rector, in the general seminary at Hradisch; but in 1790 he lost his post through the abolition of the seminaries throughout Austria, and returned as a guest to the house of the count. In 1792 he was commissioned by the Bohemian Academy of Sciences to visit Stockholm, Abo, Petersburg, and Moscow in search of the manuscripts which had been scattered by the Thirty Years' War: and on his return he accompanied Count Nostitz to Switzerland and Italy. His reason began to give way in 1795, and in 1801 he had to be confined in a lunatic asylum; but by 1803 he had completely recovered. The rest of his life was mainly spent either in Prague or at the country-seats of his friends Counts Nostitz and Czernin: but his death took place at Brünn, whither he had gone in

3 to make investigations in the library. While his e rests chiefly on his philological labours, his botanical lies are not without value in the history of the science. following is a list of his more important works; and it be observed that, dealing, as they do, with Slavonic jects, they are all composed in Latin or German :—

ragmentum Pragense evangelii S. Marci, vulgo autographi, 3; a periodical for Bohemian and Moravian Literature, 1780–7; *Scriptores Rerum Bohemicarum*, 2 vols. 1783; *Geschichte böhm. Sprache und ältern Literatur*, 1792; *Die Bildsamkeit slaw. Sprache*, 1799; a *Deutsch-böhm. Wörterbuch* compiled ollaboration with Leschka, Puchmayer, and Hanka, 1802–1821; *wurf eines Pflanzensystems nach Zahlen und Verhältnissen,* 2; *Glagolitica*, 1807; *Lehrgebäude der böhm. Sprache*, 1809; *itutiones linguæ slavicæ dialecti veteris*, 1822; *Entwurf zu einem emeiner Etymologikon der slaw. Sprachen*, 1813; *Slowanka Kenntniss der slav. Literatur*, 1814; and a critical edition of lanes, *De Rebus Geticis*, for Pertz's *Monumenta Germaniæ historica.* Palacky, *J. Dobrowsky's Leben und gelehrtes Wirken*, 1833.

DOBRUDJA, or DOBRUDSCHA, in Bulgarian Dobritch, he district lying between the Black Sea and the lower ches of the Danube, by which it is separated from umania. The southern part of its area of 2900 square es is occupied by an irregular steppe stretching north m the Balkan range; while the northern belongs to the vial tract produced by the action of the river. The dominant element in its heterogeneous population, which estimated at 160,000, consists of the Tatars, whose nums have been greatly augmented by immigration since 59; but there are also Turks, Bulgarians, Roumanians, eeks, Armenians, Germans, and Jews, and all the various tionalities remain strikingly distinct, and usually occupy re or less exclusively their separate settlements. The incipal places in the Dobrudja are Rassova, Hirsova, atchin, Isakcha, and Tulcha on the Danube; Babadagh wards the north, which was formerly regarded as the ief town of the district; Kustendji, Mangalia, and ltchik on the coast; Basardjik towards the south and me distance inland; and, finally, the new Tatar city of edjidia, which has sprung up since 1860 on the railway tween Tchernavoda and Kustendji. The strategical portance of the Dobrudja was recognized by the mans, who in the reign of Trajan built a line of fortificans from the river near Rassova to the coast near stendji; and in modern times it has been more than e utilized, especially during the Russian invasions of 28, 1854, and 1877. See Peters, *Grundlinien zur Geo- phie und Geologie der Dobrudscha*, Vienna, 1867–1868

DOBSCHAU, or DOBSINA, a town of Northern Hungary, the comitat of Gömör, on the Dobsina. In the vicinity mines of iron, copper, cobalt, and mercury. Population, 5 in 1869.

DOBSON, WILLIAM (1610–1646), an English portrait historical painter, born at London in 1610. His father master of the Alienation Office, but by his improvice had fallen into reduced circumstances. The son was rdingly bound an apprentice to Peak, a stationer and ure dealer in Holborn Bridge; and while in his loyment he began to copy the pictures of Titian and dyck, whose manner he ever after retained. He also k portraits from life under the advice and instruction of ncis Cleyn, a German artist of considerable repute. dyck, happening to pass a shop in Snow Hill where of Dobson's pictures was exposed, sought out the artist, presented him to Charles I., who took Dobson under protection, and not only sat to him several times for own portrait, but caused the prince of Wales, Prince pert, and many others, to do the same. The king had gh opinion of his artistic ability, styled him the English toret, and appointed him sergeant-painter on the death Vandyck. After the fall of Charles, Dobson was nced to great poverty, and fell into dissolute habits. He died at the early age of thirty-six. Excellent examples of Dobson's portraits are to be seen at Blenheim, Chatsworth, and several other country seats throughout England. The head in the Decollation of St John the Baptist at Wilton is said to be a portrait of Prince Rupert.

DOCETÆ (from δοκεῖν, to appear), a name applied to those heretics in the early Christian church who held that Christ, during his life, had not a real or natural, but only an apparent or phantom body. Other explanations of the δόκησις, or appearance, have, however, been suggested, and in the absence of any statement by those who first used the word of the grounds on which they did so, it is impossible to determine between them with certainty. The name Docetæ is used by Clement of Alexandria as the designation of a distinct sect, of which he says that Julius Cassianus was the founder. Docetism, however, undoubtedly existed before the time of Cassianus. The origin of the heresy is to be sought in the Greek, Alexandrine, and Oriental philosophizing about the imperfection or rather the essential impurity of matter. Traces of a Jewish Docetism are to be found in Philo; and in the Christian form it is generally supposed to be combated in the writings of John, and more formally in the epistles of Ignatius. It differed much in its complexion according to the points of view adopted by the different authors. Among the Gnostics and Manichæans it existed in its most developed type, and in a milder form it is to be found even in the writings of the orthodox teachers. The more thoroughgoing Docetæ assumed the position that Christ was born without any participation of matter; and that all the acts and sufferings of his human life, including the crucifixion, were only apparent. They denied, accordingly, the resurrection and the ascent into heaven. To this class belonged Dositheus, Saturninus, Cerdo, Marcion, and their followers, the Ophites, Manichæans, and others. The other, or milder school of Docetæ, attributed to Christ an ethereal and heavenly instead of a truly human body. Amongst these were Valentinus, Bardesanes, Basilides Tatianus, and their followers. They varied considerably in their estimation of the share which this body had in the real actions and sufferings of Christ. Clement and Origen, at the head of the Alexandrian school, took a somewhat subtle view of the incarnation, and Docetism pervades their controversies with the Monophysites. Docetic tendencies have also been developed in later periods of the church's history, as for example by the Priscillianists and the Bogomiles, and also since the Reformation by Jacob Boehme, Menno Simonis, and a small fraction of the Anabaptists. Docetism springs from the same roots as Gnosticism, and the Gnostics generally held Docetic views. Accordingly, for a fuller account of the principles out of which Docetism arose, and of the various modifications it assumed, the reader is referred to the article GNOSTICISM. See also the articles on the leading Docetæ mentioned above.

DOCK, the name applied to the plants constituting the section *Lapathum* of the genus *Rumex*, and natural order *Polygonaceæ*. The leaves of the docks are pinnate-veined, and are never sagittate or hastate; the flowers, which are arranged in two to five rows, in alternate fascicles similar to whorls, are generally perfect, and have three free styles, multifid stigmas, six stamens, and the three inner perianth-segments or petals in some cases tubercled; the fruit is an achene (see vol. iv. p. 150). In the Common or Broad-leaved Dock, *Rumex obtusifolius*, the flower-stem is erect, branching, and 18 inches to 3 feet high, with large radical leaves, heart-shaped at the base, and more or less blunt; the other leaves are more pointed, and have shorter stalks. The whorls are many-flowered, close to the stem, and mostly leafless. The root is many-headed, black externally, and yellow within. The flowers appear from June to

August. In autumn the whole plant may become of a bright red colour. It is a troublesome weed, common by roadsides and in fields, pastures, and waste places throughout Europe. An infusion of its root has been used as a remedy for ichthyosis; in large quantities it acts as a purgative. The powdered root is sometimes employed as a dentifrice. The Great Water Dock, *R. Hydrolapathum*, believed to be the *herba britannica* of Pliny (*Nat. Hist.*, xxv. 6), is a tall-growing species; its root is used as an antiscorbutic. The root of the Curled Dock, *R. crispus*, affords an ointment and decoction reputed to be cures for scabies; and the seeds of the same species have been found efficacious in dysentery. Other British species are the Sharp Dock, *R. conglomerata*, the root of which has been employed in dyeing; the Bloody-veined Dock, or Bloodwort, *R. sanguineus*; the Yellow Marsh Dock, *R. palustris*; the Fiddle Dock, *R. pulcher*; the Golden Dock, *R. maritimus*; the Grainless Curled Dock, *R. domesticus* (= *aquaticus*); and the Meadow Dock, *R. pratensis*. The naturalized species, *R. alpinus*, or "Monk's Rhubarb," was early cultivated in Great Britain, and was accounted an excellent remedy for ague.

DOCK. See HARBOURS.

DOCKYARDS. Previously to the reign of Henry VIII., the kings of England had neither naval arsenals nor dockyards, nor any regular establishment of civil or naval officers to provide ships of war, or to man them; they had admirals, however, possessing a high jurisdiction and very great power (see the article ADMIRAL). There are strong evidences of the existence of dockyards, or of something answering thereto, at very early dates, at Rye, Shoreham, and Winchelsea. In November 1243 the sheriff of Sussex was ordered to enlarge the house at Rye in which the king's galleys were kept, so that it might contain seven galleys. In 1238 the keepers of some of the king's galleys were directed to cause those vessels to be breamed, and a house to be built at Winchelsea for their safe custody. In 1254 the bailiffs of Winchelsea and Rye were ordered to repair the buildings in which the king's galleys were kept at Rye. At Portsmouth and at Southampton there seem to have been at all times depôts both for ships and stores, though there was no regular dockyard at Portsmouth till the reign of Henry VIII. It would appear, from a very curious poem in Hakluyt's *Collection*, called *The Policie of Keeping the Sea*, that Henry V. had ships, officers, and men exclusively appropriated to his service, and independently of those which the Cinque Ports were bound, and the other ports were occasionally called upon, to furnish on any emergency. By this poem it also appears that Little Hampton, unfit as it now is, was the port at which Henry built

> his great *Dromons*
> Which passed other great shippes of the commons.

The "dromion," "dromon," or "dromedary," was a large war ship, the prototype of which was furnished by the Saracens. Roger de Hoveden, Richard of Devizes, and Peter de Longtoft celebrate the struggle which Richard I., in the "Trench the Mer," on his way to Palestine, had with a huge dromon,—"a marvellous ship! a ship than which, except Noah's ship, none greater was ever read of." This vessel had three masts, was very high out of the water, and is said to have had 1500 men on board. It required the united force of the king's galleys, and an obstinate fight, to capture the dromon.

The foundation of a regular navy, by the establishment of dockyards, and the formation of a board, consisting of certain commissioners for the management of its affairs, was first laid by Henry VIII.; and the first dockyard erected during his reign was that of Woolwich. Those of Portsmouth, Deptford, Chatham, and Sheerness followed in succession. Plymouth was founded by William Pembroke was established in 1814, a small yard hav previously existed at Milford.

From the first establishment of the dockyards to present time, most of them have gradually been enla and improved by a succession of expedients and m shifts, which answered the purposes of the moment; the best of them have not possessed those convenience advantages which might be obtained from a doc systematically laid out on a uniform and consistent with its wharfs, basins, docks, slips, magazines, and shops arranged according to certain fixed principle culated to produce convenience, economy, and despat

Neither at the time when our dockyards were first lished, nor at any subsequent periods of their enlargem could it have been foreseen what incalculable advant would one day be derived from the substitution of machi for human labour; and without a reference to this vast provement in all mechanical operations, it could no expected that any provision would be made for its fu introduction; on the contrary, the docks and slips, workshops and storehouses, were successively built random, and placed wherever a vacant space would conveniently admit them, and in such a manner as in cases to render the subsequent introduction of machi and railways, and those various contrivances found in private manufacturing establishments, quite imposs even in the most commodious of Her Majesty's dockya

From a brief description of the royal dockyards as now stand a general idea may be formed of their sev capacities, advantages, and defects. Taking them in cession, according to their vicinity to the capital, the fir

DEPTFORD.—Deptford dockyard was first establi about the year 1513, and continued to be a building y as well as a large depôt for naval stores, until 1869, w it was closed as a building yard in pursuance of a re mendation of a committee of the House of Commons, w reported in 1864. The increasing size of ships of rendered the yard unsuitable for any but the smaller of vessels, while the continuous deposits of river mud only along the frontage but also in the docks and b rendered it a costly and decreasingly valuable pla construction. It had an interesting history. Not were some of the most celebrated ships of the navy there, but during the Great Plague the office of Admiralty was removed thither from Seething Lane. P the Great worked in the yard as a shipwright, dwelling while at Sayes Court, the residence of Evelyn, the autho *Sylvia* and of the diary not less famous than Pepys Evelyn was the grantee of some of the ground on w the dockyard stood, for no other consideration than there should always be a keel laid down in the yard. Qu Elizabeth's Admiralty officials were at one time resid at Deptford; and thither went the queen in 1580 to co the honour of knighthood on Sir Francis Drake, and to d with him on board the ship in which he had circ navigated the world.

Though closed as a building yard in 1869, in accorda with the recommendation of a committee of the House Commons, part of the establishment, with suitable sto houses, was retained as a depôt for naval stores, and as one place from which shipments of stores to naval dep abroad should be made. Of the residue, part was sold Mr Evelyn, who made the purchased part into a recreati ground for the Deptford people, and gave it to them. T rest was sold for a metropolitan meat market to Corporation of London. When intact the front or wh wall of this dockyard, facing the Thames, was about 17 feet in length, and the mean breadth of the yard 650 fe the superficial content about 30 acres. It had three or ships of the line on the face next the river; and two or smaller vessels, which launched into a basin or wet dock, 260 by 220 feet. There were also three dry docks,—one of them a double dock, communicating with the Thames, and the other a smaller one, opening into the basin. The number of men employed in this yard, in time of war, was about 1500, of whom one-half were shipwrights and artificers, and the other half labourers. There were, besides, 18 or 20 teams of 4 horses each, to drag timber and heavy stores.

The proximity of Deptford yard to the capital is of great importance, in the convenience it affords for receiving from this great mart all the home manufactures and products which may be purchased for the use of the navy. It is the general magazine of stores and necessaries for the fleet, whence they are shipped off, as occasion requires, to the home yards, the outports, and the foreign stations, in store-ships, transports, coasting sloops, lighters, and launches, according to the distance they have to be sent.

The management of Deptford naval store yard is now merged in that of the victualling yard, a most complete establishment of its kind. Till 1869 this management comprised a naval captain superintendent, with a master in the navy as his assistant. Under them a storekeeper, a store receiver, an accountant, an inspector of stores, and their respective staffs, conducted the administrative duties of the place. In 1869 the Board of Admiralty, in accordance with the recommendations of a departmental committee, abolished the offices of captain superintendent and master attendant, and placed the establishment under the civilian management of the storekeeper. The naval superintendents were appointed for five years, and after that time were withdrawn to make way for others. The superintending storekeeper is appointed as a permanent officer, and under him experience is accumulated and applied in all the manufactories and other business departments of the yard. The manufactures conducted by and for the Government at Deptford comprise biscuit making on such a scale as to supply, with the yield of the victualling yards at Gosport and Plymouth, biscuit enough for the whole navy, and also chocolate making, mustard making, flour grinding, and the operations of a large cooperage. Most of the salt beef required for the navy is salted and put up there. Deptford may be called the heart of the victualling service. From its stores are shipped the whole of the consignments required for replenishment of depôts abroad, as well as the requirements of the other two victualling yards in England, except that at the last-named the supplies of biscuits and flour are provided on the spot. The number of men employed at Deptford necessarily varies. During war upwards of a thousand men are required. The space occupied by the victualling yard is about 19 acres. There is a river frontage of 1700 feet, and a mean depth of 1000 feet.

In 1877 there are employed in the naval store and victualling yard at Deptford 258 men on the establishment, and 390 men on the hired list, at a cost of £25,847.

Woolwich Dockyard.—This no longer exists as a naval station. Though retaining its name, it remains as a depôt in the hands of the War Department, for whose work its river frontage of 3680 feet, and its docks and basins, afford excellent accommodation. Woolwich was the first and most ancient of all the dockyards, having been established in the reign of Henry VII. From it have been launched some of the finest and most celebrated ships of the English navy. In 1512 the "Harry Grace de Dieu" was built, and in 1552 was accidently burnt, there. In more modern times the "Nelson" and the "Ocean" were from Woolwich, and those latest specimens of the now extinct class of fighting ship, the "Trafalgar," "Agamemnon," and "Royal Albert." As an establishment for the building and repair of ships, especially steam ships, Woolwich was perhaps the completest and best furnished of all the dockyards. Its power to make and repair engines and all iron work, whether of ship or fittings, was so extensive as to enable the Government, before the introduction of iron-clads, to be nearly independent of the private trade. With occupation for 1800 workmen, it was able to rely upon its own resources almost exclusively. Its proximity to London gave it other great advantages, including this, that the Admiralty were thereby enabled the more easily to supervise the constructive work for which its architects were responsible. But for the fatal operation of two causes, the increased and increasing depth of ships of war, and the continuous silting of the river into the docks and basins of the yard, Woolwich would probably have remained one of the chief dockyards. Both these causes, however, operated. The depth of the "Nelson's" hold had to be lessened in order to ensure her passing Erith; and it was stated in the *Eighth Report of the Select Committee on Finance* (1818) that "the wharf wall at Woolwich, owing to the action of the tide on the foundation, is in a falling state, and in danger of being swept into the river, it being secured only in a temporary manner; and requires to be immediately rebuilt in a direction that will preserve it from similar injury hereafter, and prevent, in a great degree, that accumulation of mud which has, in the course of the last ten years, occasioned an expense of upwards of £125,692, and would threaten in time to render the yard useless." Till 1869, however, notwithstanding the recommendations of a parliamentary committee, and the frequent urgings of members on both sides of the House of Commons, Woolwich yard was kept open. Then, in accordance with a policy long commended, it was closed, steps were taken to dispose of the plant and material that remained, and the place itself was handed over, with its workshops and factories, to the War Department in 1872.

Woolwich Division of Royal Marines.—About the same time that the dockyard was broken up, the division of marines—no longer in contact with ships and shipping—was abolished, and its strength was distributed between the divisions at Chatham and Plymouth.

Chatham Dockyard.—This dockyard, founded by Queen Elizabeth, though not on the present site, is situated on the right bank of the Medway, to which it presents a line of wharfage extending 10,000 feet, and of embankment 4500 feet more. The superficial contents may be estimated at about 500 acres. The old part of the yard has seven building-slips on the front, from which ships are launched into the river, all equal to the building of ships of the line, and three others for frigates and smaller vessels. In the same front are four dry docks communicating with the Medway. At the southern extremity of the yard is the ropery, 1248 feet in length and 47½ feet in width; in which are employed about 250 persons. It is equal to the manufacture of every description of cordage required for the naval service, including the largest size cable. The hemp houses, 306 feet long by 36 feet wide, are equal to the stowage of 1600 tons of hemp and 3000 hauls of yarn. Next to these are the slips and docks, with the working-sheds and artificers' shops close in the rear, an excellent smithery, timber-berths, seasoning sheds, deal and iron yard, &c., and beyond these, on the eastern extremity of the yard, the officers' houses and gardens. The superintendent's house is situated nearly in the centre of the yard. The lower or north-eastern part of the old yard is occupied by mast-ponds, mast-houses and slips, store-boat houses and slips, ballast wharf, timber-berths, and saw-pits.

Before the construction of the extension works in 1867–73, there was no wet dock or basin in Chatham-yard; but the

Medway, flowing along it in a fine sheet of water, in some degree answered the purpose of one. Owing to the shallowness of the water and the crooked navigation from Chatham round Upnor Point, ships were obliged to take in their water and ballast at one place, their stores and provisions at another, their guns, powder, and ammunition at a third; in consequence of which, a ship was usually longer in getting out to sea from Chatham than even from Deptford.

The necessity of improving the accommodation at Chatham forced itself upon the attention of those who were responsible for the navy many years before the opportunity came for effecting the improvements. Pepys records a visit to Chatham in July 1663, to inspect the site of a projected wet dock. It was estimated to cost £10,000, and Pepys remarked that "the place indeed is likely to be a very fit place when the king hath money to do it with." In effect, however, it was not taken in hand by the king, who allowed the Dutch, instead of docks, to be found in the Medway. It was not till 1867 that ground was broken for the extension works at Chatham, though the plans had been prepared and certain preparations made many months before, under the supervision of Colonel Sir Andrew Clarke, C.B. The extension works may be thus described. Three basins give access from Gillingham Reach, which formerly connected the mainland with the salt marshes. These marshes were covered with water every spring tide. The Government bought 150 acres of them, and proceeded to re-make the ground which forms the site of the new dockyard workshops and factories. The three basins communicate with each other by caissons, so that ships of the largest class can pass from the bend of the Medway at Gillingham to that at Upnor. Upnor Reach entrance, opposite Upnor Castle, is 80 feet wide, the others are 84 feet. The first (Upnor) basin is the repairing basin, which has an area of 22 acres, and a depth, in common with the others, of 33 feet at spring, and 30 feet at neap tides. On the south side of this basin, and opening into it, are four graving docks, each capable of receiving the largest man of war. From this basin a passage about 175 feet long leads to the "factory" basin, which has an area of 20 acres. Contiguous to it are being erected the engine and boiler factories, and the principal workshops necessary for iron war-ship building. Next to the "factory" basin is the fitting out basin, with an area of 28 acres. In this place ships are to receive their sea stores and be got ready for service. Here, too, they will be dismantled and paid out of commission.

Very great engineering difficulties had to be contended against in prosecuting these works, owing chiefly to the soft mud and to the treacherous character of the ground on which foundations had to be laid. Convict labour was largely employed in the work of excavation, and in the manufacture of bricks, whereof 20,000,000 a year were turned out, at small cost, on the spot. The cost of these new works is reckoned at about £2,000,000.

A considerable piece of new ground (about 2000 feet in length by 200 in breadth) was added a few years ago to the upper part of the present Chatham dockyard, on which Mr Brunel erected one of the completest saw-mills in the United Kingdom. It is supposed to be equal to the power of fifty saw-pits and nearly one hundred sawyers, and is capable of supplying the dockyards of Chatham and Sheerness with all the straight-sawn timber that they can require. But a great advantage of the plan is in its application of the steam engine to the management and arrangement of timber, by which the labour and expense of a great number of horses are saved, and the obstruction and impediments to the general services of the yard avoided.

Since the introduction of iron as the material for shi hulls, Chatham has taken a more prominent place among dockyards. Most of the iron ships built in the royal yar have been built at Chatham and Pembroke,—the capal lities being greater at Chatham, where the "Achille "Monarch," "Glatton," "Rupert," "Raleigh," "Beller phon," "Sultan," "Alexandra," "Temeraire," and ma also of the Musquito fleet of gunboats were built. Chatham and Devonport the whole of the cordage requir for the navy is manufactured; and, since 1869, the who business of remanufacturing copper and old iron for t navy has been concentrated at Chatham.

The first division of royal marines, consisting twenty-eight companies, is stationed at Chatham, in e cellent barracks, situated near one of the extremities the dockyard, and occupying nine acres of ground.

There was formerly a small victualling depôt, situat partly in the parish of Chatham and partly in that Rochester, from which the ships at Chatham and Sheerness and the Nore received a supply of provisions a water. Ships now obtain their supplies from Deptfor except fresh meat and vegetables, which are obtained local contracts on demand.

It may be found necessary to establish a fresh depôt f victualling stores at Chatham when the port becom developed as a place for fitting out and repairing as we as for building. This process of development is going rapidly. In March 1873 the executive of the Sheerne steam reserve with their ship were removed to Chatha and the steps necessary for transferring the princip powers and attributes of the exposed dockyard at Sheerne to the strongly defended port of Chatham will be quick taken. The great difficulties of navigation in the Medwa combined with the successive forts and torpedo statio which stud the river, are calculated to make Chatha unassailable. As Hollingshed said of Lundy Island, the will be "no entrance but for friends." When the Chatha works shall have been finished, the question will probab be revived whether Sheerness should not, as has be often recommended, be closed; but the advantages of ha ing even a small yard whither ships only slightly injured sea or by the enemy can run for repair, without having thread the reaches of the Medway up and down, are great that it is unlikely the place will be abandoned.

In 1876 Chatham dockyard was raised to a rea admiral's command. The number of workmen employ at Chatham yard in 1877 is 1478 established and 20 hired men, at an aggregate cost of £220,138.

SHEERNESS DOCKYARD.—This dockyard is situated on low point of land on the island of Sheppey, of which the s is composed of sand and mud brought from the sea on t one side, and down the Medway on the other, and has much contracted the mouth of that river as completely command the entrance of it. The situation, in a milita point of view, is a most important one, particularly fro its vicinity to the North Sea and to the anchorage at t Nore; by which anchorage, and by the works of Sheernes the mouths of the Thames and the Medway are complete defended.

As a situation for a dock, the objections to which it w liable are now in a great measure removed. On accou of the low swampy ground on which it stood, fevers a agues were at one time so prevalent that shipwrights a other artificers were literally impressed and compelled work at Sheerness. In process of time, however, a tow sprung up close to the dockyard, and with it some litt improvement by drainage, embankments, and oth measures. Still it continued, for a considerable time, unhealthy and disagreeable place. As a dockyard it w totally destitute of all convenience or arrangement; an the whole premises, mixed among wharfs and buildings belonging to the Ordnance Department, did not cover more than 15 acres. The storehouses were dispersed in various parts of this space, and in so ruinous a state, that a ship hauled up in the mud was by far the best storehouse in the whole yard. There were two small inconvenient docks for frigates or smaller vessels. It was in fact a mere port of refitment, and might be considered as an appendage to Chatham.

The very limited capacity of Sheerness, and other considerations, led to the origination of the project of a naval arsenal at Northfleet, which, from change of circumstances, and from the important improvements now carried out at Sheerness, is not likely ever again to be revived. These improvements were of sufficient magnitude to render any establishment at Northfleet wholly unnecessary, by making Sheerness a very complete dockyard. Previously to carrying into execution this important undertaking, a committee of engineers and others was appointed, whose plan was afterwards minutely examined, and with some slight improvements adopted. The first stone was laid on the 19th August 1814, and the whole work was completed at an expense not far short of one million sterling. The additions, together with some part of the premises held by the War Department, make the whole area of the dockyard of Sheerness amount to upwards of 50 acres. The wharf wall on the south side of the basin in front of the mast-houses is 100 feet, and that on the river front 60 feet in width, lined on both sides with as complete a specimen of good and beautiful masonry of granite as any in the kingdom.

Portsmouth Dockyard. — Portsmouth dockyard, founded by Henry VII., will always be considered as the grand naval arsenal of England, and the headquarters or general rendezvous of the British fleet. It appears at all times to have been regarded as a very important naval station, notwithstanding the rivalry of Southampton, which was the principal port in Plantagenet times. In 1225 an order was issued to the barons of the Cinque Ports to provide men for the king's galleys at Portsmouth. In 1226 the sum of £25, 14s. 4d. was paid to the masters and crews of the "king's two great ships at Portsmouth." In 1229, £40 was paid to the king's clerk for the repairs of the king's galleys and great ship at Portsmouth. King John on several occasions assembled his barons at Portsmouth for naval expeditions. He seems, moreover, to have aimed at increasing the accommodation there for ships. In May 1212 the sheriff of Southampton was commanded to cause the docks at Portsmouth to be inclosed with a strong wall, in the manner which the archdeacon of Taunton would point out, for the preservation of the king's ships and galleys. He was also to cause pent-houses to be erected for their stores and tackle. This was to be done immediately, lest the galleys or their stores should be injured in the coming winter.

In 1540, when the dockyard seems to have been regularly established, the area of the yard was comprised in 8 acres of ground, and abutted upon the harbour near what are now known as the King's Stairs. Cromwell added 2 acres in 1658; Charles II. added 8 in 1663, and 10 more in 1667. Between 1667 and 1710, 30 acres were reclaimed from harbour mud, or bought from the town, and various subsequent additions gave 90 acres as the area on which Portsmouth dockyard stood at the end of the last century. Early in Queen Victoria's reign the growth of the steam navy necessitated an enlargement of dock accommodation. In 1843 were ordered, and in 1848 were opened a fine steam basin holding 7 acres of water, and four new docks, the dockyard ground being extended to 115 acres in all. A few years more and the want of dock room was as great as ever. Huge iron-clads, of a draught and length greater than had yet been known, required new docks and basins of special construction. The extension works at Chatham (see above) and Portsmouth were accordingly entered upon. At the present time (August 1877) great progress has been made with both sets of works, under the direction of Colonel Sir A. Clarke, C.B., R.E., and Colonel Pasley, R.E. When finished the Portsmouth new works will comprise a tidal basin, three floating basins (upon one of which four docks will abut), a large deep dock, entered from the tidal basin, two floating basin entrance locks, which may also be used as deep docks, and greatly increased wharfage and space for building storehouses and factories. The system of docks and basins will begin with the tidal basin, entered from the harbour by an opening 100 yards wide, and having a depth of 30 feet of water at low spring tides. The deep dock and the two locks at the head of this basin will carry 28 feet of water over the invert at low spring tides; the two latter will be the entrances to the repairing, rigging, and fitting-out basins, which will lead from each other in the order named. These locks will in themselves be magnificent docks, able to receive the largest iron-clad at once from the tidal basin. They will lead to the repairing basin, a vast excavation, of a parallelogram shape, which will measure 22 acres, and carry at high spring tides 35 feet of water. This depth of water will be common to the three basins; it may be made permanent by the closing of the lock gates, and one great use of the locks will be that vessels may be docked in them in any state of the tide without lowering the level of water in the inner basins, where the tide may be ponded at its highest level of 35 feet of water, if necessary. Having been raised to this level in the locks by ingress of water from the tidal basin, vessels will be able to pass inwards to the repairing and other basins without any lessening of the depth of water. The four large docks of the repairing basin will have a depth of 30 feet of water on their sills, even when filled at high neap tides. Two of them are entirely finished, and the excavation of the others is far advanced. Opposite to these docks will be the entrance to the rigging basin, an excavation of 14 acres, in a trapezoid shape. The third, or fitting-out basin, which will receive the ships when they have been repaired and rigged, will be a pentagon of 14 acres. On one side of this basin there will be a coal depôt, so that vessels may leave the docks with their coals on board, ready for sea. In addition to these four basins and seven docks there is an entrance between the tidal basin of the new works and the steam basin of 1848, which will connect the old and new portions of the dockyard; and, as for wharfage, the harbour or north wall of the extension works will have 26 feet and the wall of the tidal basin 30 feet of water alongside it at low spring tides, making altogether three miles of wharfage accommodation in connection with the extension works, and that for ships of the largest class. The size of the whole dockyard will be more than doubled, for its present 115 acres will be increased by more than 177 acres of reclaimed mud land and fortifications glacis, making in all an exact measurement of 293 acres 2 roods and 29 perches. These great works were estimated when designed in 1865 to cost £3,000,000, exclusive of convict labour. They have given employment on the spot to upwards of 1600 free men and about 800 convicts. The latter are employed in brick-making, and have made upwards of 100,000,000 bricks since the works were begun.

A complete network of railway connects all parts of the yard with the docks and basins, and the whole with the neighbouring railroad to all parts of the kingdom, so that iron or coal can be put into waggons at Sheffield or Cardiff and brought in a few hours, without change of medium, to the side of the ship which is to use the material.

This dockyard, accordingly, is by far the most capacious of all; and the safe and extensive harbour, the noble anchorage at Spithead, the central situation with respect to the English Channel and the opposite coast of France, render Portsmouth of the very first importance as a naval station; and in this view of it, every possible attention appears to have been paid to the extension and improvement of its dockyard.

In the centre of the old wharf-wall, facing the harbour, is the entrance into the great basin, whose dimensions are 380 by 260 feet, and its area 2¼ acres. Into this basin open four excellent dry docks, and on each of its sides is a dry dock opening into the harbour; and all of these six docks are capable of receiving ships of the largest class. Besides these is a double dock for frigates, the stern dock communicating through a lock with the harbour, and the head dock with another basin about 250 feet square. There is also a camber, with a wharf-wall on each side, 660 feet in length, and of sufficient width to admit of transports and merchant ships bringing stores to the dock-yard. In the same face of the yard are three building slips capable of receiving the largest ships, and a small one for sloops, besides two building slips for frigates on the northern face of the yard, and a smaller slip for sloops. The range of storehouses on the north-east side, and the rigging-house and sail-loft on the south-west side of the camber are magnificent buildings, the former occupying nearly 600 feet in length, exclusive of the two intermediate spaces, and nearly 60 feet in width, and the two latter 400 feet. The sea-store houses occupy a line of building which, with the three narrow openings between them of 25 feet each, extend 600 feet. The rope-house, tarring-house, and other appendages of the ropery are on the same scale; but since the suppression of the Portsmouth ropery (in 1869), and the concentration of rope-making at Devonport and Chatham, these premises have been used as general storehouses. The two sets of quadrangular storehouses, and the two corresponding buildings, with the intervening timber-berths and saw-pits, at the head of the dry docks, issuing from the great basin, are all excellent, and conveniently placed. The smithery is on a large scale, and contiguous to it are the various factories for metal work used in the building and repair of iron ships. Formerly there was also a copper mill, capable of turning out 300,000 sheets a year, besides bolts, bars, and gudgeons for ships' use. But since 1869 the whole business of remaking old metal of whatever kind has been concentrated at Chatham. Most of these factories were constructed under the direction of General Bentham. At the head of the north dock are the wood mills, at which every article of turnery, rabetting, &c., is performed for the use of the navy, from boring the chamber of a pump to the turning of a button for a chest of drawers. But the principal part of these mills is the remarkable machinery for making blocks, contrived by Brunel (see BLOCK-MACHINERY).

The northern extremity of the dock-yard is chiefly occupied with seasoning-beds, saw-pits, and timber-berths, the working boat-house, and boat store-house. On the eastern extremity are situated the houses and gardens of the superintendent and principal officers of the yard, the chapel, and the late royal naval college.

Portsmouth yard, in 1877, employs 4910 men, at a cost of [illegible].

Naval College.—The establishment of a college at Portsmouth for the education of young gentlemen for the navy was first formed in 1729 under the title of the Naval Academy. It contained 40 scholars, the sons of the nobility and gentry. In 1806 it was reorganized under the name of the Royal Naval College, and the number of scholars was raised from 40 to 70; of whom 40 were to consist of the sons of commissioned officers of the navy, and to receive their board, clothing, lodging, and education free of all expense; the remainder to consist of sons of noblemen, gentlemen, civil and military officers, on payment of £72 a year. The age of admission was from twelve and a half to fourteen years. No student to remain at college longer than three years; at the end of which time, or sooner if he should have completed the plan of education, he was to be discharged into one of Her Majesty's ships, the college time being reckoned two years of the six required to be served to qualify for such a commission. In 1837 the Royal Naval College for the education of young gentlemen for the navy was abolished, and by an order in council of 1838 it was reopened as an establishment for the scientific education of a certain number of officers and mates of the naval service, the latter to have passed both their examinations in seamanship and in navigation, and to remain one year in the college. A limited number o[illegible] commissioned officers of any rank were also permitted [illegible] study at the college, but no expense was incurred on the[illegible] account.[1]

Naval Architectural School.—The number of stude[illegible] formerly did not exceed 24. Candidates were admit[illegible] by examination at stated periods; the age of entrance [illegible] from fifteen to seventeen, and the duration of apprent[illegible] ship seven years. At the expiration of their appren[illegible] ship they were eligible to all the situations in the [illegible] building department of her Majesty's dockyards, to [illegible] there employed as supernumeraries until regular vaca[illegible] might occur. This school, which was subsequently [illegible] bodied with South Kensington, is now incorporated [illegible] Greenwich College.

Victualling Yard.—There were formerly two victua[illegible] establishments at this port,—the one in Portsmouth [illegible] the other across the harbour, at a place called Wee[illegible] both of them inconveniently situated for supplying ships with water and provisions, more especially su[illegible] had to take them on board at Spithead. The forme[illegible] sisted chiefly of provision-stores and magazines, with a [illegible] mill and a bakery; at the latter there were a cooperage [illegible] a brewery. The victualling establishments are now [illegible] solidated at Gosport, and the Royal Clarence Victua[illegible] rd is a very fine establishment. At this victualling rd, as at Deptford and Plymouth, large quantities of scuit and flour are manufactured. Casks and barricoes e also made; but with these exceptions there is no anufacture at Gosport. The depôt is supplied with sea ovisions and clothing from Deptford, and re-issues them to e fleet at Portsmouth. There is an excellent slaughter rd in the place, where cattle delivered under contract are ain, and the meat issued to the fleet.

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[1] On 1st February 1873 Portsmouth College was superseded by [illegible] Royal Naval College at Greenwich. The means of education [illegible] vided at Portsmouth were at once too limited and not technical enou[illegible] The disused buildings of Greenwich hospital furnished the extra [illegible] required, and the new system of higher education of naval offic[illegible] which was pronounced by the select committee on that subject t[illegible] necessary, was considered and carried out by Mr Goschen, then [illegible] lord of the Admiralty. Rear-admiral Sir Cooper Key, K.C.B., [illegible] the first president of the college. The minute of the Board [illegible] Admiralty consequent upon the Order in Council of 16th Janua[illegible] 1873, whereby Greenwich College was founded, states that—"My Lords intend that the Royal Naval College at Greenwich shall [illegible] organized as to provide for the education of naval officers of [illegible] ranks above that of midshipman, in all branches of theoretical [illegible] scientific study bearing upon their profession; but my Lords [illegible] continue the instruction given in the 'Excellent' gunnery ship as [illegible] tofore, and arrangements for instruction in practical surveying [illegible] also be continued at Portsmouth. My Lords desire, by the establ[illegible] ment of the college, to give to the executive officers of the [illegible] generally every possible advantage in respect of scientific educa[illegible] but no arrangements will be made at all prejudicing the all-[illegible] portant practical training in the active duties of their profess[illegible] All matters relating to the particular classes of officers admitt[illegible] study, and the different subjects of study, are determined by [illegible] regulations as may from time to time be laid down by the Admir[illegible] Special pecuniary concessions are made to officers on half-pay [illegible] may enter for study, and officers of the lower grades are put upon [illegible] pay, while in all cases there is a Government contribution in a[illegible] the mess. Special professional inducements to study are offered, [illegible] everything is done to make the college answer thoroughly [illegible] purposes for which it was founded. Practical knowledge is taug[illegible] the Thames and its estuaries, as theory is taught in the college.

Haslar Hospital.—This magnificent hospital for the ception of sick and wounded lies at the point seawards, the Gosport side of the harbour. It is in charge of a sident medical inspector-general, who is assisted by a mpetent medical and clinical staff.

The second division of royal marines, consisting of enty-six companies, is stationed at Forton barracks, on e Gosport side. Sixteen companies of royal marine tillery have excellent quarters at Eastney, three miles om Portsmouth, opposite St Helen's, and at Fort Cumberland, a half mile from Eastney.

Plymouth Dockyard.—The naval station of Plymouth hardly inferior to that of Portsmouth. It possesses ne of the finest harbours in the world, capable of ntaining, in perfect security at their moorings, not ss than a hundred sail of the line; and by means the breakwater it may boast of an excellent roadead for eighteen or twenty sail of the line. The old ockyard has only one basin, without gates, but the mensions are 300 by 280 feet. The excellent harbour Hamoaze, on the western bank of which the wharfall extends, almost compensates for the want of other asins, especially as the depth of water allows the largest hips to range along the jetties, and receive their stores on oard immediately from the wharf.

Plymouth dockyard proper extends in a circular sweep long the shores of Hamoaze 3500 feet, its width about he middle, where it is greatest, being 1600, and at each xtremity 1000 feet, making its superficial contents about 6 acres. The land front is about 2850 feet. In the line acing the harbour are two dry docks for ships of the first ate, a double dock for seventy-four gun ships, communicating with Hamoaze, and another dock for ships of he line, opening into the basin. There is, besides, a graving-dock without gates, and a canal or camber similar o that in Portsmouth yard, for the admission of vessels bringing stores into the yard, which, communicating with the boat-pond, cuts the dock-yard nearly into two parts. There are five jetties projecting from the entrances of the dry docks into Hamoaze, alongside of which ships are conveniently brought when undocked. All these are situated between the centre and the northern extremity of the harbour line. On the southern part are three building slips for the largest class of ships and two for smaller vessels, the outer mast-pond and mast-houses, timber-berths, saw-pits, and smithery. Higher up, on this end of the yard is an extensive mast-pond and mast-locks, with plank-houses over them, and, above these, three hemp magazines, contiguous to which is the finest ropery in the kingdom, consisting of two ranges of buildings, one the laying-house, the other the spinning-house, each being 1200 feet in length, and three stories in height. In the construction of the new rope-house no wood has been used excepting the shingles of the roof, to which the slates are fastened. All the rest is of iron. The ribs and girders of the floors are of cast iron, covered over with Yorkshire paving stone, and the doors, window frames, and staircases are all of cast iron, so that the whole building may be considered as proof against fire.

The northern half of the yard, besides the docks and basin, with all the appropriate working sheds and artificers' shops, contains a cluster of very elegant stone buildings, ranged round a quadrangle, the longest sides being about 450 feet, and the shortest 300 feet. Within the quadrangle are also two new ranges of buildings, in which iron has been used in the place of wood. These buildings consist of magazines for different kinds of stores, rigging-houses, and sail-lofts. The northern and upper part of the yard is occupied by a range of handsome houses, with good gardens behind them, for the admiral-superintendent and the principal officers of the yard, the chapel, the guard-house, and pay-office, stables for the officers and the teams, and a fine reservoir of fresh water for the supply of the yard.

Plymouth is not only a good building and repairing yard, on account of its excellent docks and slips, and the great length of line along the Hamoaze, but also a good refitting yard.

A large addition has been made to Plymouth yard by the fine establishment of Keyham steam factory which adjoins it, with a water frontage of about 1300 feet, with two steam basins—one 630 feet by 560 feet, and another 700 feet by 400 feet. There are also excellent graving docks leading into these basins, around which are coal sheds, storehouses, boat berths, engineers' shops, boiler factories, and all the necessary appliances of mast shears, cranes, and capstans worked by hydraulic or steam machinery. There is no railway within the yard connecting it with the general system of railroad, though means are being taken to secure a junction with the narrow gauge line through Okehampton. Traction engines, called "camels," at present discharge most of the work of a railway.

The number of men borne in Plymouth yard in 1877 is 4336, costing £292,563.

Plymouth Victualling Establishment.—The Royal William Victualling Yard stands on the eastern entrance to Hamoaze, on about 11 acres of ground,—adjoining 4 acres on its south side, on which stand two small forts, and a reservoir containing about 8000 tons of water, which supplies the fleet—the water being brought from Dartmoor.

Plymouth Hospital is a handsome building of stone, or rather a series of separate buildings, regularly arranged, in which respect, as admitting a freer circulation of air, it is perhaps superior to that of Haslar.

The third division of royal marines, consisting of thirty companies, is stationed at Plymouth. The barracks, situated at Stonehouse, are very airy and spacious.

Pembroke Dockyard.—This dockyard was established in 1814, and is now used merely as a building-yard. It is situated on the southern shore of Milford Haven, not two miles from the town of Pembroke. It includes an area of about 60 acres, its surface descending in a gradual slope to the water's edge, along the shore of which there is a frontage of about 2350 feet. It has a dock, and 14 building slips, 6 of which are for first-rates. The largest wooden ship of the royal navy, the "Duke of Wellington," 131 guns, was launched from this yard. Here, too, were built the "Thunderer" and the "Fury," the huge mastless iron-clads, intended with the "Devastation" and the "Staunches" to form the sea police of the coasts.

Other Yards.—In addition to the foregoing, there are several small naval yards—at Haulbowline in the Cove of Cork, at Gibraltar, Malta, Antigua, Halifax, Bermuda, Kingston (Jamaica), Cape of Good Hope, Trincomalee, and Hong Kong.

Dockyard Officers.—The management of the dockyards is intrusted to a superintendent, either a rear-admiral or captain; a master attendant and his assistant; a chief constructor and assistant; a store-keeper; an accountant, who is also store-receiver; and a director of police.

RESERVES IN DOCKYARDS.—At each of the ports where there is a dockyard, Pembroke excepted, a certain number of ships when put out of commission, or new ships not commissioned, are laid up in reserve, being classed in one of the four classes, according to the state in which they are when paid off, or the state of forwardness for further service to which they may be ordered by the Admiralty. The reserves used to be comprehended in what was called "the ordinary." But since twenty years the reserve ships have been placed under a captain of the navy, the flag captain of the dockyard admiral. The captain of the reserve is responsible for the care of ship and engines, and also for the due preservation and readiness for immediate service of all the ship's stores and equipment. The latter, excepting very heavy gear, which is kept on board, are kept in special storehouses at the dockyard, where all the items of the ship's "establishment," from cordage to hammocks and lanterns, are kept ready for immediate shipment. These arrangements apply to the ships in the first division of the reserve. Competent technical officers, all the ship's artificers in port not otherwise employed, and a large body of seamen are under the orders of the captain of the reserve.

HISTORY OF MANAGEMENT OF DOCKYARDS.—When Henry VIII. first established a regular king's dockyard at Woolwich, he appointed a board, consisting of certain commissioners for the management of all naval matters; and it is curious enough (see the *Pepysian Collection of Manuscripts* in the university of Cambridge), that the regulations which he made for the civil government of the navy, and which were in the reign of Edward VI. revised, arranged, and turned into ordinances, form the broad basis of all the subsequent instructions given to the several officers to whom the management of the civil affairs of the navy has been committed. The commissioners of the navy then consisted of the vice-admiral of England, the master of the ordnance, the surveyor of the marine causes, the treasurer, comptroller, general surveyor of the victualling, clerk of the ships, and clerk of the stores. They had each their particular duties; and once a week they were ordered to meet at their office on Tower Hill, and once a month report their proceedings to the lord high admiral.

In 1603 the principal officers for conducting the civil affairs of the navy were suspended, in consequence of many abuses being complained of; and other commissioners were appointed, with powers to manage, settle, and put the affairs of the navy into a proper train, and to prevent, by such measures as might appear to be necessary, the continuance of the many great frauds and abuses which had prevailed. A similar commission was renewed in 1618, which in a full and minute report detailed and explained those frauds and abuses. That commission, which ended on the death of James I., was renewed by his successor, and remained in force till 1628, when it was dissolved, and the management of the navy was restored to the board of officers established by Edward VI.

In the disturbed reign of Charles I. the navy was suffered to go to decay; but by the extraordinary exertions of Cromwell it was raised to a height which it had never before reached; it again declined, however, under the administration of his son. At the Restoration, the duke of York, of whom Macaulay wrote that he was the only honest man in his dockyards, was appointed lord high admiral, and by his advice a committee was appointed to consider a plan he had drawn out for the future regulation of the affairs of the navy, at which he himself presided. "In all naval affairs," say the commissioners of revision, "he appears to have acted with the advice and assistance of Mr Samuel Pepys, who first held the office of clerk of the acts, and was afterwards secretary of the Admiralty,—a man of extraordinary knowledge in all that related to the business of that department, of great talents, and the most indefatigable industry."

The entire management of the navy was now in the hands of the duke, as lord high admiral, by whom three new commissioners were appointed to act with the treasurer of the navy, the comptroller, the surveyor, and clerk of the acts, as principal officers and commissioners of the navy. A book of instructions, drawn out by Pepys, was sent to the navy board for its guidance. A rapid progress was made in the repair and augmentation of the fleet: but the duke being called away, in consequence of the Dutch war in 1664, the example of zeal and industry set by Pepys was not sufficient, in the duke's absence, to prevent neglect and mismanagement in every department, except his own.

From 1673 to 1679, the office of lord high admiral was put in commission with Prince Rupert at the head of it. The king, through Pepys, arranged all naval affairs; but in the latter year, when the duke was sent abroad, and Pepys to the Tower, a new set of men were made commissioners of the navy, who, without experience, ability, or industry, suffered the navy to go to decay. "All the wise regulations," say the commissioners of revision, "formed during the administration of the duke of York, were neglected; and such supineness and waste appear to have prevailed as, at the end of not more than five years, when he was recalled to the office of lord high admiral, only twenty-two ships, none larger than a fourth-rate, with two fireships, were at sea; those in the harbour were quite unfit for service; even the thirty new ships which he had left building had been suffered to fall into a state of great decay, and hardly any stores were found to remain in the dock-yards." Pepys was re-appointed secretary of the Admiralty; the king instituted an inquiry into the characters and abilities of the first ship-builders in England, and by the advice of Pepys added Sir Anthony Dean, eminent in that profession, with three others, to the former principal officers. The old commissioners were directed entirely to confine their attention to the business of a committee of accounts. To each of the new commissioners was intrusted a distinct branch of the proposed reform; and it appears that, highly to their credit, "they performed what they had undertaken in less time than was allowed for it, and at less expense," having completed their business to the general satisfaction of the public two months before the Revolution. The business of the navy, thus methodized and settled, remained undisturbed by that event.

It will readily be seen that the vast increase of our naval force since that time has necessarily required many additional orders and regulations, some of which, from circumstances, were not compatible with each other; some were given to one dockyard and not to another; others in one yard became obsolete, while they continued to be acted upon in another; so that there was no longer that uniformity in the management which it is desirable—indeed, essentially necessary—to preserve. From the year 1764 to 1804, when the king appointed a commission "for revising and digesting the civil affairs of his navy," the attention of the lords of the admiralty and the navy board had frequently been directed to this important subject; but nothing was done to forward so desirable an arrangement, except that Sir Charles Middleton (afterwards Lord Barham), when comptroller of the navy, classed and digested under distinct heads all orders and regulations prior to the year 1786. The commissioners of naval inquiry, appointed in 1803, state the necessity of revising the instructions, and digesting the immense mass of orders issued to the dockyard officers, and regret that a work of such utility should not have been completed. The commission consisted of Admiral Lord Barham, John Fordyce, Esq., Admiral Sir Roger Curtis, Bart., Vice-Admiral Domett, and Ambrose Serle, Esq. They made fifteen distinct reports, the date of the first being 13th June 1805, of the last the 6th March 1808. All these except two were printed by order of the House of Commons, and were mostly carried into effect by Orders in Council. One of the two not printed is an inquiry into the state of the navy at different periods, and of naval timber; the other relates to the formation of a new dock-yard at Northfleet.

These reports led to the establishment, for the first time, in all dockyards, of one uniform system of management, by which it was hoped incalculable advantages would have been secured, in the preventing of frauds, in the saving of labour and materials, and consequently time and expense, and in securing better workmanship in the construction of ships; but the system was cumbrous and expensive, and has given way to other more judicious management.

The management of the dockyards, and of all the civil affairs of the navy, was formerly intrusted to certain commissioners, of whom the comptroller of the navy, three surveyors, and seven other commissioners formed a board at Somerset House, for the general direction and superintendence of the civil concerns of the navy, subject to the control of the Admiralty. At most of the yards, both home and foreign, was a commissioner of the navy, who was nearly always a naval officer of the rank of captain. The foreign yards over which a commissioner presided were Bermuda, Cape of Good Hope, Gibraltar, Halifax, Jamaica, Malta, Quebec, Kingston (Canada), and Trincomalee. These, with the five belonging to the home yards, Woolwich (including Deptford), Chatham, Sheerness, Portsmouth, and Plymouth, made the whole number of commissioners of the navy amount to twenty-four.

In 1832 Sir James Graham, then first lord of the Admiralty, substituted for these commissioners five departmental officers, who were called "principal" officers of the navy. These were the surveyor of the navy, the accountant-general, the storekeeper-general, the comptroller of victualling and transports, the director general of the medical department (see ADMIRALTY). To these were subsequently added a director of works and a director of transports. In 1869 this arrangement was modified. The post of storekeeper-general was abolished, and the duties discharged by him were incorporated with the department of the comptroller of the navy, who had a few years before superseded the more limited surveyor of the navy; the office of comptroller of victualling was also modified, and the work of his department was incorporated with that of the Admiralty generally, under the control of the sea lord. The business of purchase and sale for each of the five departments was at the same time concentrated in one purchase department under a director of navy contracts.

Victualling establishments.—At each of the dockyards at Deptford, Portsmouth, and Plymouth are victualling establishments for supplying the fleet with provisions and water; and also at Cork, Cape of Good Hope, Gibraltar, Malta, Jamaica, Halifax, Trincomalee, Rio de Janeiro, Barbados, Sierra Leone, Hong Kong, Valparaiso, and Bermuda. The victualling board at Somerset House consisted formerly of a chairman and deputy chairman, and five other commissioners, two secretaries, a registrar of securities, and 136 clerks.

The transport board having been dissolved at the end of the great French war, its twofold duties were divided between the navy and victualling boards; those which concerned the hiring of transports devolved on the commissioners of the navy, and those which related to the sick and hurt department, on the commissioners of the victualling board, on whom also devolved the direction and superintendence of all the naval hospitals at home and abroad. These have also merged in the Admiralty, where there is a transport department under the supervision of a director of transports,—a naval officer, first appointed after the Crimean war.

Officers of the dockyard.—The principal officers of an established dockyard, prior to 1833, were—1, the commissioner; 2, the master attendant; 3, the master shipwright; 4, the clerk of the check; 5, the storekeeper; 6, the clerk of the survey; to which were added the subordinate officers of timber-master, and the master measurer. By the regulations in 1833, the commissioner was superseded by a superintendent, the offices of clerk of the check, clerk of the survey, and master measurer were abolished, and a store-receiver was substituted for the timber-master. Many subordinate offices were abolished, and the whole system of working the men and keeping the accounts was simplified and amended. Some idea may be formed of the diminution of the expense by the simple fact that, while in the ordinary estimate of the navy for 1817 the establishment of officers in Portsmouth yard was £50,065, in 1833 it was only £19,803, and in 1853, £20,121. To this last, however, must be added the salaries of officers employed in the steam factory, which amounted to £2555. The principal officers in the factory are—1, the chief engineer and inspector of machinery; 2, his assistant; 3, assistant inspector of machinery; 4, foreman of the factory; 5, foreman of boilermakers; 6, pay-clerk and book-keeper.

At one time the men in the dockyards were employed almost wholly on job and task-work. Between 1830 and the present time they have been almost wholly on a day pay smaller than that given in the general trade, but having a title to a pension, contingently upon good service and good behaviour, attached to it. In 1869 Mr Childers cut down to a considerable extent the "establishment" system of dockyardmen, replaced the vacancies with hired men on higher pay, but without a title to pension, and with the liability to discharge at a week's notice when work is slack. The salary system, with its concomitant vested interests, was not found to be productive of quick and therefore of economical work. Mr Childers's alteration improved matters not a little, but job and task-work, besides being more in accordance with the usages of the day, is far more likely to interest and stimulate the men. One great advantage, however, of the salary system is the discouragement it gives to strikes. The conditions under which alone pensions are earned act as deterrents.

In ordinary years the number of workmen of all kinds required for the service of the dockyards is, in round numbers, 16,000.

Defence of the yards.—In the year 1847 the workmen of the several dockyards were enrolled into a corps for the defence of the yards; and certain numbers were trained to the use of the great gun exercise, so that each of the dockyard battalions had some artillery attached to them. In 1854 the corps fell into desuetude, and was finally swallowed up in the volunteer movement.

FOREIGN DOCKYARDS.—The dockyards of the principal foreign states at the present time (1877) are as follows:—

Austria..........	Pola and Trieste.
Denmark........	Copenhagen.
France............	Cherbourg, Brest, L'Orient, Rochefort, Toulon.
Germany.........	Kiel, Dantzic, Wilhelmshafen.
Italy......	Spezzia, Naples, Castellamare.
Russia.....	Cronstadt, St Petersburg, Sevastopol, Nicholaieff.
Spain.......	Cartagena, Cadiz.
United States...	Portsmouth, Charlestown, Brooklyn, Philadelphia, Washington, Norfolk, Pensacola, Mare Island (Pacific).

Numbers and Dimensions of Docks, Locks, and Basin Entrances in H. M. Dockyards, February 1878.

DOCKYARD.	LENGTH from Bilge of Caisson or Mitre Post of Gates (Blocks taken at 3 ft. high).				BREADTH							DEPTH ON SILL.								Depth of Dock Floor below Sill.		Caisson or Gates.	REMAR
	At Coping.		On Blocks.		At Coping.		On Floor at Stern.		Coping at Entrance.			H.W. O.S.T.		H.W. O.N.T.		L.W. O.S.T.		From Coping					
	ft.	in.	ft.	in.	ft.	in.	ft.	in.		ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.	ft.	in.		
CHATHAM.																							
No. 1 Dock	225	0	203	5	73	11	46	0		57	5	16	0	13	0	*	—	22	0	level		Gates	* Sill ... above L. ... S.T. Not av... able as a ... Used as ... Floor.
„ 2 „	408	5	384	9	85	2	30	0		65	0	23	6	20	6	5	6	29	0	2	0	Caisson	
„ 3 „	363	6	336	6	90	0	26	0		63	5	23	6	20	6	5	6	29	0	level		do.	
„ 4 „	253	0	232	0	80	0	44	0		62	8	21	0	18	0	3	0	26	0	do		do.	
„ 5 „ D	456	3	416	0	108	0	42	6		80	0	31	6	28	6	13	6	37	6	4	0	do.	
„ 6 „ E	456	3	416	0	108	0	42	6		80	0	31	6	28	6	13	6	37	6	4	0	do.	
„ 7 „ F	457	3	416	0	110	0	42	6		82	0	32	0	29	0	14	0	38	0	3	6	do.	
„ 8 „ G	457	3	416	0	110	0	42	6		82	0	32	0	29	0	14	0	38	0	3	6	do.	
North Lock M K } . . .	477	6	436	0	95	0	85	0	*Outer*	94	6	33	6	30	6	15	6	41	6	5	0	*do.*	Not yet b...
									Inner	94	6	32	6	29	0	14	0	40	0	6	6		
South „ L I } . . .	479	6	438	0	85	0	75	0	*Outer* *Inner*	84	6	32	6	29	0	14	0	40	0	5	0	*do.*	
Basin Entrance A . .	—		—		—		—			79	7½	30	0	27	0	12	0	36	0	—		do.	
„ „ B . .	—		—		—		—			84	0	32	0	29	0	14	0	38	0	—		do.	
„ „ C . .	—		—		—		—			84	0	32	0	29	0	14	0	38	0	—		do.	
PORTSMOUTH.																							
No. 1 Dock	253	6	228	3	92	7	39	1		57	7	19	6	17	0	6	2	25	6	1	4½	Gates	
„ 2 „	252	10	231	6	88	6	24	6		63	4	24	0	21	6	10	8	30	0	1	0	do.	
„ 3 „	287	1	275	2	91	6	28	1		67	6	25	6	23	0	12	2	30	0	0	9	Caisson	
„ 4 „	286	3	279	8	85	5	32	2		67	6	26	0	23	6	12	8	29	6	2½" above		do.	
„ 5 „	230	4	209	4	85	1	33	9		55	4	20	0	17	6	6	8	24	9	level		Gates	
„ 6 „	220	1	189	8	83	9	35	0		52	11	19	0	16	6	5	8	25	0	0	1½	do.	
„ 7 „ { Double Dock }	658	1	648	8	100	0	35	0		80	5	27	0	21	6	13	8	34	0	3	0	Caisson	
„ 10 „					100	0	35	0		88	6	27	0	24	6	13	8	34	0	3	0	do.	
„ 8 „	340	0	307	0	80	4	32	9		70	0	22	9	20	3	9	5	28	3	1	2½	do.	
„ 9 „	304	6	268	0	83	0	36	0		64	11	21	9	19	8	8	5	25	4	1	9	do.	Not use... a Dock.
„ 11 „	427	0	401	6	99	0	35	0		70	0	27	0	24	6	13	8	34	0	1	2	do.	
„ 12 „ K	456	0	415	0	110	0	42	6		80	0	32	6	30	0	19	2	38	6	4	0	do.	
„ 13 „ I	456	0	416	0	110	0	42	6		82	0	33	0	30	6	19	8	39	0	3	6	do.	
„ 14 „ H	—		—		—		—			82	0	33	0	30	6	19	8	39	0	—		do.	Entrances only built.
„ 15 „ G	—		—		—		—			82	0	33	0	30	6	19	8	39	0	—		do.	
Deep Dock D	452	0	428	0	101	6	40	6		82	0	40	8	38	2	27	4	46	8	1	0	do.	
North Lock B E } . . .	466	0	458	0	100	0	42	6	Outer	82	0	41	8	39	2	28	4	47	8	level		do.	
									Inner	82	0	33	0	30	6	19	8	39	0	8	8		
South „ C F } . . .	466	0	458	0	100	0	40	6	Outer	82	0	40	8	38	2	27	4	46	8	1	0	do.	
									Inner	80	0	32	6	30	0	19	2	38	6	9	2		
Basin Entrance A . .	—		—		—		—			80	0	32	6	30	0	19	2	38	6	—		do.	
„ „ L . .	—		—		—		—			80	0	32	6	30	0	19	2	38	6	—		do.	
„ „ M . .	—		—		—		—			94	0	32	6	30	0	19	2	38	6	—		do.	
„ „ N . .	—		—		—		—			80	0	32	6	30	0	19	2	38	6	—		do.	
Steam Basin Entrance O	—		—		—		—			78	10½	28	6	25	6	14	8	34	0	—		do.	‖ If Ca... is used inst... of Gates ... 27' 8" to ...
Ship „ „ . .	—		—		—		—			67	0	26	0	23	6	12	8	33	6	—		do.	
SHEERNESS.																							
No. 1 Dock	253	8	241	2†	89	5	26	8		57	7	25	2	20	8	9	2	30	7	0	6	Caisson & Gates	‡ Sill ... above L.W. S.T.
„ 2 „	251	10	225	7	90	5	28	3		57	8	25	2	20	8	9	2	30	7	0	6	Gates	
„ 3 „	260	8	265	6	90	2	26	3		63	5	25	8	21	2	9	8	31	1	level		Caisson	
„ 4 „	202	6	177	3	75	10	33	8		50	3	19	10	15	4	3	10	25	0	do.		Gates	§ In conju... tion with Co... nance Cham... ber.
„ 5 „	186	11	176	0	61	4	45	4		58	7	14	8	10	2	‡	--	20	3	do.		Caisson	
Small Basin Ent. (Tidal)	—		—		—		—			50	0	20	6	16	0	4	6	25	11	—		Swing Bridge	
Great „	—		—		—		—			64	8	25	8	21	2	9	8	32	5	—		Caisson	
Boat „ (Tidal)	—		—		—		—			§100	0	19	10	15	4	3	10	25	3	—		Nil	
DEVONPORT.																							
No. 1 Dock (Basin) .	305	6	[illegible]	6	95	9	33	6		65	0	27	10	2	4	12	5	35	9	0	10½	Gates	‖ Caisson ... Entrance ... Keyham ... end) fits Outer Entrance, 6" wide. ... used, add 3" to length
„ 3 „ (New Long)	437	6	415	6	97	0	29	9		73	0	32	1	27	7	16	8	40	0	2	0	do.	
„ 4 „ (North) .	273	7	253	4	96	0	31	0		64	8	21	6½	17	0½	6	1½	27	9½	1	6	do.	
Basin Entrance . .	—		—		—		—			81	5½	31	4½	26	10	15	11½	33	8½	—		Nil	
New Dry Dock (begun 1877) on site of No. 3	380	0	[illegible]	6	95	0	50	0		94	0	35	2	30	8	19	9	42	11	3	0	*Caisson*	*New ... built.*
KEYHAM.																							
No 1 Dock (South) .	[illegible]	9½	347	2	91	2	30	0		80	0	26	0	21	6	10	7	33	0	level		Caisson	Add 7 ... Caisson ... Outer Stop...
„ 2 „ (Middle)	[illegible]	[illegible]	[illegible]	9	92	0	30	1		80	0	23	0	18	6	7	7	30	0	3	0	do.	
„ 3 „ (Queen's)	421	4½	417	4	95	8½	30	0½		80	0	27	0	22	6	11	7	34	0	3	0½	do.	
Entrance Lock . .	253	0	253	0	80	0	33	3	Outer	80	0	36	0	31	6	20	7	43	0	4" above		do.	Add 11 ... Caisson ... Outer Stop... ner Caisson
									Inner	80	0	34	0	29	6	18	7	41	0	level		do.	
„ to N. Basin .	—		—		—		—			80	0	34	0	29	6	18	7	41	0	—		do.	
„ between Basins	—		—		—		—			80	0	27	0	22	6	11	7	34	0	—		do.	
PEMBROKE.																							
No. 1 Dock	[illegible]	0	257	8	91	5	26	4		75	0	22	11	16	11	2	8	33	2	level		Caisson	
HAULBOWLINE.																							
No. 1 Dock	455	0	414	0	110	6	48	6		94	0	32	8	30	0	20	11	38	8	2	10	*Caisson*	*New ... built.*
Basin Entrance . . .	—		—		—		—			94	0	32	8	30	0	20	11	38	8	—		*do.*	
WOOLWICH.																							
No. 1 Dock	276	9	[illegible]	0	[illegible]	4½	32	5		65	0	22	3	17	6	2	9	26	3	*level*		*Gates*	*The Yard transferred to War Department. The dimensions here given are those formerly used.*
„ 2 „	[illegible]	4	241	3	91	6	[illegible]	11		65	0	21	1	16	4	1	7	25	1	1	9½	*Caisson*	
„ 3 „	253	0	[illegible]	2	94	4	40	5		80	0	21	1	16	4	1	7	25	1	1	10½	*do.*	
Inner Basin Entrance .	—		—		—		—			68	0	21	0	16	3	1	6	25	0	—		*do.*	
Outer „ „ .	—		—		—		—			65	0	22	10	18	1	3	4	26	10	—		*do.*	
MALTA.																							
Outer Dock } Double Dock	[illegible]	1	[illegible]	1	[illegible]	1	[illegible]	9		81	4½	25	0	Average		W. Line		29	11	level		Caisson	Double Dock, ...' ...long
Inner „	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4½		73	2							29	7	1	10	do.	
Somerset Dock	[illegible]	0	427	8	104	0	12	6		80	0	31	6	„		„		39	6	level		do.	
BERMUDA.	Overall		Inside		Inside		Outside			Inside		Depth outside		Depth inside									
Floating Dock . . .	[illegible]		[illegible]	0	83	9	123	9		83	9	71	5	51	5					level		Caissons	

(F. W. L.)

, denoting etymologically a teacher, is the
d by the highest university degree. Originally
nly two steps in graduation, those of bachelor
and the title doctor was given to certain
ı alternative or as a merely honorary appella-
n this sense that the word is to be understood
: *Doctor Angelicus* applied to Aquinas, and in
familiar instances of a similar kind. The
·hich the doctorate became established as a
distinct from and superior to that of master,
ery clearly traced. At Bologna it seems to
onferred in the faculty of law as early as the
·, but there is no sufficient authority for the
ımonly made that the celebrated Irnerius drew
ulary for the ceremonial, and that Bulgarus
who took the degree. Paris, the other great
the Middle Ages, conferred the degree in the
vinity, according to Antony Wood, some time
he earliest recipients being Peter Lombard and
Portree. In England the degree was intro-
reign of John or of Henry III. Both in
on the Continent it was confined for a con-
:iod to the faculties of law and divinity; it
the 1 ith century that it began to be conferred
and in England it is still unknown in the
ts. In Germany, however, there is a degree
›hilosophy. The doctorate of music was first
Oxford and Cambridge; its use in Germany
·ely recent. See UNIVERSITIES.

S' COMMONS was a society of ecclesiastical
.ondon, forming a distinct profession for the
he civil and canon laws. Some members of
ı purchased in 1567 a site near St Paul's, on
:ir own expense they erected houses for the
he judges and advocates, and proper buildings
ıe ecclesiastical and admiralty courts. "In the
:oyal charter was obtained by virtue of which
ıbers of the society and their successors were
under the name and title of 'The College of
w exercent in the Ecclesiastical and Admiralty
e college consists of a president (the dean of
e time being) and of those doctors of law who,
.arly taken that degree in either of the
of Oxford or Cambridge, and having been
·ocates in pursuance of the rescript of the
: Canterbury, shall have been elected fellows
:r prescribed by the charter." The judges of
;copal courts were always selected from this
20 and 21 Vict. c. 77 (the Act to amend the law
obate and Letters of Administration) § 116 and
:ge is empowered to sell its real and personal
surrender its charter to Her Majesty, and it
hat on such surrender the college shall be
: the property thereof shall belong to the then
.bers as tenants in common for their own use
In pursuance of this enactment the college
solved and the ecclesiastical courts are now
·hole bar.

JAIRES, the name applied by its opponents
ut very influential political party in France
itself prominent after the restoration of the
1815. The *doctrine* or fundamental principle
ıction was based was that the sole justification
of government was the manner in which it
power. Rejecting the claim of divine right,
:d for monarchy or for republicanism, the
were opposed alike to the ultra-royalists and
tionists. In the chamber they occupied the
and thus marked themselves out from the
ıisterialist and the left or opposition party. While maintaining the re-established dynasty their efforts were mainly directed towards moulding the constitution into a shape resembling as nearly as possible that of England. The leaders of the doctrinaires were Royer-Collard, the Duc de Broglie, and Guizot. After the revolution of 1830 several of them came into power and proved strong supporters of constitutional monarchy on the model that has existed in England since the reign of William. The name doctrinaires fell entirely out of use after 1848, but the principles of the party have been faithfully represented since that date by the Orleanists. See FRANCE.

DODD, DR WILLIAM (1729-1777), an unfortunate English divine, eldest son of the Rev. William Dodd, many years vicar of Bourne, in Lincolnshire was born there in May 1729. He was sent, at the age of sixteen, to the university of Cambridge, where he was admitted a sizar of Clare Hall in 1745. He took the degree of B.A. in 1750, being in the list of wranglers. On leaving the university, he married a young woman of the name of Perkins, the daughter of a verger. She had a more than questionable reputation, and her extravagant habits contributed in no small degree to her husband's disgrace and ruin. In 1751 he was ordained deacon, and in 1753 priest, and he soon became a popular and celebrated preacher. His first preferment was the lectureship of West-Ham and Bow. In 1754 he was also chosen lecturer of St Olave's, Hart Street; and in 1757 he took the degree of M.A. at Cambridge. He was a strenuous supporter of the Magdalen Hospital, which was founded in 1758, and soon afterwards became preacher at the chapel of that charity. In 1763 he obtained a prebend at Brecon, and in the same year he was appointed one of the king's chaplains,—soon after which the education of Philip Stanhope, afterwards earl of Chesterfield, was committed to his care. In 1766 he went to Cambridge, and took the degree of LL.D. At this period he was held in high estimation; but eager for further advancement, he unhappily entered on courses which in the end proved the occasion of his ruin. On the living of St George's, Hanover Square, becoming vacant, he wrote an anonymous letter to the wife of the lord chancellor offering three thousand guineas if, by her assistance, he was promoted to the benefice. This letter having been traced to him, a complaint was immediately made to the king, and he was dismissed with disgrace from his office of chaplain. After residing for some time at Geneva and Paris, he returned to England in 1776. He still continued to exercise his clerical functions, but his extravagant mode of life soon involved him in difficulties. To meet the demands of his creditors he forged a bond on his former pupil Lord Chesterfield for £4200, and actually received the money. But he was detected, committed to prison, tried at the Old Bailey, found guilty, and sentenced to death; and, in spite of numerous applications for mercy, he was executed at Tyburn on the 27th June 1777 Dr Samuel Johnson was very zealous in pleading for a pardon, and a petition from the city of London received 23,000 signatures. Dr Dodd was a voluminous writer, and possessed considerable abilities, with but little judgment and much vanity. His *Beauties of Shakespeare*, published before he entered the church, was long a well-known work; and his *Thoughts in Prison*, a poem in blank verse, written in the interval between his conviction and his execution, naturally attracted much attention. He published a large number of sermons and other theological works. An accurate list of his various writings is prefixed to his *Thoughts in Prison.*

DODDER (Frisian *dodd*, a bunch; Dutch *dot*, ravelled thread), the popular name of the annual, leafless, twining, epiphytic plants forming the genus *Cuscuta* and natural order *Cuscutaceæ* or, according to some botanists, the tribe *Cuscuteæ* of the *Convolvulaceæ*. All the species are natives of temperate regions, and all have strong acrid properties. The flowers, which grow in clusters, have a quinque-partite, coloured calyx; scales alternating with the corolline lobes; carpels forming a syncarpous ovary; the albumen of the seeds fleshy; and the embryo spiral, filiform, and acotyledonous. On coming in contact with the living stem of some other plant the seedling dodder throws out a sucker, by which it attaches itself and commences to absorb the sap of its foster-parent; it then soon ceases to have any connection with the ground. As it grows, it throws out fresh suckers, establishing itself firmly on its victim. After making a few turns round one stem the dodder finds its way to another, and thus it continues twining and branching till it resembles "fine, closely-tangled, wet catgut." The injury done to flax, clover, hop, and bean crops by species of dodder is often very great. *C. europæa*, the Greater Dodder, is found parasitic on nettles, thistles, vetches, and the hop; *C. Epilinum*, on flax; *C. Epithymum*, on furze, ling, and thyme. *C. Trifolii*, the Clover Dodder, is perhaps a sub-species of the last-mentioned. For a figure of *C. verrucosa*, the Warty Dodder, see vol. iv. pl. x.

DODDRIDGE, Philip (1702–1751), a celebrated nonconformist divine, was born in 1702. His father, Daniel Doddridge, was a London merchant, and his mother the orphan daughter of the Rev. John Bauman, a Bohemian clergyman who had fled to England to escape religious persecution, and had held for some time the mastership of the grammar school at Kingston-upon-Thames. He was the youngest of a family of twenty, of whom there was at his birth only one other child, a daughter, surviving. It is also remarkable that he himself at his birth was put aside as actually dead, and was only preserved alive owing to the accidental glance of one of the attendants, who fancied she perceived a feeble heaving of the infant's chest, and was successful in rekindling the almost extinguished vital spark. Before he could read, his mother taught him the history of the Old and New Testament by the assistance of some blue Dutch tiles; and these stories, he says, were the means of enforcing such good impressions on his heart as never afterwards wore out. When sufficiently old to leave the paternal roof he was placed under the tuition of the Rev. Mr Scott, who taught a private school in London, and on attaining his tenth year he was sent to the grammar school at Kingston-upon-Thames. About 1715 he was removed to a private school at St Albans, where he began to keep an exact account of his time in order the better to improve himself by private meditation and study, and was in the habit during his walks of entering the neighbouring cottages to read to the inmates a few pages from the Bible or from some religious book. Through the interest of friends a proposal was made to him, in 1719, which would have enabled him to enter the English bar; but receiving at the same time an invitation to study for the ministry, he preferred the latter, and shortly thereafter removed to the academy for dissenters at Kibworth in Leicestershire, taught at that time by the Rev. John Jennings. Mr Jennings having in 1722 received an invitation to Hinckley, the academy was removed thither; and in 1723 Doddridge, having finished his studies, accepted an invitation to succeed him in the ministry at Kibworth. He had also been mentioned by Jennings, who died in 1723, as the person most fitted to extend his plans and carry on the instruction of candidates for the ministry, but it was not till 1729 that, at a general meeting of nonconformist ministers, he was chosen to conduct the academy established in that year at Harborough. In the same year he received an invitation from the congregation at Northampton, which he accepted. Here he continued his ministrations till 1751, when the rapid progress of consumptive disease caused him to seek the advantages of a milder climate. Accordingly he sailed for Lisbon on the 30th September of that year: but the change was unavailing, and he died there on 26th October.

His popularity as a preacher is said to have been chiefly due to his "high susceptibility, joined with physical advantages and perfect sincerity." His sermons were mostly practical in character, and his great aim was to cultivate in his hearers a spiritual and devotional frame of mind. "He endeavoured," he says, "to write on the common general principles of Christianity, and not in the narrow spirit of any particular party." "There is," says his biographer, "a remarkable delicacy and caution evinced in the works of Dr Doddridge whenever the subject approaches the disputed points of theology. The genuine expressions of the sacred writers are then employed, and the reader is allowed to draw his own conclusions, unbiassed by the prejudices of human authorities." Those portions of his theological lectures which treat on the matter alluded to, substantiate this statement. His principal works are *The Rise and Progress of Religion in the Soul*, *The Family Expositor*, *Life of Colonel Gardiner*, and a *Course of Metaphysical, Ethical, and Theological Lectures*. He also published several courses of sermons on particular topics, and is the author of many well-known hymns.

See *Memoirs*, by Rev. Job Orton, 1766; *Letters to and from Doddridge*, by Rev. Thomas Stedman, 1790; and *Correspondence and Diary*, in 5 vols. by his grandson, John Doddridge Humphreys, 1829.

DÖDERLEIN, Johann Christoph Wilhelm Ludwig (1791–1863), a distinguished German philologist, was born at Jena on the 19th December 1791. His father, Johann Christoph Döderlein, professor of theology at Jena, was celebrated for his varied learning, for his eloquence as a preacher, and for the important influence he exerted in guiding the transition movement from strict orthodoxy to a freer theology. Ludwig Döderlein, after receiving his preliminary education at Windsheim and Schulpforta, studied at Munich, Heidelberg, Erlangen, and Berlin. He devoted his chief attention to philology under the instruction of such men as Thiersch, Creuzer, Voss, Wolf, Boeckh, and Buttmann. In 1815, soon after completing his studies at Berlin, he accepted the appointment of ordinary professor of philology in the academy of Bern. In 1819 he was transferred to Erlangen, where he became second professor of philology in the university and rector of the gymnasium. In 1827 he became first professor of philology and rhetoric and director of the philological seminary. He continued to discharge the duties of both these offices until within a short period of his death, which occurred on the 9th November 1863. Döderlein's most valuable work as a philologist was rendered in the department of etymology and lexicography. He is best known by his *Lateinische Synonymen und Etymologien* (6 vols., Leipsic, 1826–38), and his *Homerische Glossarium* (3 vols., Erlangen, 1850–58). To the same class belong his *Lateinische Wortbildung* (Leipsic, 1838), *Handbuch der Lateinischen Synonymik* (Leipsic, 1839), and the *Handbuch der Lateinischen Etymologie* (Leipsic, 1841), besides various works of a more elementary kind intended for the use of schools and gymnasia. Most of the works named have been translated into English. To critical philology Döderlein contributed valuable editions of Tacitus (*Opera*, 1847; *Germania*, with a German translation) and Horace (*Epistolæ*, with a German translation, 1856–8; *Satiræ*, 1860). His *Reden und Aufsätze* (Erlangen, 1843–7) and *Oeffentliche Reden* (1860) consist chiefly of academic addresses dealing with various subjects in pædagogy and philology.

DODO, from the Portuguese *Dôudo* (a simpleton[1]), a large bird formerly inhabiting the island of Mauritius, but now extinct—the *Didus ineptus* of Linnæus.

Brief mention of this remarkable creature has already been made (see BIRDS, vol. iii. p. 732), but some further particulars may be welcome. The precise year in which the Portuguese discovered the island we now know as Mauritius is undetermined; various dates from 1502 to 1545 having been assigned. Mascaregnas, their leader, seems to have called it *Cerne*, from a notion that it must be the island of that name mentioned by Pliny; but most authors have insisted that it was known to the seamen of that nation as *Ilha do Cisne*—perhaps but a corruption of Cerne, and brought about by their finding it stocked with large fowls, which, though not aquatic, they likened to Swans, the most familiar to them of bulky birds. However, the experience of the Portuguese is unfortunately lost to us, and nothing positive can be asserted of the island or its inhabitants (none of whom, it should be observed, were human) until 1598, when the Dutch, under Van Neck, arrived there and renamed it Mauritius. A narrative of this voyage was published in 1601, if not earlier, and has been often reprinted. Here we have birds spoken of as big as Swans or bigger, with large heads, no wings, and a tail consisting of a few curly feathers. The Dutch called them *Walghvögels* (the word is variously spelled), *i.e.*, nauseous birds, because, as is said, no cooking made them palatable; but another and perhaps better reason, for it was admitted that their breast was tender, is also assigned, namely, that this island-paradise afforded an abundance of superior fare. De Bry gives two admirably quaint prints of the doings of the Hollanders, and in one of them the *Walchvögel* appears, being the earliest published representation of its unwieldy form, with a footnote stating that the voyagers brought an example alive to Holland. Among the company there was a draughtsman, and from a sketch of his Clusius, a few years after, gave a figure of the bird, which he vaguely called "*Gallinaceus Gallus peregrinus*," but described rather fully. Meanwhile two other Dutch fleets had visited Mauritius. One of them had rather an accomplished artist on board, and his drawings fortunately still exist.[2] Of the other a journal kept by one of the skippers was subsequently published. This in the main corroborates what has been before said of the birds, but adds the curious fact that they were now called by some *Dodaarsen* and by others *Dronten*.[3]

Henceforth Dutch narrators, though several times mentioning the bird, fail to supply any important fact in its history. Their navigators, however, were not idle, and found work for their naturalists and painters. Clusius says that in 1605 he saw at Pauw's House in Leyden a Dodo's foot,[4] which he minutely describes. Of late years a copy of Clusius's work has been discovered in the high school of Utrecht, in which is pasted an original drawing by Van de Venne superscribed "Vera effigies huius avis *Walghvogel* (quæ & a nautis *Dodaers* propter fœdam posterioris partis crassitiem nuncupatur), qualis viua Amsterodamum perlata est ex insula Mauritii. Anno M.DC.XXVI." Now a good many paintings of the Dodo by a celebrated artist named Roelandt Savery, who was born at Courtray in 1576 and died in 1639, have long been known, and it has always been understood that these were drawn from the life. Proof, however, of the limning of a living Dodo in Holland at that period had hitherto been wanting. There can now be no longer any doubt of the fact; and the paintings by this artist of the Dodo at Berlin and Vienna—dated respectively 1626 and 1628—as well as the picture by Goiemare, belonging to the Duke of Northumberland, at Sion House, dated 1627, may be with greater plausibility than ever considered portraits of a captive bird. It is even probable that this was not the first example which had sat to a painter in Europe. In the private library of the late Emperor Francis of Austria is a series of pictures of various animals, supposed to be by the Dutch artist Hoefnagel, who was born about 1545. One of these represents a Dodo, and, if there be no mistake in Von Frauenfeld's ascription, it must almost certainly have been painted before 1626, while there is reason to think that the original may have been kept in the *vivarium* of the then Emperor Rudolf II., and that the portion of a Dodo's head, which was found in the Museum at Prague about 1850, belonged to this example. The other pictures by Roelandt Savery, of which may be mentioned that at the Hague, that in the possession of the Zoological Society of London (formerly Broderip's), that in the Schönborn collection at Pommersfelden near Bamberg, and that belonging to Dr Seyffery at Stuttgart are undated, but were probably all painted about the same time (*viz.* 1626 to 1628). The large picture in the British Museum, once belonging to Sir Hans Sloane, by an unknown artist, but supposed to be by Roelandt Savery, is also undated; while the still larger one at Oxford (considered to be by the younger Savery) bears a much later date, 1651. Undated also is a picture said to be by Pieter Holsteyn, and in the possession of Dr A. van der Willige at Haarlem in Holland.

In 1628 we have the evidence of the first English observer of the bird—one Emanuel Altham, who mentions it in two letters written on the same day from Mauritius to his brother at home. These have only of late, through the intervention of Dr Wilmot, been brought to light.[5] In one he says: "You shall receue . . . . . a strange fowle: which I had at the Iland Mauritius called by ye portingalls a Do Do: which for the rareness thereof I hope wilbe welcome to you." The passage in the other letter is to the same effect, with the addition of the words "if it liue." Nothing more is known of this valuable consignment. In the same fleet with Altham sailed Herbert, whose *Travels* ran through several editions and have been long quoted. It is plain that he could not have reached Mauritius till 1629, though 1627 has been usually assigned as the date of his visit. The fullest account he gives of the bird is in his edition of 1638, and in the curiously affected style of many writers of the period. It will be enough to quote the beginning: "The Dodo comes first to a description: here, and in *Dygarrois*[6] (and no where else, that ever I could see or heare of) is generated the Dodo (a Portuguize name it is, and has reference to her simpleness,) a Bird which for shape and rareness might be call'd a Phœnix (wer't in Arabia :) "—the rest of the passage is entertaining, but the whole has been often reprinted. Herbert, it may be remarked, when he could see a possible Cymric similarity, was weak as an etymologist, but his positive statement, corroborated as it is by Altham, cannot be set aside, and hence we do not hesitate to assign a Portuguese derivation for the word.[1] Herbert also gave a figure of the bird.

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[1] Alewyn and Collé, in their *Woordenschat der twee Taalen Portugeesch en Nederduitsch* (Amsterdam: 1714, p. 362), render it "Een sot, dwaas, dol, of, uitzinnig mensch."

[2] It is from one of these that the figures of the large extinct Parrot (*Lophopsittacus mauritianus*), before given (BIRDS, vol. iii. p. 732), were taken. Prof. Schlegel has announced his intention of immediately publishing these sketches in *fac-simile*.

[3] The etymology of these names has been much discussed. That of the latter, which has generally been adopted by German and French authorities, seems to defy investigation, but the former has been shown by Prof. Schlegel (Versl. en Mededeel. K. Akad. Wetensch. ii. pp. 255 *et seqq.*) to be the homely name of the Dabchick or Little Grebe (*Podiceps minor*), of which the Dutchmen were reminded by the round stern and tail diminished to a tuft that characterized the Dodo. The same learned authority suggests that Dodo is a corruption of *Dodaars*, but, as will presently be seen, we herein think him mistaken.

[4] What has become of the specimen (which may have been a relic of the bird brought home by Van Neck's squadron) is not known. Broderip and the late Dr Gray have suggested its identity with that now in the British Museum, but on what grounds is not apparent.

[5] *Proc. Zool. Soc.* 1874, pp. 447–449.

[6] *I.e.*, Rodriguez; an error, as we shall see.

Proceeding chronologically we next come upon a curious bit of evidence. This is contained in a MS. diary kept between 1626 and 1640 by Thomas Crossfield of Queen's College, Oxford, where, under the year 1634, mention is casually made of one Mr Gosling "who bestowed the Dodar (a blacke Indian bird) vpon ye Anatomy school." Nothing more is known of it. About 1638, Sir Hamon Lestrange tells us, as he walked London streets he saw the picture of a strange fowl hung out on a cloth canvas, and going in to see it found a great bird kept in a chamber "somewhat bigger than the largest Turky cock, and so legged and footed, but shorter and thicker." The keeper called it a Dodo and shewed the visitors how his captive would swallow "large peble stones . . . . . as bigge as nutmegs."

In 1651 Morisot published an account of a voyage made by François Cauche, who professed to have passed fifteen days in Mauritius, or "l'isle de Saincte Apollonie," as he called it, in 1638. According to De Flacourt the narrative is not very trustworthy, and indeed certain statements are obviously inaccurate. Cauche says he saw there birds bigger than Swans, which he describes so as to leave no doubt of his meaning Dodos; but perhaps the most important facts (if they be facts) that he relates are that they had a cry like a Gosling ("il a un cry comme l'oison"), and that they laid a single white egg, "gros comme un pain d'un sol," on a mass of grass in the forests. He calls them "oiseaux de Nazaret," perhaps, as a marginal note informs us, from an island of that name which was then supposed to lie more to the northward, but is now known to have no existence.

In the catalogue of Tradescant's *Collection of Rarities, preserved at South Lambeth*, published in 1656, we have entered among the "Whole Birds" a "Dodar from the island *Mauritius*; it is not able to flie being so big." This specimen may well have been the skin of the bird seen by Lestrange some eighteen years before, but anyhow we are able to trace the specimen through Willughby, Lhwyd, and Hyde, till it passed in or before 1684 to the Ashmolean collection at Oxford. In 1755 it was ordered to be destroyed, but, in accordance with the original orders of Ashmole, its head and right foot were preserved, and still ornament the Museum of that University. In the second edition of a *Catalogue of many Natural Rarities*, &c., to be seen at the place formerly called the Music House, near the West End of St Paul's Church, collected by one Hubert *alias* Forbes, and published in 1665, mention is made of a "legge of a Dodo, a great heavy bird that cannot fly; it is a Bird of the Mauricius Island." This is supposed to have subsequently passed into the possession of the Royal Society. At all events such a specimen is included in Grew's list of their treasures which was published in 1681. This was afterwards transferred to the British Museum, where it still reposes. As may be seen it is a left foot, without the integuments, but it differs sufficiently in size from the Oxford specimen to forbid its having been part of the same individual. In 1666 Olearius brought out the *Gottorfische Kunst Kammer*, wherein he describes the head of a *Walghvogel*, which some sixty years later was removed to the Museum at Copenhagen, and is now preserved there, having been the means of first leading zoologists, under the guidance of Prof. Reinhardt, to recognize the true affinities of the bird.

Little more remains to be told. For brevity's sake we have passed over all but the principal narratives of voyagers or other notices of the bird. A compendious bibliography, up to the year 1848, will be found in Strickland's classical work,[2] and the list was continued by Von Frauenfeld[3] for twenty years later. The last evidence we have of the Dodo's existence is furnished by a journal kept by Benj. Harry, and now in the British Museum (*MSS. Addit.* 3668. 11. D). This shows its survival till 1681, but the writer's sole remark upon it is that its "flesh is very hard." The successive occupation of the island by different masters seems to have destroyed every tradition relating to the bird, and doubts began to arise whether such a creature had ever existed. Duncan, in 1828, shewed how ill-founded these doubts were, and some ten years later Broderip with much diligence collected all the available evidence into an admirable essay, which in its turn was succeeded by Strickland's monograph just mentioned. But in the meanwhile little was done towards obtaining any material advance in our knowledge, Prof. Reinhardt's determination of its affinity to the Pigeons (*Columbæ*) excepted; and it was hardly until Clark's discovery in 1865 (BIRDS, vol. iii. p. 732) of a large number of Dodos' remains, that zoologists generally were prepared to accept that affinity without question. The examination of bone after bone by Prof. Owen and others confirmed the judgment of the Danish naturalist, and there is now no possibility of any different view being successfully maintained.

The causes which led to the extirpation of this ponderous Pigeon have been discussed in a former article, and nothing new can be added on that branch of the subject; but it will be remembered that the Dodo does not stand alone in its fate, and that two more or less nearly allied birds inhabiting the sister islands of Réunion and Rodriguez have in like manner disappeared from the face of the earth. (A. N.)

DODONA, in Epirus, was the seat of the most ancient and venerable of all Hellenic sanctuaries. In the plain [illegible] the Dodonæa, and on the banks of the neighbouring Acheloüs, there dwelt in times long anterior to history [illegible] race of Helli or Hellenes, who thence spread into Thessaly and Greece. In after times the Greeks of the south looked on the inhabitants of Epirus as barbarians; nevertheless for Dodona they always preserved a certain reverence, and the temple there was the object of frequent missions from them. This temple was dedicated to the Pelasgic Zeus, the wielder of the thunderbolt in the storms so frequent in Epirus. Connected with the temple was an oracle which enjoyed more reputation in Greece than any other save that at Delphi, and which would seem to date from more early times than the worship of Zeus; for the normal method of gathering the responses of the oracle was by listening to the rustling of an old oak tree, which was supposed to be the seat of the deity, and by taking thence an augury of the future. We seem here to have a remnant of the very ancient and widely diffused tree-worship. Sometimes, however, auguries were taken in other manners, being drawn from the moaning of doves in the branches, the murmur of a fountain which rose close by, or the resounding of the wind in the brazen tripods which formed a circle all round the temple. The oracle was thus, compared with the articulate responses of Delphi, dumb, but none the less constantly consulted. Crœsus proposed t his well-known question; Lysander sought to obtain m it a sanction for his ambitious views; the Athenians quently appealed to its authority during the Peloponne- n war. But the most frequent votaries were the neigh- uring tribes of the Acarnanians and Ætolians, together h the Bœotians, who claimed a special connection with district.

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[1] Hence we venture to dispute Prof. Schlegel's supposed origin of "Dodo." The Portuguese must have been the prior nomenclators, and if, as is most likely, some of their nation, or men acquainted with their language, were employed to pilot the Hollanders, we see at once how the first Dutch name *Walghvogel* would give way. The meaning of *Doudo* not being plain to the Dutch, they would, as is the habit of sailors, convert it into something they did understand. Then *Dodaers* would easily suggest itself.

[2] *The Dodo and its Kindred*, &c. By H. E. Strickland and A. G. Melville. London: 1848. 4to.

[3] *Neu aufgefundene Abbildung des Dronte*, u. s. w. Erläutert von Georg Ritter von Frauenfeld. Wien: 1868. fol.

Dodona is not unfrequently mentioned by ancient ters. Homer speaks of it twice, once calling it the rmy abode of Selli who sleep on the ground and wash their feet, and on the second occasion describing a it of Odysseus to the oracle. Hesiod has left us a com- te description of the Dodonæa or Hellopia, which he s a district full of corn-fields, of herds and flocks and of pherds, where is built on an extremity (ἐπ' ἐσχατιῇ) dona, where Zeus dwells in the stem of an oak (φηγός). rodotus tells a story which he learned at Egyptian ebes, that the oracle of Dodona was founded by an yptian priestess who was carried away by the Phœnicians, t says that the local legend substitutes for this priestess lack dove, a substitution in which he tries to find a ional meaning. From later writers we learn that in storical times there was worshipped, together with Zeus, Asiatic goddess under the name Dione, and thencefor- rd the responses were given by the priestesses of the tter, who were called doves, and not by the Selli.

As to the site of Dodona there has been a good deal of scussion. We know from the authorities that the town s situated in a fertile vale at the foot of the mountain omarus, whence issued a multitude of springs, and that it as on the eastern boundary of Epirus, and on the confines Thesprotia and Molossis. We are further told that odona was a two days' journey from Ambracia, and a urney of four days from Buthrotum. It would also ppear certain that it was in a region of frequent thunder- storms. In accordance with these indications, Colonel Leake fixed on Castritza near Janina in Epirus, at the foot the mountain Mitzikéli, as the site of Dodona. But his easons are not conclusive. Quite recently excavations ave been undertaken at a spot in the valley of Dramisius, few leagues south of Castritza, at the foot of Mount Olytzika, where Leake found the remains of a theatre and two temples. This has usually been supposed to be the site of Passaron, the ancient capital of the Molossian kings. But these excavations have brought to light not only many ntiquities, but tablets *ex voto* bearing dedicatory inscrip- tions to Zeus Naïos and Dione, and many fragments of ripods, whence it would seem highly probable that the opinion of Leake must be given up, and the new site efinitely fixed upon as that of Dodona. (See Leake, *Northern Greece*, vols. i. iv.; *Revue Archéologique* for 1877, p. 329, 397.)

The temple of Dodona was destroyed by the Ætolians 219 B.C., but the oracle survived to the times of usanias and even of the emperor Julian.

DODSLEY, Robert (1703–1764), an eminent book- ller and versatile writer, born in 1703 at Mansfield, ottinghamshire, where his father is said to have been a hoolmaster. In his youth he was apprenticed to a cking-weaver, from whom he ran away, taking service a footman. His first poetical attempts seem to have n made when he was a servant in the family of the Hon. s Lowther, and were published by subscription under title of *The Muse in Livery, or the Footman's Miscellany* [illegible]). This was followed by an elegant little satirical e called *The Toyshop*, the hint of which is said to have n taken from Randolph's *Muse's Looking-glass*, and ch, having obtained the approbation of Pope, was acted ovent Garden with great success. The profits accruing the sale of these two publications enabled him to establish himself as bookseller in Pall Mall; and his merit and enterprising spirit soon made him one of the foremost publishers of the day. One of the first copyrights he published was that of Johnson's *London*, for which he gave ten guineas in 1738, and he was afterwards the leader of the association of booksellers that furnished Johnson with funds for the preparation of his *English Dictionary*. In 1737 a new piece of his own, entitled *The King and the Miller of Mansfield*, was received with undiminished applause. His immediately subsequent farces, however, were not so popular. In 1738 he published a collection of his dramatic works in one volume 8vo, under the modest title of *Trifles*, which was followed by the *Triumph of Peace*, a masque, occasioned by the treaty of Aix-la-Chapelle, and a fragment on *Public Virtue*. Dodsley was also the author of the *Economy of Human Life*, a work which acquired considerable celebrity; but for this it is supposed he was not a little indebted to the mistaken opinion which long prevailed that it was the production of Lord Chesterfield. The name of Dodsley is from this period associated with much of the literature of his time. Among other things he projected *The Annual Register*, commenced in 1758, *The Museum*, *The World*, and *The Preceptor*. To these various works Horace Walpole, Akenside, Soame Jenyns, Lord Lyttelton, Lord Chesterfield, Edmund Burke, and others were contributors. His own latest production was a tragedy entitled *Cleone*, which was received with even greater enthusiasm than his earlier works. It had a long run at Covent Garden; two thousand copies of it were sold on the day of publication, and it passed through four editions within the year. It has long, however, ceased to be read, and apart from his fame as a publisher Dodsley is now chiefly remembered on account of his *Select Collections of Old Plays* (12 vols. 12mo, London, 1744; 2d edition, 12 vols. 8vo, 1780). He died at Durham while on a visit to a friend, 25th September 1764.

DODWELL, Edward (1767–1832), an English antiquarian writer and draughtsman of considerable note in the department of classical investigation. He belonged to the same family as Henry Dodwell the theologian, and received his education at Cambridge. Being under no necessity to adopt a profession as a means of livelihood, he devoted himself entirely to his favourite pursuits, travelled for several years—from 1801 to 1806—in Greece, and spent the rest of his life for the most part in Italy, either at Naples or at Rome. An illness contracted in 1830 during a visit of exploration to the Sabine Mountains, undermined his constitution and ultimately resulted in his death, which took place at Rome in May 1832. His widow, a daughter of Count Giraud, was thirty years his junior, and after his death became famous as the "beautiful" countess of Spaur, and played a considerable rôle in the political life of the Papal city.

His works are—*A Classical and Topographical Tour through Greece*, 2 vols., London, 1819, of which a German translation by Sickler was published at Meiningen in 1821; *Views in Greece*, consisting of thirty coloured plates, London, 1821; and *Views and Descriptions of Cyclopian and Pelasgic Remains in Italy and Greece*, London 1834. The last work, which contains 130 plates, was brought out simultaneously at Paris with a French text.

DODWELL, Henry (1641–1711), a learned controversial writer, was born at Dublin in October 1641. His father had once been possessed of considerable property in Connaught, but having lost it at the rebellion settled at York in 1648. Here Henry received his preliminary education at the free school. By the death of his parents he was reduced in early life to the greatest poverty. In 1654 he was sent by his uncle to Trinity College, Dublin, of which he was soon afterwards chosen scholar and fellow. Having conscientious objections to take orders he relinquished his fellowship in 1666, and resided for some time at Oxford, Dublin, and London successively. In 1688 he was elected Camden professor of history at Oxford; but in 1691 he was deprived of his professorship for refusing to take the oaths of allegiance to William and Mary. Retiring to Shottesbrooke in Berkshire, and living on the produce of a small estate in Ireland, which he had at first generously relinquished in favour of a near relation, he devoted himself to those literary labours in chronology and ecclesiastical polity on which his fame now rests. In the former department he published—*Discourse on the Phenician History of Sanchoniathon* (1681); *Annales Thucydidei et Xenophontei* (1696); *Chronologia Græco-Romana pro Hypothesibus Dion. Halicarnassei* (1692); *Annales Velleiani, Quintiliani, Statiani* (1698); and a larger treatise entitled *De Veteribus Græcorum Romanorumque Cyclis, obiterque de Cyclo Judæorum ac Ætate Christi, Dissertationes* (1701). All these obtained considerable reputation, and were frequently reprinted. Gibbon speaks of his learning as "immense," and says that his "skill in employing facts is equal to his learning." In the department of ecclesiastical polity his works are more numerous and of much less value, his judgment being far inferior to his power of research. In his earlier writings he was regarded as one of the greatest champions of the non-jurors; but the absurd doctrine which he afterwards promulgated, that immortality could be enjoyed only by those who had received baptism from the hands of one set of regularly ordained clergy, and was therefore a privilege from which dissenters were hopelessly excluded, justly deprived him of the confidence even of his friends. It is interesting, however, in view of the recent revival of the same doctrine, to know that he published in 1706 a treatise professing to prove from Scripture and the first fathers that the soul is naturally mortal. Dodwell died at Shottesbrooke, 7th June 1711. His eldest son Henry is known as the author of a pamphlet entitled *Christianity not founded on Argument*, to which a reply was published by his brother William, who was besides engaged in a controversy with Dr Conyers Middleton on the subject of miracles.

DOG, a name common to several species of *Canidæ*—a family of Carnivorous Mammals widely distributed over nearly every part of the globe. Many of the species belonging to this family, as the wolf and the jackal, are social animals, hunting in packs, and are readily tamed; while in confinement they show little or no repugnance to breeding. In a group thus eminently capable of domestication, it is not surprising that in the earliest times one or more species should have been brought under the dominion of man, or that under human care the domestic dog should have become, as Baron Cuvier calls it, "the completest, the most singular, and the most useful conquest ever made by man." There is sufficient evidence to show that the dog existed in the domesticated state during prehistoric times; consequently neither history nor tradition is available to solve the question of its origin. That must be decided, if at all, by the naturalist, and the variety of opinion existing on this point at the present time renders it exceedingly improbable that the parentage of the dog will ever be ascertained with certainty. Some suppose that all our breeds have sprung from a single wild source, others that they are the product of the blending of several distinct species. Of the former, the majority regard the wolf as the parent form, others favour the claims of the jackal, while a few regard them as the descendants of an extinct species, and point to the fossil remains of a large dog, found in the later Tertiary deposits, as the probable wild stock. The prevalent belief at the present day is probably that which regards the domestic dog as the product of the crossing of several species, living and e
This opinion is founded on such considerations
presence in the earliest historic times of many
(totally distinct from each other, and nearly rese
existing forms), the existence of wild species of dog
quarters of the globe, the fondness of savage m
taming wild animals, and the extreme improbabilit
among so many presumably equally tameable canine
only one should have been chosen for domestication.
is it to be forgotten, as Darwin has well shown, th
of man in most wild animals is a gradually ac
instinct, and that before its acquirement a wild
would have been much more readily tamed than
Thus the wild dog of the Falkland Islands
antarcticus), when these were first visited by
approached him without sign either of fear or of av
The weightiest reason for this opinion, however, lies
fact that many of the breeds of domestic dogs, fou
different countries, bear a more or less striking resem
to the wild species still existing in those countries.
Esquimaux dogs of North America so closely resemb
wolf of the same regions, both in appearance and in
that Sir J. Richardson on one occasion mistook a p
those wild animals for a troop of Indian dogs; a
Indians are said to take the young of wolves in o
improve their canine breed, which would seem to
that the dog and wolf are sufficiently fertile *inter se*.
Hare Indian or Mackenzie River Dog, although som
smaller in size than the prairie wolf (*Canis latrans*)
ring in the same regions, so resembles the latte
Richardson could detect no decided difference in for
seems, in fact, to bear the same relation to the prair
that the Esquimaux dog does to the great grey wolf
mentioned. The wolf certainly exhibits few pec
dog-like qualities, being both ferocious and cowardl
showing no attachment to man; but instances, ne
less, are on record of tamed wolves which in their
ness, in love for their masters, and in intelligence,
true dog-like capacity. The Esquimaux dogs are li
decidedly wolfish in disposition, showing little
attachment to their owners, and sometimes, it is sai
attacking them when pressed by hunger. Distinct v
of the wolf occur in Europe and in India, an
European breeds as the shepherd dog of Hungary so
resemble the wolf that an Hungarian has been kn
mistake that animal for one of his own dogs; while
of the Hindu pariah dogs are said by Blyth to re
the Indian variety of wolf. The large semi-domes
dogs of the northern parts of both hemispheres mu
be regarded as principally derived from the various
and varieties of wolves still existing there. The pe
gestation in the wolf and dog is the same, being 6
in both. In the tropical regions of the Old Wor
wolf disappears, and with it the prevalence of w
dogs, their places being taken by smaller breeds, s
certain of the pariah dogs of India and of Egypt, b
which and the jackals abounding in those count
structural difference can, according to Geoffroy Saint-
be pointed out. Their period of gestation agrees wi
of the dog and wolf, and like dogs, tamed jackals
caressed "will," says Darwin, "jump about for jo
their tails, lower their ears, lick their master's hands
down and even throw themselves on the ground
upwards;" when frightened, also, they carry the
between their legs. Jackals associate readily wit
and their hybrid offspring are not sterile; there is
instance on record of one of these which barked
ordinary dog. The habit of barking, so character
dogs, is not, however, universal among them, the d
dogs of Guinea and certain Mexican breeds being de

as dumb. This faculty appears to be readily lost and to be capable of reacquirement. The domestic dogs which ran wild on the island of Juan Fernandez are said to have lost the power of barking in 33 years, and to have gradually reacquired it on removal from the island. The Hare Indian Dog makes an attempt at barking, which usually ends in a howl, but the young of this breed born in the Zoological Gardens seem to possess this faculty to the full extent. In tropical America, where jackals are unknown, there are several wild species of dogs to which the domestic breeds of those regions bear a considerable resemblance, and at the present day the Arawak Indians cross their dogs with an aboriginal wild species for the purpose of improving the breed. In Australia the Dingo, regarded by many as constituting a distinct species indigenous to that country, its remains having been found in caves associated with those of other extinct mammals, occurs both in the wild state and domesticated at the present day. Darwin, after reviewing this question, concludes that "it is highly probable that the domestic dogs of the world have descended from two good species of wolves (*Canis lupus* and *C. latrans*), and from two or three other doubtful species of wolves, namely, the European, Indian, and North African forms, from at least one or two South American canine species, from several races or species of the jackal, and perhaps from one or more extinct species."

Remains of the dog, of Neolithic age, occur in the kitchen-middens of Denmark, and in similar deposits in Switzerland. In Denmark the earliest known dog is followed, in the Bronze period, by a larger breed, and that by a still larger form in the succeeding or Iron period; while a somewhat similar succession occurs in Switzerland. These successive changes, however, may merely indicate the appearance in those countries of new races of prehistoric man, who brought with them their own dogs. In historic times the earliest records of the dog are to be found in the figures of these animals on Egyptian monuments from three to five thousand years old; and these show that thus early, such varieties as the hound, greyhound, watch-dog, and turnspit were cultivated on the banks of the Nile. By the ancient Egyptians the dog was worshipped under the title Anubis, as the genius of the River Nile,—the appearance of Sirius, the dog star, corresponding with the time of the annual rise of that river. The city of Cynopolis was built in its honour, and there its worship was carried on with great pomp. Certain kinds of dogs were regularly sacrificed to Anubis, their bodies being afterwards embalmed; and occasionally the mummies of these are still found. The earliest record of the dog in sacred history is in connection with the sojourn of the Israelites in Egypt; and the religious homage paid to it by their oppressors may probably explain why the Jews were taught to regard it as unclean. Under Moslem law, which in many matters was founded upon Jewish practices, the dog occupies an equally degraded position; and throughout Mahometan countries at the present day, their generally wretched condition bears ample testimony to the neglect and ill-treatment to which for centuries they have been subjected. The pariah dogs of Eastern cities know no master; they prowl about the streets in troops, eating whatever garbage may come in their way, thus serving the useful purpose of scavengers, and occasionally receiving a meal from the more humane of the inhabitants. On no account, however, must even the garments of an orthodox Mahometan be defiled by their touch, and such is the intelligence and sagacity of these ownerless curs that, having become aware by painful experience of this religious prejudice, they seem to take the greatest care to avoid giving such offence. The value set upon the dog by the Egyptians seems to have been shared in by the ancient Greeks and Romans, who possessed many breeds closely allied to still existing forms. Those early breeds, however, are remarkable for the entire absence of pendulous ears, which do not make their appearance till near the decline of the Roman empire. By both Greeks and Romans they were employed in the chase, and in war, and for the latter purpose they were armed with spiked collars, and sometimes even with a coat of mail. Corinth was said to have been saved by 50 war dogs, which attacked the enemy that had landed while the garrison slept, and which fought with unbounded courage till all were killed except one, which succeeded in rousing the garrison. Shakespeare thus put no figure of speech in the mouth of Antony when he exclaims—

> "Cry havoc, and let slip the dogs of war."

Dogs are naturally carnivorous, preferring flesh that is slightly putrid; but they can also live on vegetable food, and in countries where the dog itself is eaten, it is generally thus fed. In drinking it laps with its tongue, and it never perspires, although when heated its tongue hangs from its mouth, and a fluid runs from it. When about to go to sleep, no matter where, it turns round and round, and scratches the ground with its forepaws as if to form a hollow couch; and in this seemingly senseless action it is no doubt continuing a habit once found useful to its wild progenitors. Its sense of smells and hearing are exceedingly acute, and many suppose that the remarkable power possessed by the dog, in common with the cat, of finding its way for great distances along unknown roads may be due to the exercise of the former sense. The differences that obtain between the various breeds of dogs are very great, the skulls, according to Cuvier, differing more from each other than they do in the different species of a natural genus. The molar teeth, which normally consist of 6 pairs above and 7 below, sometimes number 7 pairs above and below, while in the hairless dog of Egypt the teeth are sometimes reduced to a single molar on each side, incisors and canines being entirely awanting. Some varieties are six times as long as others, excluding the tail, and the number of vertebræ in the latter organ is also exceedingly various; nor is the number of mammæ always uniform, there being 5 on each side in some, and 4 in others, while occasionally the number on the two sides is unequal.

While man has thus bestowed great attention on the physical development of the dog, and availing himself of natural variations has, by careful selection and intercrossing, moulded the dog into an almost infinite variety of forms, he has also, by education, developed its moral and intellectual capabilities, so that the dog may, in this respect, be said to have, within its own limits, kept pace with its master's advancement; and it is undoubtedly owing to a certain community of feeling existing between dog and man that this domestic animal has, since the earliest times, been regarded as the companion as well as the humble servant of mankind. There are few human passions not shared in by the dog. It is, like him, subject to anger, jealousy, envy, love, hatred, and grief; it shows gratitude, pride, generosity, and fear. It sympathizes with man in his troubles, and there are numerous instances on record of its showing sympathy for the distressed of its own kind. It remembers, and is evidently assisted thereto, as man is, by the association of ideas; that it is not devoid of imagination may be assumed from the fact that it dreams, pursuing in its sleep imaginary game. Its judgment is often singularly correct; while it may almost be said to have a religion, in which man is its god, and his will its rule of conduct, disobedience to which produces an evident feeling of shame and a quiet submission to punishment. It shares with man in awe of the unknown, and the most courageous dog will often tremble at the sudden rustle of a leaf. While the possession of such faculties has rendered him fit above all other animals for the companionship of man, the physical and intellectual qualities characteristic of the various breeds have been seized upon and developed to their utmost by man, so as to enable him to use the dog for a great variety of purposes; what these are will appear in the following necessarily brief account of the more important breeds of dogs.

According to Professor Fitzinger, there are at least 189 distinct varieties of the domestic dog, and when it is considered that the origin of many if not most of these is uncertain, it is not surprising that considerable difference of opinion should exist as to the most natural mode of grouping them together. Their arrangement into the following six races, founded to a certain extent on the form and development of the ears, probably affords an approximation to a natural classification, viz., WOLF-DOGS, GREYHOUNDS, SPANIELS, HOUNDS, MASTIFFS, and TERRIERS.

I. WOLF-DOGS.—Throughout the northern regions of both hemispheres there are several breeds of semi-domesticated wolf-like dogs having nearly erect ears, and long woolly hair; these include among others the dogs of the Esquimaux and the Kamtchadales. The Esquimaux Dog is usually of a black and white colour, nearly as large as a mastiff, with a fine bushy tail, and sharp pointed muzzle. It is of the greatest value to the inhabitants of the boreal regions of America in hunting the seal, bear, and reindeer; while it is equally useful as a beast of burden, carrying loads on its back—a kind of work for which dogs are by no means well suited—and drawing sledges over the snow. On a good road half a dozen of these dogs will draw, it is said, from 8 to 10 cwts., at the rate of 7 miles an hour; and Kane, the Arctic traveller, tells how that number of dogs, well worn by previous travel, carried him with a fully burdened sledge, between seven and eight hundred miles during the first fortnight after leaving his ship—a mean rate of 57 miles a day. According to the same authority, the training of these dogs is of the most ungracious sort. "I never heard," he says, "a kind accent from the Esquimaux to his dog. The driver's whip of walrus hide, some 20 feet long, a stone or a lump of ice skilfully directed, an imprecation loud and sharp, made emphatic by the fist or foot, and a grudged ration of seal's meat, make up the winter's entertainment of an Esquimaux team." Owing to the ill-treatment to which they are thus habitually subjected, they are highly irritable and difficult to manage, and in sleighing it is necessary to have a well-trained dog as leader, to whom the driver speaks, and by whom the other dogs in the team are guided. They readily relapse into the wild state, and have been known thus to hunt the reindeer in packs like wolves. These dogs have borne a prominent part in Arctic exploration, and much of the difficult work done in this field would have been well-nigh impossible without them. The Kamtchatka dogs are also used for sledging, and are famed for their swiftness and endurance. During summer they run at large and cater for themselves, returning in winter to their masters, who feed them principally with the heads of dried fish.

The Sheep-dog.—In Eastern countries where the sheep follow the shepherd, the duties that fall upon the dog are simpler, and require less intelligence, than those performed by [illegible] breeds. Their task is chiefly to defend the [illegible] from wild beasts and robbers, and for [illegible] Turkoman Watch-dog and the Sheep-dog of Natolia are, by their great strength and courage, admirably fitted. The former is described by Sir J. McNeill as a shaggy animal, nearly as large as the Newfoundland dog, and very fierce and powerful, the dam of the specimen he describes having killed a full grown wolf without assistance. The sheep-dog of Europe is generally classed among the wolf-like dogs, owing to the erect or semi-erect character of its ears, its pointed nose, and shaggy covering; and Buffon, for such reasons, regarded it as nearest to the primitive type of the domestic dog. It is more reasonable to suppose with Martin (*History of the Dog*) that those points "only indicate purity of breed unalloyed by admixture with other varieties." The fact that its life is spent almost entirely out of doors, and that it has little or no opportunity of mixing with dogs other than of its own kind, would tend to preserve uniformity in external appearance; while its high cerebral development and intelligence prove beyond a doubt that the breed of sheep-dogs is one of the most highly improved, and in this respect remotest from the primitive type. Its whole intellect is devoted to the one duty of tending its master's flocks, and in the performance of this it is equally sagacious, vigilant, and patient. At a word, or even a look, from its master, it will gather the sheep, scattered for miles around, to one place. During and after the snowstorms to which highland districts are so frequently exposed, the sheep-dog is invaluable in saving its master's property from almost total destruction. Without it the Highlands of Scotland would be almost useless for sheep-farming purposes. "It would require," says the Ettrick Shepherd, "more hands to manage a stock of sheep, gather them from the hills, force them into houses and folds, and drive them to markets, than the profits of the whole stock would be capable of maintaining." The sheep-dog stands about 15 inches high, is covered with long shaggy hair of a black colour varied with dark grey or fulvous brown, and its tail is of moderate length, slightly recurved and bushy. In disposition it is quiet; and although not quarrelsome, it shows great courage in defending its charge. It will not wantonly attack a stranger, but evidently regards him with suspicion, and rejects all friendly advances. There are three varieties of the sheep-dog found in Great Britain, viz.—the Scottish Collie, standing only from 12 to 14 inches high, and regarded as the purest and most intelligent; the Southern Sheep-dog, of larger size, but with shorter fur, and having the tail often very short—a peculiarity which, according to Bell, "appears to be perpetuated from parents whose tails have been cut," and the Drover's Dog or Cur, generally black and white in colour, and taller in its limbs than the others. It is employed in driving sheep and cattle to the city markets, and in the discharge of this duty shows intelligence quite equal to that of the other varieties; although in the treatment of the herds under its charge, it often displays a more savage disposition. The sheep-dogs of South America are so trained as to unite in themselves the duties of dog and shepherd. "When riding," says Darwin, "it is a common thing to meet a large flock of sheep, guarded by one or two

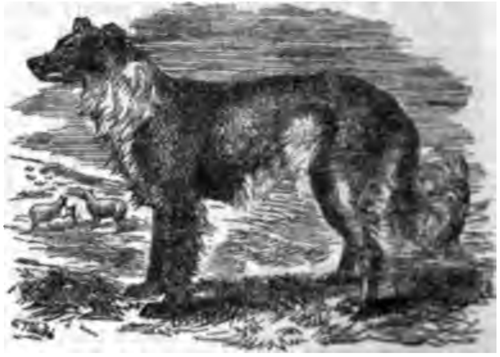

FIG. 1.—Sheep Dog.

dogs, at the distance of some miles from any house or man." And on inquiry he found out the method by which this friendship between dog and sheep had been established. The dog when a puppy is removed from its mother, and is no longer allowed to associate with other dogs, or even with the children of the family. It is kept in the sheep pen, and suckled by a ewe. Generally also it is castrated and thus has little or no community of feeling with its kind. Brought up among the sheep it shows no desire to leave the flock, but assumes the position of leader. "It is amusing," says the above writer, "to observe, when approaching a flock, how the dog immediately advances barking, and the sheep all close in his rear as if round the oldest ram." It comes home daily for food, on receipt of which it immediately returns to the flock; and this it is often taught to bring home in the evening.

The Newfoundland and Great St Bernard or Alpine Dogs occupy an uncertain position, forming, according to some authors, a group by themselves, and being classed by others among the wolf-like dogs, although in their large and pendulous ears they differ widely from the typical forms already noticed.

The Newfoundland Dog is believed to have been brought to England from the island to which it owes its name, but probably owing to partial crossing, it differs somewhat from the original American breed, the latter being smaller in size, with the muzzle less blunted, and almost totally black in colour. In Newfoundland and Labrador these dogs are used as beasts of burden, drawing considerable loads of wood and provisions on sledges. The feet are partially webbed, and consequently they are unrivalled as water-dogs, and although their weakness of scent and comparative slowness of foot renders them useless to the hunter, yet in a country of fens and morasses, the sportsman finds them of the greatest service in rescuing birds that have fallen into the water; nor do they hesitate in their eagerness for retrieving to make their way through the roughest cover. The English variety of Newfoundland Dog is a noble creature, standing 30 inches high at the shoulders, its hair waved or curly and of a black and white colour in nearly equal proportions, its tail massive and bushy and curled upwards at the extremity. Equally noble in disposition, it does not allow the annoyance of smaller dogs to disturb its serenity, while its patience with children is not readily exhausted. In defence of its master's property it will fly with bull-dog ferocity at any intruder, while it will battle with the waters to save him from drowning. Its services in the saving of life are well known. When kept in confinement its temper is more variable, and in a fit of irritation these dogs have been known to attack those for whom they have previously shown the greatest regard; but even in confinement such cases are altogether exceptional. This breed is supposed by some not to be indigenous to North America, but to have been introduced either on the first discovery of Newfoundland by the Norwegians about the year 1000, or on its re-discovery by Cabot in 1497. The Norwegians, according to Martin, have dogs closely resembling the Newfoundland breed, which are used in hunting bears and wolves, and which are armed with spiked collars in order to protect them from the wolves which seek to seize them by the throat. The Great St Bernard Dog of the present day is a powerful animal, as large as a mastiff, with close short hair and pendulous ears, and varying in colour, in one case being described as "sandy red or tawny" with black muzzle, in another as "more or less marked with grey, liver colour, and black clouds." Previous to 1820 there existed another breed of these dogs, closely allied in form and size to the Newfoundland, but in that year the greater portion of them died of an epidemic, which necessitated the introduction of the present variety. These dogs are kept by the monks of the Hospice of St Bernard, in their convent, situated on one of the most dangerous passes between Switzerland and Italy, near the top of the Great St Bernard, where they are trained to the work of rescuing travellers who, overtaken by the snow-storm, may have lost their way, or sunk benumbed by the cold. On such occasions these sagacious and powerful dogs set out from the convent in pairs, one bearing a flask of spirits attached to his neck, the other with a cloak. Should they come upon the baffled yet struggling traveller, they conduct him to the convent; but should he have succumbed and be covered by the snow, their keen scent detects his presence although buried several feet beneath the surface. By loud barking—and a young dog of this breed kept many years ago in the suburbs of Edinburgh was able to make itself heard a mile away—they apprise the monks of the need of succour, while with their feet they attempt to clear away the snow from the body. In this way these dogs are instrumental in saving many lives every year, although often at the sacrifice of their own; one dog which thus met its death bore a medal stating that it had been the means of saving twenty-two lives.

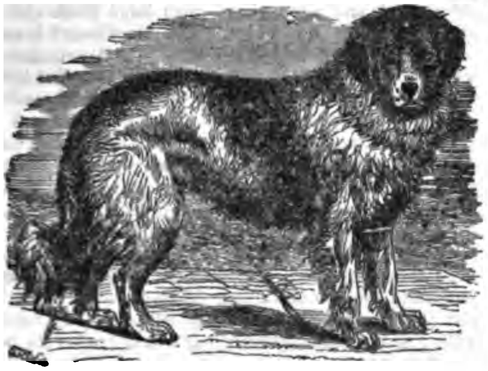

FIG. 2.—Newfoundland Dog.

II. GREYHOUNDS.—Representations on Egyptian monuments prove the existence of the greyhound race of dogs at least 3000 years ago, and the silky-haired breeds existing in Egypt, Arabia, and Persia at the present day are probably the slightly modified descendants of those ancient forms. The numerous varieties of this race may be conveniently grouped into the wire-haired and smooth-haired breeds,—of the first of which the Irish Greyhound or Wolf-dog is an example. In former times this magnificent breed was employed in Ireland in hunting the wolf and the stag, but the extirpation of these beasts of chase led to the neglect and consequent degeneracy of the breed, and it has now become extinct in that country. It was probably introduced from the sister isle into Scotland, where its modified descendant, the Scottish Deerhound, in hunting the stag still bears testimony to the great strength and agility of its progenitor. The Old English Greyhound was only allowed to be kept by the nobles and princes, and the killing of it was, under the old game laws, a felony punishable by death. It was employed in coursing the red deer and fallow deer, and Queen Elizabeth is said to have witnessed, on one occasion, the pulling down of 16 bucks by greyhounds. These must have been much more powerful animals than the modern English breed, which, however, is regarded as the finest of the smooth-haired greyhounds. In speed and wind it is unrivalled, all other points having been sacrificed to these by breeders. It has thus almost lost the power of scent, and is the only dog that hunts by sight alone, hence probably the name *gaze-*

hound formerly applied to it. According to Daniel, its speed on flat ground is little inferior to that of a racehorse,

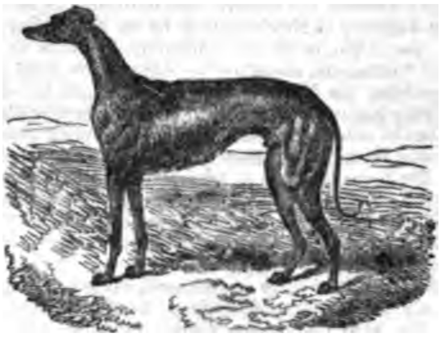

FIG. 3.—Greyhound.

while on hilly ground it is probably superior to it. Every part of its body is suggestive of activity and speed—the long and pointed muzzle, the narrow head, thin neck, chest deep and flanks contracted, long slender legs, and the tail narrow and curved upwards. It is exceedingly docile, good-tempered, and affectionate. The colour varies in different breeds, and even in individuals of the same breed. Bell suggests that the greyhound may owe its name to the prevailing colour of the original stock; while others, with more probability, derive it from the ancient British *grech* or *greg*, a dog. The Italian greyhound is a small but exceedingly elegant and delicate breed, relegated in this country to the parlour as a ladies' pet. The Lurcher is supposed to be the result of a cross between the rough greyhound and the sheep-dog, having the sharp, pointed muzzle of the former, and owing its diminished height but greater stoutness to the latter. It resembles the sheep-dog still more in its great intelligence, and in devotion to its master. That master is usually the poacher, and in his illegal pursuit of game, the keeness of scent, the cunning, and the absolute silence of this dog render it the most suitable of all for such nocturnal work. It waylays the rabbit returning to its burrow, its cunning circumvents the hare where its speed would not avail, and it has strength sufficient to pull down the fallow deer. According to Colonel Smith these dogs sometimes run wild when their owners are captured and imprisoned, and when thus catering for themselves they have been regularly hunted with hounds.

III. SPANIELS.—The spaniels are characterized by large pendulous ears, long silky hair often curled and shaggy, and acute scent. In cerebral development, and, consequently in intelligence, they are probably superior to all other dogs, while they are unrivalled in docility and in devotion to man's service. They include the Common Spaniel, the Water Dog, and the Setter, besides numerous fancy varieties, as King Charles's Spaniel, the Blenheim Spaniel, and the Maltese Dog. The Spaniel is the favourite of the sportsman, entering more than any other dog into his master's feelings, and seeming to enjoy the sport for its own sake. It is elegant in form, with remarkably long ears, and beautifully waved hair, usually of a red and white colour. It takes readily to the water, and has been known to exhibit a remarkable propensity, as well as great dexterity, in fish-catching. The Water Dog is larger than the spaniel, and is covered with abundant curly hair. Its colour is generally a mixture of black and white. From its aquatic habits it is of great service to the water-fowl sportsman as a retriever. It is readily taught to fetch and carry, and the sagacity which it shows in finding any article it has once seen, but which has afterwards been lost or purposely concealed, is truly remarkable. The Setter is also a favourite with sportsmen, its habit of crouching when it has scented game rendering it specially serviceable. This habit, like that of pointing, is probably, as Darwin suggests, "merely the exaggerated pause of an animal about to spring on its prey." It is generally white in colour, with large liver-coloured spots.

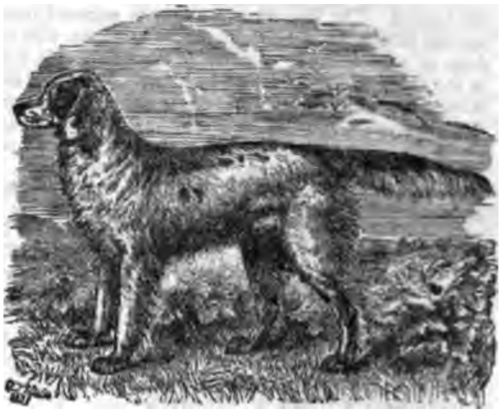

FIG. 4.—Setter.

IV. HOUNDS.—Hounds are those dogs with long pendulous ears, close hair, and long deep muzzle which hunt by scent. They include the Bloodhound, Staghound, Foxhound, Harrier or Beagle, and Pointer.

The Bloodhound, regarded by many as the original stock from which all the other varieties of British hounds have been derived, is now rarely to be met with in entire purity. Its distinguishing features are long, smooth, and pendulous ears, from 8 to 9 inches in length, full muzzle, broad breast, muscular limbs, and a deep sonorous voice. The prevailing colour is a reddish tan, darkening towards the upper part, and often varied with large black spots. It stands about 28 inches high. The bloodhound is remarkable for the acuteness of its scent, its discrimination in keeping to the particular scent on which it is first laid, and the intelligence and pertinacity with which it pursues its object to a successful issue. These qualities have been taken advantage of not only in the chase, but also in pursuit of felons and fugitives of every kind. According to Strabo, these dogs were used in an attack upon the Gauls. In the clan feuds of the Scottish Highlands, and in the frequent wars between England and Scotland, they were regularly employed in tracking fugitive warriors, and were thus employed, according to early chroniclers, in pursuit of Wallace and Bruce. The former is said to have put the Sleuth-hound, as it was called, off the scent by killing a suspected follower, on whose corpse the hound stood,

> "Nor farther moved fra time she found the blood."

For a similar purpose captives were often killed. Bruce is said to have baffled his dogged pursuer as effectually, though less cruelly, by wading some distance down a stream, and then ascending a tree by a branch which overhung the water, and thus breaking the scent. In the histories of border feuds these dogs constantly appear as employed in the pursuit of enemies, and the renown of the warrior was great who,

> "By wily turns and desperate bounds,
> Had baffled Percy's best bloodhounds."

In suppressing the Irish rebellion in the time of Queen Elizabeth, the earl of Essex had, it is said, 800 of these animals accompanying the army, while in later times they

terror of deer-stealers, and for this purpose were
he earls of Buccleuch so late as the 18th century,
at the present time their remarkable power of
casionally employed with success in the detection
The Cuban Bloodhound is of Spanish descent,
considerably in form from the English variety,
nall, though pendulous ears, with the nose more
and with a more ferocious appearance. Its
nt in the capture of runaway slaves, and in the
onnected with the suppression of negro insurrec-
brought the animal into the evil repute which
erly belongs to the inhuman masters, who thus
d the courage, sagacity, and pertinacity of this
to such revolting purposes.

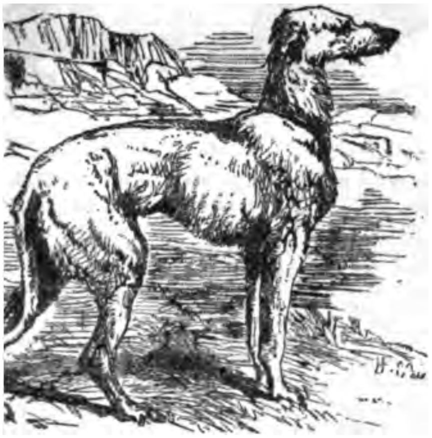
FIG. 5.—Staghound.

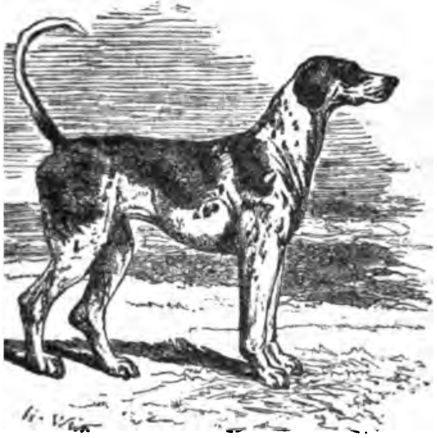
FIG. 6.—Foxhound.

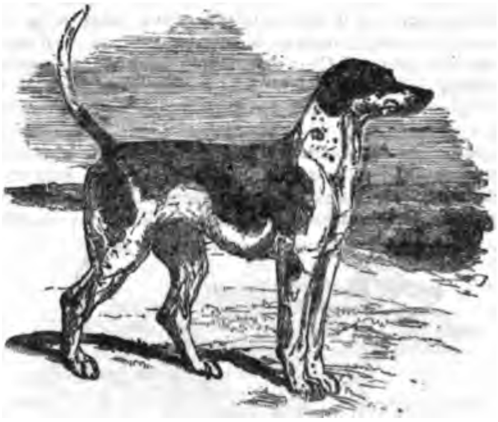
FIG. 7.—Harrier.

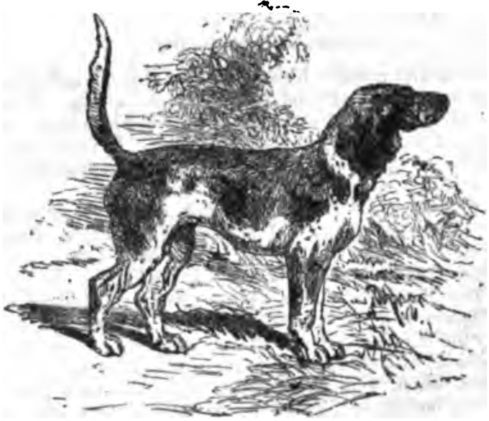
FIG. 8.—Beagle.

taghound has been generally regarded as the
cross between the slow-paced old southern hound
fleeter foxhound; but it has been objected that
was known in England long before the foxhound
use of, and indeed before there was an animal at
bling the one which is now known by that term,
e who maintain this view regard the staghound
dhound crossed with some lighter dog, as a grey-
a lurcher. However produced, it is a majestic
reat strength and considerable swiftness, besides
g in common with the bloodhound, and with it
property of unerringly tracing the scent it is first
among a hundred others. In the reign of George
III., who was himself ardently attached to the sport of stag-hunting, packs of these dogs were maintained in several parts of the country, but since the death of that monarch this form of hunting has declined, and the total extinction of these dogs at no distant date seems probable. The Foxhound is the hunting-dog upon which the breeder has bestowed the greatest pains, and, according to Bell (*British Quadrupeds*), his efforts have been rewarded "by the attainment of the highest possible degree of excellence in the union of fine scent, fleetness, strength, perseverance, and temper." It stands usually from 20 to 22 inches high at the shoulders, and is of a white colour, marked with large clouds of black and tan. Its speed is such that a foxhound has been known to get over 4 miles in 7 minutes, while its endurance has been shown in such cases as the 10 hours' continuous run performed by the duke of Richmond's hounds in 1738 before killing the fox, during which many of the sportsmen tired three horses, and several of the latter died during the chase. The Harrier is smaller than the foxhound, not exceeding 18 inches in height at the shoulders, and is exclusively used, as the name shows, in hunting the hare. Of late years it has been greatly improved, so as to be almost literally a foxhound in miniature. According to Beckford, to whom much of the improvement in the breed is owing, "harriers, to be good, like all other hounds, must be kept to their own game. If you run fox with them you spoil them; hounds cannot be

perfect unless used to one scent and one style of hunting." A still smaller hound is the Beagle, from 12 to 14 inches high, the most diminutive of the hunting dogs. It was formerly a great favourite, being used in hunting the hare, but in this it has been almost wholly superseded by the harrier. It is much slower than the foxhound or harrier, but in spite of this its exquisite scent and its perseverance seldom fail to secure for it the object of its chase, although it may be after a leisurely hunt of 3 or 4 hours. The voice of the beagle is highly musical, and on this account a certain number of them were formerly added to each pack of hounds as a band now is to a regiment of soldiers. Diminutive packs, from 9 to 10 inches high, have been kept, and O'Connell used to beguile his winter leisure with a dozen of these tiny favourites. The Pointer is related to the hounds, and is supposed to be derived from an old Spanish breed. It is a beautiful, smooth-haired dog, coloured somewhat like a foxhound, active in its movement, and patient of fatigue. It owes its name to its habit of standing fixed at the scent of game, and this, like the crouching of the setter, whether due to long-continued training alone, or to the modification and exaggeration by man of the instinctive start of surprise common to all dogs, when first aware of their prey, is now inherited, the puppy pointing before his training has begun. The strength of this pointing propensity was never more signally shown than in the case, told by Daniel, of two pointers which stood immovable as statues during the hour and a quarter occupied in sketching them. The Dalmatian Dog is a remarkably handsome breed, apparently intermediate between hound and pointer It is of a white colour, thickly marked with rounded black spots, but it is not sufficiently keen scented or sagacious to be of use in hunting. It has accordingly been relegated to the stables, where it receives the training necessary to a coach-dog. It is known in France as the *Brague de Bengale*, and is supposed to be an Indian variety.

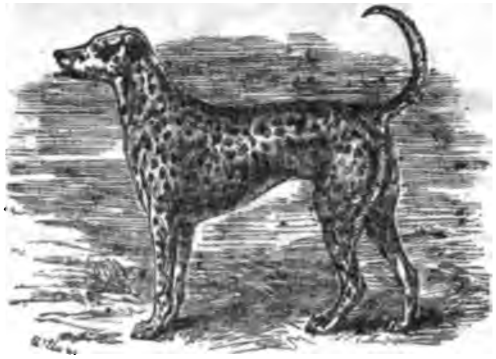

FIG. 9.—Dalmatian Dog.

V. MASTIFFS.—The Mastiff race of dogs is characterized by extreme shortness and breadth of muzzle, enormous strength of jaws, and general robustness of form. It includes the Mastiff, the Bull-dog, and the Pug.

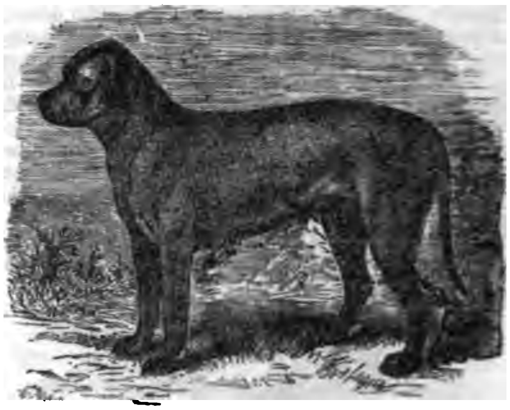

FIG. 10.—Mastiff.

The Mastiff equals in courage, while in strength, intelligence, and mildness of disposition it excels, its near ally the bull-dog. It is commonly supposed to have been the breed of large dogs abundant in Britain during Roman times, which were exported in large numbers to Rome for the purpose of fighting in the Amphitheatre, although Colonel Smith believes that these early British dogs were only bull-dogs of a larger size than the present breed, and that the mastiff was introduced into Britain from the cold regions of Central Asia. It is a large dog, standing 30 inches high at the shoulders, with thick muzzle, pendulous lips, and heavy expression, its ears small and drooping, and the tail well developed. It is usually of a buff colour, with ears and muzzle darker. Although fierce in combat, it does not attack without considerable provocation, and it bears the teasings of children with the greatest good nature. When in former times it entered into combat with wild animals, it has been known to engage a bear, a leopard. and a lion, and pull each of them down in succession. At the present time the breed is rarely met with pure, and is chiefly useful as a watch-dog, its sagacity and fidelity in this capacity being well known. While he shows great attachment to man when made his companion, the temper of the mastiff becomes soured by confinement, and he is then dangerous to strangers. The Thibet Mastiff is larger than the English breed, and its countenance is still heavier. It is the watch-dog of the tribes inhabiting Thibet and the Central Asian table-land, to whom it is strongly attached, although exceedingly savage towards strangers. There is a huge mastiff figured on an Assyrian sculpture, 640 B.C., and Sir H. Rawlinson states that similar dogs are still imported into that country. The Bull-dog is the least sagacious, as well as the most ferocious and obstinate, of the dog tribe. It is smaller than the mastiff, but is strongly built. Its broad, thick head, the projection of the lower jaw beyond the upper disclosing the incisor teeth, the sudden rise of the head from the face, and the scowling expression of the eyes, combine to make the countenance of the bull-dog terrible. Bell points out, in his *History of British Quadrupeds*, the resemblance in the deep chest, the narrow loins, muscular limbs, and stiff tapering tail of the bull-dog to the elegant form of the greyhound. The chief difference appears in the muzzle, a variation which may have suddenly arisen in a single individual, and been perpetuated in its progeny. The ears of the bull-dog are short and semi-erect, and the nostrils distended; the colour varies, being brindled in some, and black and white in others. It is essentially a fighting-dog, and was formerly bred for the brutal sport of bull-baiting, in which its terrible obstinacy usually gained for it the victory. It differs from other dogs in giving no warning of its attack by preliminary barking, and when once it has fixed its teeth into the object of attack, no amount of torture will cause it to relax its hold. Colonel Smith states that he has seen one "pinning down an American bison and holding his nose down till the animal gradually brought forward its hind feet, and, crushing the dog to death, tore his muzzle out of the fangs, most dreadfully mangled;" and there is an instance on record of its returning to the attack on a bull,

of its feet had been cut off in succession. The
of this breed has been but slightly developed,
hibits little of that attachment to man which
es other dogs, although it may be said to show a
of fondness for its master The Spanish Bull-
er and more powerful than the English breed.
og, which in form might be described as a minia-
og, is probably a monstrous variety, rather than
te form, of the bull-dog It is, however, wholly
latter in disposition, being timid and good
and is kept only as a pet, for which its dulness
scarcely fits it.

RIERS—These include the numerous varieties of
g, and the Turnspit The Terrier is a small but
ct breed and is probably one of the oldest dogs

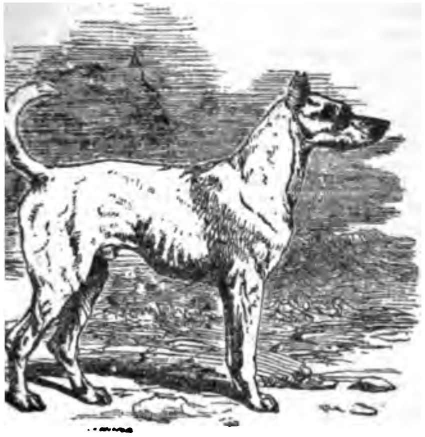

Fig 11.—Terrier.

Great Britain Three distinct varieties exist in
ry, viz., the English Terrier, smooth and graceful
with sharp muzzle and erect ears, compact body,
ugh slender limbs, and tail carried aloft and some-
red—the colour being black, with the belly and
s usually tan, but sometimes white; the Scotch
iffering from the former in the shortness of the
d limbs, and in the rough wiry character of the
h is usually of a dirty white colour; and the Skye
istinguished by the length and coarseness of its
extreme shortness of its limbs, and the great
its body. It is of a light brown colour. The
all its varieties is an exceedingly bold, active, and
dog. It was formerly a regular accompaniment
ack of hounds, for the purpose of unearthing the
to its eagerness in taking the earth it owes
Terriers are now chiefly employed in the destruc-
tters, badgers, weasels, and rats, a form of sport
h they enter with the greatest ardour, and
they show the most remarkable dexterity, a cele-
rrier having been known to kill 100 rats, collected
om, in 7 minutes. The Bull-terrier is a cross
his breed and the bull-dog, and is one of the most
d obstinate of its kind. It was the breed chiefly
e brutal sports of badger-baiting and dog-fighting,
st unknown in England. The Turnspit, a monstrous
log, is not confined to any single breed. It is
the ancient monuments of Egypt, and occurs
e pariah dogs of India and of Paraguay. In
where they seem to be derived from hounds or
here are smooth and rough turnspits, a name
y owe to their having been formerly employed in
itchen spits by working inside a wheel, which when once set in motion forced the dog to continue running At Caerleon in Monmouthshire, a few years ago, a dog of this kind might have been seen thus employed in the inn kitchen. The turnspit is characterized by great length of body and extreme shortness of limb, the latter being generally crooked. (J. OI.)

DOGE, a modified form of the ordinary Italian *duce*, from the Latin *dux*, a leader or duke, employed to designate the chief magistrate in the republics of Genoa and Venice. In both cities the office underwent from time to time a variety of transformations, for details on which the larger histories of the republics must be consulted.

In Venice the doge was originally chosen by universal suffrage, held office for life, and was regarded as the civil, military, and ecclesiastical chief. His duties and prerogatives were not defined with much precision, and the limits of his ability and ambition were practically the limits of his power. In 755 his independence was diminished by the appointment of two assistants or *duumvirs;* but this institution was again allowed to fall into the background, and the doge acquired more and more of irresponsible authority, while at the same time the office was usually committed to a member of one or other of the more powerful families. This tendency towards a hereditary despotism was checked in 1033 by Flabenigo's law, which reinstituted the duumvirate, and declared distinctly that no doge had the right of associating any member of his family with himself in the government, or of transmitting his office on his decease. In 1172 a still more important change was introduced; not only was the duumvirate replaced by a body of six councillors, but universal suffrage was abolished, and the election of the doge intrusted to a committee of twelve persons, elaborately selected from the members of the great council. On the death of Ziani II. in 1229, two commissions were appointed, which obtained a permanent place in the constitution, and gave emphatic testimony to the fact that the doge was merely the highest servant of the community; the first consisted of five *Correttori della promisione ducale*, whose duty was to consider if any change ought to be made in the oath of investiture administered to the doge; the second was a board of three *inquisitori sul doge*, intrusted with the curious task of examining and passing judgment on the acts of the deceased magistrate, whose estates might be mulcted in accordance with their decision. To minimize as far as possible the influence of individual families, the election of the doge was in 1268 effected by a curiously complex machinery, which remained, with some modifications, till the close of the republic; thirty members of the great council, elected by ballot, selected nine members, who in their turn chose forty; of these forty twelve taken by lot chose twenty-five; the twenty-five were next reduced to nine; the nine elected forty-five; the forty-five were reduced to eleven; and the eleven chose the final forty-one in whose hands lay the actual election of the doge. In proportion to the development attained by the oligarchical element in the constitution; the more important functions of the office were assigned to other officials or to administrative boards, and he who had once been really the pilot of the ship became little more than an animated figure-head, properly draped and garnished. On state occasions he was still attended by all the ceremonial observances of former times: his robe was still purple, the horns of his beretta were still exalted, the sword, the tapers, and the trumpets were borne before him, his leaden seal was affixed to public documents, and the ring was still dropped yearly from his hand in symbolic espousal of Venice and the sea. But he was under the strictest surveillance, had to wait for the presence of other officials in order to open the despatches from foreign powers, was forbidden to leave the city, could not legally be possessed of property in a foreign land, or contract a foreign alliance for any of his children, and was moreover liable to the infliction of a fine for any trespass he might commit. The office was maintained, however, till the last days of the republic, and from time to time was held by men who knew how to make it something more than such an empty simulacrum. (See Cecchetti, *Il Doge di Venezia*, 1864.)

In Genoa the institution of the doge dates from 1339, and at first he was elected without any restriction by popular suffrage, and held office for life; but after the reform effected by Andrea Doria in 1528, the term was reduced to two years, plebeians were declared ineligible, and the appointment was intrusted to the members of the great and the little councils, who were bound, however, to employ, in proof of impartiality, nearly as complex a machinery as that of the later Venetians.

DOG-FISH, a name applied to several species of the smaller sharks, and given in common with such names as hound and beagle, owing to the habit these fishes have of pursuing or hunting their prey in packs. The Small-spotted Dog-fish or Rough Hound (*Scyllium canicula*) and the Large-spotted or Nurse Hound (*Scyllium catulus*) are also known as ground-sharks. They keep near the sea bottom, feeding chiefly on the smaller fishes and Crustacea, and causing great annoyance to the fishermen by the readiness with which they take bait. They differ from the majority of sharks, and resemble the rays in being ovoviviparous. Their young are brought forth inclosed in semi-transparent horny cases, known on the British coasts as *mermaids' purses*, and these have tendril-like prolongations from each of the four corners, by means of which they are moored to sea-weed or some other fixed object near the shore, until the young dog-fish is ready to make its exit. The larger of these species attains a length of 4 to 5 feet, the smaller rarely more than 30 inches. The Picked Dog-fish (*Acanthias vulgaris*) is pre-eminently *the* dog-fish. It is the smallest and most abundant of the British sharks, and occurs in the temperate seas of both northern and southern hemispheres. It rarely attains a length of two feet, the female, as in most sharks, being larger than the male. The body is round and tapering, the snout projects, and the mouth is placed far under. There are two dorsal fins, each of which is armed on its anterior edge with a sharp and slightly curved spine, hence its name "picked." In order to strike with these spines the fish first bends itself into a bow, and by a quick motion causes them to spring asunder in opposite directions, seldom failing thus to strike the object aimed at. The dog-fish is exceedingly prolific, the female, according to Couch, producing young almost daily for 9 or 10 months in the year. These are not contained in egg-cases, as in the ground-sharks, but are produced alive. It is gregarious, and is abundant at all seasons everywhere on the British coasts. In 1858 an enormous scull of dog-fish, many square miles in extent, appeared in the north of Scotland, when, says Couch, "they were to be found floating in myriads on the surface of every harbour." They are the special enemies of the fisherman, injuring his nets, removing the hooks from his lines, and spoiling his fish for the market by biting pieces out of them as they hang on his lines. Still greater injury is caused to the fisheries in the wholesale destruction of small fishes by this predacious species. They are, however, eaten, both fresh and salted, by fishermen, especially on the west coast of England.

DOGMATIC (Ger. *Dogmatik*) is the name usually given by modern writers, especially on the Continent, to that branch of theological study which treats of the doctrines of Christianity. As there are considerable varieties in the conception and treatment of dogmatic by different theologians, churches, and schools, it will be b
an historical account of the origin and usage of

The Greek word δόγμα, from which it is derive
meanings, one of which is found in the LXX.
Testament, while the other is given to it by so
ancient philosophical writers. According to t
sense, it denotes a decree or ordinance, *i.e.*, a pr
conduct or observance, proceeding from human
authority (Luke ii. 1, Acts xvi. 4, Eph. ii. 15).
the only meaning in which the word is used in
but by Plato, Cicero, Seneca, and others it is em
denote the doctrines of the philosophers, *i.e.*, pri
theories formulated or accepted in the different sc
this latter sense the word was used by the early
writers, as describing indifferently heathen, Ch
heretical doctrines, as the case might be; althou
times, when the word was applied to the Christia
it may have acquired, from the other use of it,
tinge of the idea of authority belonging to the d
the faith. As early as Cyril of Jerusalem (*Cat*
the distinction was made between the doctrina
moral elements of Christianity; and the term
appropriated to the former, the latter being call
μέρος.

But it was not till long afterwards that the
"dogmatic," was used to distinguish a particular
theological study; for in early times the need of s
in the scientific study of Christian truth was not
the name theology was sufficient to describe all w
ing with that subject in any way. The progress
and inquiry in the history of the Church has,
made it possible and necessary to treat the
Christianity in various different ways, from disti
of view; and hence different kinds and depar
theology have come to be distinguished. In the
tury the divines who wrote systems of theol
different titles to their works, indicating the speci
of their treatment; *e.g.*, Mastricht, *Theologia*
Practica; F. Turretin, *Theol. Elenctica*; Marck
pendium Theol. Didactico-Elencticum; Quenste
Didactico-Polemica; Baier, *Theol. Positiva*.

The title *Theologia Dogmatica* was first adopted
Francis Buddæus, a Lutheran divine, in 1724.
minology was followed by J. H. Michaelis, S
others, and from it the word *Dogmatik* as a su
came into common use in Germany. In Eng
America, in so far as any specific designation of t
term theology or divinity has been thought nece
title "systematic" has been until recently more cur
"dogmatic." As, however, the division and mu
tions of the various theological studies have b
thoroughly discussed in recent times, especially b
theologians, and as the name "dogmatic" has bee
them to denote one principal department of these
good reason for its adoption by English writers. So
the form "dogmatics," after the analogy of "math
"physics," &c.; but this seems awkward and nee

But there is among the best authorities on th
a considerable difference as to the proper nature
in the theological sciences of dogmatic. There ar
tinct conceptions of its nature, each supported
nent names, according to one of which it is an
and according to the other a philosophical stu
difference may be said to turn on what substantiv
understood along with the adjective *dogmatica*. I
ing to what was undoubtedly the older usage, w
theologia, then the name "dogmatic theology" wou
the study of God and divine things in a doctrinal
or so as to exhibit its results in a series of doctri
epithet dogmatic would indicate, not the subje

ly, but the manner of it; and thus it would fall under general head of philosophical or systematic theology. s was the older view, and is held in modern times by ius Müller [1] and Hagenbach.[2] If, however, it be held, is held by many moderns, that *scientia* is the stantive understood with *dogmatica*, then the term means science of doctrines, and has for its object not the istian realities themselves, but the doctrines that have n formed about them; and as such it must be an histori- science. This is the view adopted by Schleiermacher,[3] he,[4] Martensen, Oosterzee, and others; though the ticular form and development of the general idea differs ording to the different views of these writers as to the ure and formation of doctrines. There can be no doubt t an historical and critical study of the doctrines that e been held in the Christian Church or its several nches is a legitimate, and in its own place, not unim- tant pursuit, and whether such study should be called gmatic is a mere question of nomenclature and usage. t it can be as little doubted that this study does not upy that central place in the theological sciences that usually been assigned to dogmatic, and is not fitted to persede that direct study of Christian truth that has long ne the name of theology by way of eminence. Hence me of those who make dogmatic a merely historica- ience hold that there is required besides that a science of eculative theology, dealing directly in a philosophical y with the objects of Christian faith; while Al. Schweizer inks that dogmatic, as a science of dogmas, should be scarded as essentially un-Protestant, and that in its stead ould be placed what he calls *Glaubenslehre.* It is clear at we must have some name to express the former con- ption of dogmatic, and there is no other name so con- nient or so generally used as this. On the other hand, are not agreed on the necessity and importance of a parate science of dogmatic in the historical conception of ; and it is not easy to draw a line of distinction between and symbolical theology, or the study of the creeds and nfessions of the different churches. It seems therefore nvenient to regard dogmatic as a branch, not of histo- al, but of systematic or philosophical theology. In is view it is the study which endeavours to under- and the facts and truths of Christianity in their true ture, causes, and mutual relations. This study presup- ses the reality of Christianity, as the divinely-revealed d perfect religion, and on that basis proceeds to in- stigate what is contained in it with a view to its ientific comprehension. It is thus distinct from, and sterior in the order of nature to, apologetic, which is nother branch of philosophical theology, and has for function the scientific exhibition of the grounds of ligion in general and of Christianity in particular. pologetic has accomplished its task, when it has established nd vindicated against attacks that Christianity is truly ivine, and the final form of revealed religion. Dogmatic ccepts this conclusion as its starting-point, and proceeds to quire what are the facts that constitute Christianity, ow they are to be accounted for, and what is their mutual elation. In this process it must needs generalize and etermine the conceptions suggested by the facts by means f definitions, and combine these in the form of definite ropositions, which are what are called doctrines, and hich are again arranged and framed into a system of octrine. Doctrines, as usually understood, have reference imply to truths to be believed; and they correspond to the laws of nature discovered and formulated by science. The leading theological doctrines are thus attempts to explain in a scientific way certain religious phenomena that belong to Christianity. In dealing simply with facts as distinct from laws, with what is as distinct from what ought to be, dogmatic is distinguished from ethic or moral theology, which is another branch of the same general division of theological studies. For Christianity is more than a revelation of truths; it is also a body of practical precepts; and the meaning, principles, and application of these afford a wide and important field of inquiry. There have indeed been some weighty and earnest protests raised against the separation of ethic from dogmatic;[5] and there is a certain advantage in the two subjects being treated together, as they usually were by the older theologians, under the heads of *fides* and *observantia*, or the like. Christian doctrine and Christian duty can never be separated in reality without the loss of the life of both, and this should be kept in mind in their discussion. But each of these subjects has grown to such an extent that convenience almost necessitates the plan that has become usual in academic teaching and books, of giving them a separate treatment, and restricting the province of dogmatic to the truths of Christianity that are objects of belief, as distinct from its precepts as matters of duty. Polemic and irenic are branches of theology that have also a very close connection with dogmatic,—the former having for its object the exclusion from the system of Christian doctrine of ideas and opinions that are essentially alien to its principles, and the latter the harmonizing or bringing into a relation of mutual toleration views of doctrine which differ in some particulars, and yet are neither of them essentially un-Christian or anti-Christian. These may be regarded as appendices to dogmatic, being the application of its principles to the varieties of belief that exist among Christians.

There are two other studies, of recent origin, whose relation to dogmatic should be defined, as they have sometimes been thought capable of superseding it—biblical theology and the science of religion. The former of these is a development of Scripture exegesis, and seeks, in dealing with the sacred writings, not merely to understand their direct meaning, but to enter into the conceptions of their several writers on the whole subject of religious truth,—to find out from their writings the theology of Paul, or Peter, or John, just as the historian of doctrine endeavours to exhibit the theology of Athanasius, Augustine, or Luther. Then, taking a wider view, it groups all the inspired writers of a period together, and seeks to present the theology of the New Testament, or of the Old, just as one may do with the Nicene or the Reformation theology. This is a most interesting and useful study, and much valuable work has been done by it; but it is clearly an historical study, and as such belongs to a different department from dogmatic, if that is placed in philosophical theology. It furnishes important materials for dogmatic, and gives us the power of using Scripture in a more historical way than would be possible without it; but as it cannot be assumed that any one inspired man, or any one age of the history of revelation, saw the entire system of divine truth as it is in itself, even the most perfect results of biblical theology will only be materials for dogmatic, not dogmatic itself.

The science of religion, again, investigates the various forms of religion among mankind, and by the comparative study of these seeks to discover their origin and mutual relations. It is probably too soon yet to judge what the results of this young and promising study may be, but they should certainly not be despised by the Christian theologian. They may have an important bearing on apologetic, and through that may possibly affect the form, and even in some points the substance, of dogmatic. But the science of religion is itself entirely distinct from dogmatic; for it takes as its subject all religious beliefs, and treats them simply as psychological phenomena, without considering, in the first instance, whether any, or which of them, have objective reality, whereas dogmatic is a science of faith, and proceeds upon the assumption of the truth of Christianity and the Christian view of the universe.

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[1] Art. "Dogmatik" in Herzog's *Real Encyclopädie für Protestantische heologie u. Kirche.*

[2] *Encyclopädie u. Methodologie der Theologischen Wissenschaften.*

[3] *Kurze Darstellung des theologischen Studiums.*

[4] *Zur Dogmatik.*

[5] By Schleiermacher, Nitzsch, and Beck.

sibility
need of
matic.

The possibility and the need of such a science as dogmatic rest upon the specific nature of Christianity as the perfect form of a divinely given religion. Religion in general is a relation between man and God, and it may be either natural or supernatural. In the former case, it is the relation of man to the divine Being as manifested in the world, and as long as men have no other knowledge of God than this, their religion is apt to degenerate into unworthy ideas and practices; and thus natural religion, in the present state of mankind, tends to become false religion, as is seen in the various forms of heathenism. But the fundamental assumption of Christianity is, that God has, in addition to the manifestation of Himself that nature affords, also come forth in history by a divine work, leading men from the errors of false religion to the true knowledge and pure service of Himself. This work of grace has always dealt with men in a way suitable to their nature as intelligent beings, and hence has included a discovery of truth that they could not have found out for themselves, which is the idea of revelation. But while supernatural religion must include revelation as an essential part of it, this is not the whole, nor even the most vital and important element in it. The divine religion is essentially the establishment of a right relation between man and God, a fellowship between earth and heaven; and it only includes the communication of new truths, because that fellowship must be an intelligent one, brought about in an intelligent way. This work has also been a gradual one, and has had its several successive stages. Scripture represents the call of Abraham, the exodus of Israel from Egypt and covenant of Sinai, the establishment of the kingship and temple worship in Israel, and the messages of the prophets, as so many stages in the history and progress of religion; and the coming of Christ and the foundation of the Christian church is the final stage of its development. Now, like all the earlier stages, Christianity, while it implies the communication of new truth, is essentially a fact or work of history—the establishment of the perfect fellowship of man with God, which is that mediated by Jesus Christ, and the reconciliation effected by His death. It is this conception of Christianity that makes possible a scientific exhibition of it in the form of a system of doctrines as distinct from the simple interpretation of its records. If, according to a notion that early entered and long pervaded the church, Christianity is merely a new law, a revelation of hitherto unknown truths to be believed, precepts to be obeyed, and promises to be hoped for, then the theologian has nothing to do but to expound the revelation, ascertaining the meaning of its several statements, and classifying them according to their subjects or character. Any attempt to gain a scientific knowledge of the realities with which these statements have to do must proceed on general philosophical principles, and not on a specifically Christian foundation. Now this conception of Christianity was the prevailing one up to the time of the Reformation; and consequently the pre-Reformation theology, and much of later theology too, consists either of the mere exposition of certain *dicta* of authority, biblical or ecclesiastical, or of purely logical ratiocination, applying to these the principles of the philosophy current at the time. Only when the Reformers brought out the principle that Christianity is not a new law, but a work of God's grace, reconcili
himself in Christ, and that as such it must co
theology, was the construction of a system of
doctrine on right principles possible. On the b
direct experience of reconciliation to God thro
Christ, it is possible to raise and investigate the q
What is the nature, the cause, the various parts
tions, of this great work, this new relation into w
a believer am brought to God? Now this is
question that dogmatic seeks to answer; for
before said, a scientific treatment of Christiani
perfect form of supernatural religion. On this
existence of dogmatic is not due to a primary,
secondary necessity of Christian life. The prim
sity for the Christian is a fellowship with Go
ing a sense of His favour, of His guidance
cal life, and protection against all hostile influ
this religious fellowship it is not necessary th
plete system of divine truth be known or
according to the Pauline and Protestant doctrine
tion by grace through faith, it is secured a
the direct exercise of trust in Christ; and there
this before there can be any right understandi
truths contained and implied in Christianity.
is a secondary need and impulse that forms a
dogmatic,—the desire of knowing as much as p
the way in which we have been brought into th
to God which is designated a state of grace
tion. Christ and His apostles fully reco
importance of knowledge, understanding, wisdo
they teach that the only true knowledge of divi
must be preceded by direct experience of them
faith in Christ. They speak wisdom among t
are perfect, though it is a heavenly wisdom, t
spiritual enlightenment to know; and they ex
converts to strive to be perfect or mature Chri
children but men in understanding,—to add to
knowledge, and to grow in it. It is this craving
standing of their new relation to God, which for
not the first, yet an important secondary ne
healthy religious life, that affords the motive fo
struction of theology in general, and of do
particular. Some amount of such knowledge se
indispensable to qualify one for teaching others
if the church or Christian community is to ex
function of teaching, there must be, beyond the
is the primary and essential quality of true Chri
higher stage of Christian progress that is attained
who add to their faith knowledge. Theology is
essential to the bare existence of the church; ye
natural and necessary form and means of her de
in one department of her functions, the intellec
as in the department of practical morality a
ecclesiastical discipline is an indispensable dev
and in that of social devotion, ordinances of
Every living and thriving branch of the church
must, in proportion to its health and vigour,
scientific theology, as well as earnest conscien
cipline and warm spiritual devotion.

This motive prompts equally to all the b
theological study—exegetical, historical, practical
as systematic or philosophical; but that which is d
dogmatic, as falling under the last head, ma
esteemed the highest of them all, and that whic
to be desired, if only it can be attained. As,
some have doubted whether such a science is po
must not take this for granted, but indicate the g
which we believe it is. Now, if a scientific kno
any subject is impossible, this must be either b
do not possess materials enough to give us a

knowledge of it, or because we have no means of reducing these materials to their true and natural order. If there are sufficient materials of knowledge about Christianity, and a method by which these may be reduced to a system, the conditions of a scientific dogmatic may be said to exist.

The sources of dogmatic have been variously enumerated by different branches of the church and schools of thought, and the determination of the genuine ones involves the most important issues as to the whole character of the system. We may begin with the lowest and most universally accepted, and then proceed to those in regard to which there is more difference of opinion, and which determine the peculiarities of the dogmatic of different sects or churches. First, then, we may place the testimony of nature to God, which is admitted by nearly all theists to be real and valuable, so far as it goes, and which is clearly recognized in Scripture.[1] The Socinians in the 16th and 17th centuries denied the possibility of any knowledge of God without revelation; but this position, which was zealously controverted by the orthodox, has been given up by those who are the nearest modern representatives of the Socinians, and may be said to be held now only by those who would deny all knowledge of God whatever. This natural knowledge of God has sometimes been separated from properly Christian dogmatic, and relegated for separate treatment under the title of natural theology; but since most of the truths reached by it are also expressly taught in Scripture, it seems impossible to exclude from their consideration in the Christian system the prior light that nature throws on them. Hence the most orthodox divines admit that reason has as one of its functions in theology that of establishing or confirming some of its doctrines, which are therefore distinguished by many, especially of the Lutherans, as *articuli mixti*, being supported by reason and revelation together, from the *articuli puri*, which are known by revelation alone. This source of theological knowledge includes the manifestations of the being and character of God, and the nature and destiny of man in the phenomena of the external world, and also in the intellect, conscience, and religious affections of man. The importance of it arises from the fact that this natural knowledge of God alone connects the doctrines of revelation with the actual realities of consciousness and experience, and gives to the whole of theology a basis in ascertainable and verifiable fact. Unless we know, on grounds as legitimate as those of any secular science, that God is, and that He is true and good, we cannot rationally receive any revelation from Him, and our whole dogmatic would be a mere castle in the air.

But most Christians, while recognizing the reality and importance of the manifestation of God in nature, consider that this alone is inadequate, in the present condition of mankind, to bring us into that relation to Him which is the true and perfect religion; and all but those who deny the supernatural entirely believe that God has made a special revelation of himself in Christ. The person of Jesus of Nazareth is for all such the centre of God's saving discovery of himself and of His will to sinners of mankind; in His life and death we have an image of the character of God, and in His teaching, statements of religious truth that are of primary authority. On this account it may be truly said that the person and teaching of Christ is the fountainhead of revealed theology.[2] It would be quite possible to maintain that this is the only source of theological knowledge beyond the teaching of nature; but nearly all who entertain such views of Christ also believe that we have in the writings of His disciples an authoritative record of His words and deeds, and a divinely-taught explanation of their meaning. Hence the Scriptures, at least of the New Testament, are recognized as themselves a direct source of dogmatic material. Some have limited this recognition of an inspired book to the New Testament, as Schleiermacher; but this position virtually rests on the idea that Christ himself is really the only supernatural source of religious truth, and that the New Testament Scriptures are not a real communication from God, but only an authentic human record of the revelation He has made of Himself in Christ. When the notion of a truly divine and authoritative Scripture is really admitted, it is impossible, in view of the use made of the Old Testament in the New, to deny the authority of these earlier Scriptures. The coming of Christ was not a sudden isolated appearance, unprepared for and alone, like a lightning-flash in a dark night; it was rather like the rising of the sun after a long and gradually lightening twilight. The way was prepared for Him by a series of historical revelations recorded in the sacred books of the Jewish people, which have from the days of the apostles onwards been regarded as divine by the Christian church. It is this continuous line of revelation, from the beginning onwards, that gives Christianity its universality in point of time, as the perfect form of the true religion that has always in some shape or other existed in the world. On this view, the Scriptures of the Old and New Testaments, as testifying of Christ, are the more immediate source of dogmatic materials · and this is the fundamental Protestant position.

The Church of Rome goes further, and maintains, not only that the Divine Spirit has inspired the writers of Scripture to convey to us an authoritative record of God's revelation in Christ, but also that the Spirit so dwells in the church as to enable her to develop that revelation, supplementing it by tradition, authenticating it by her authority, and interpreting it by decision on controverted points. Hence, for the Romanist, tradition, decrees of councils and of popes, opinions of fathers and doctors of the church, are equally with Scripture authoritative sources of doctrine. In this, however, Protestants hold that they err as much in the way of excess, as Rationalists, who deny the authority of the Bible, err in the way of defect. Those Protestants, however, who have taken the most profound and spiritual view of the subject, have been ready to allow that there is provision made in Christianity for what Romanists seek to attain by the authority of the church. They admit that something more is needed than unaided human reason for the right interpretation and application of the word of God; but they find this, not in an infallible church, but in the work of the Divine Spirit, enlightening the mind of believers in and with the word (*testimonium Spiritus Sancti*). The recognition of this, which was very fully and strongly made by the Reformers, not only gives to Protestant theology a firmer position as against the claims of Rome than it can have without it, but also enables us to give their due place to the elements of truth, exaggerated and distorted, in the Romish doctrines of the authority of the church, fathers, and councils. If we have the witness of the Spirit, giving us an assurance of the truth and insight into the meaning of Scripture, we must admit that our fellow Christians have the same guidance also, and that believers have had it in all ages. Hence we may reasonably allow great weight to the opinions of men who have given evidence of being guided by the Spirit, and more especially to those doctrines that have been received as scriptural by the great body of the spiritually enlightened in different ages. Thus the teaching of fathers and theologians, and the consent of the Christian church, are important helps and guides to the Protestant theologian; only he does not, like the Roman Catholic, attach absolute

Work of the Spirit.

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[1] Ps. xix. 1–6; Rom. i. 19–21; Acts xiv. 15–17, xvii. 24–29.

[2] Oosterzee, *Christian Dogmatics*, sec. viii.

authority to any of them; and he esteems them, not simply because of their antiquity or their official position, but in proportion to the evidence they have given of being really guided by the Divine Spirit, who is the Spirit of holiness, love, peace, and godliness.

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This inward spiritual enlightenment of the believer corresponds very nearly to what has been called Christian consciousness, to which a prominent place has been assigned among the sources of theology by many modern divines. The currency of the phrase is due mainly to Schleiermacher; and the form of it proceeds from his fundamental principle, that religion consists properly in feeling, by which we have an immediate consciousness of the divine—a "God-consciousness." Whatever justification this view may have had, as a needed protest against the previously dominant intellectual view, that made religion virtually an affair of the understanding only, it is now generally admitted that Schleiermacher went to an extreme on the other side, and that no complete account of religion can be given that does not include the exercise of thought and will, as well as of feeling. In so far, therefore, as the phrase Christian consciousness represents in its form the one-sided conception of Schleiermacher, it is insufficient; and that which really corresponds to it is the Christian life, with its full complement of beliefs, emotions, and volitions. This, being the work of the Divine Spirit in the soul, may and must be recognized, on the principles already indicated, as the expression of the witness of the Spirit, by which the authority and meaning of the revelation in Scripture are established. In this sense, therefore, Christian consciousness, or the knowledge that a Christian has of his own religious experience and of what is implied in it, is a legitimate means of obtaining doctrinal conclusions. But if the authority of Scripture is to be recognized as the objective and normative representation of what true Christianity is, Christian consciousness can only be a mediate and subordinate source of theology, a channel rather than the fountain-head.[1] By giving it this position we are also saved from the one-sided subjectivity and variable individualism that must result from its being made a primary and independent source of knowledge. The history of the church, especially as it presents to us the expression of Christian faith and devotion in different ages and countries, gives us an insight into the religious life of the church as a whole, and so exhibits the Christian consciousness on a large scale as it were; but if we do not believe in an absolutely infallible guidance of the church, we cannot regard this either as a primary or authoritative source of doctrine, but must always test it by the standard presented in Scripture.

From these various sources, (1) God's manifestation of himself in nature, (2) His revelation in Jesus Christ authoritatively recorded in Scripture, and (3) His enlightenment of the believing soul by the Spirit in Christian life, when used, as they should be, in combination and in their proper order and subordination, we have a large supply of materials for the construction of a dogmatic system.

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gmatic.

What then is the method to be followed in order to educe general principles and laws of mutual relation from the mass of facts and truths thus presented to us bearing upon God's character and dealings with men? This is the next question that arises in regard to dogmatic theology. Now, plainly, if this study is to have a scientific character at all, it must be pursued in the same methods that are proper in other sciences of a similar kind. Theology, no doubt, differs in some important respects from all other sciences; but the difference lies in its matter rather than in the form of its elaboration. Its materials are not merely the phenomena of nature, but the great redemptive and saving works of God made known by revelation. In this respect it differs from all merely natural sciences. But if it is to have any analogy to them at all, it must apply to these facts of revelation the same processes by which the facts of nature are made to yield natural sciences. Now, there are just two essentially distinct methods by which general laws and principles can be ascertained,—the analytic or inductive, and the synthetic or deductive. Neither of these, indeed, can be absolutely separated from the other. Induction in physical science, for example, calls in the aid of deduction, when hypotheses are formed to explain certain phenomena; and then it is tested by tracing them downwards to what would be their results whether they are true or not: and, on the other hand, geometric demonstration seeks the aid of analysis as a guide to the solution of its problems. And not only in subordinate points, but as wholes, the two methods supplement each other. There can be no concrete science that does not begin with induction; and there is no complete science unless it ends in deduction. All knowledge of facts must be *a posteriori*, and from these we ascend to general principles and laws; but the aim of all such procedure must be to reach such a complete and satisfactory explanation of all the phenomena, that the process might be reversed and the facts deduced from the most general principles. It is only in a few sciences, *e.g.*, mechanics, that such a degree of perfection has been attained as to enable them to enter on the deductive process. Now it is a question debated by some of the ablest divines, whether theology can adopt this method. It is not denied by any that the inductive method, or that of empirical reflection, as it is called in Germany, is competent; but some maintain that, while this is so, that of speculation is also legitimate and possible, and that it must be followed, if we are to have a theology in the highest and most proper sense of the term. Those who take this position are for the most part of the Hegelian school; and we have a favourable specimen of the way in which it may be maintained in a truly believing spirit in Rothe.[2] But the considerations adduced by Julius Müller[3] against the possibility of such a method, if we are to avoid a pantheistic view of the universe, seem conclusive. The real and thorough-going recognition of personality and free will, both in God and man, makes it impossible to arrive at the phenomena of Christianity by any process of *a priori* demonstration; and more particularly, neither the fact of sin on the one hand, as the act of the free will of man, nor of grace on the other, as the work of God's free will, can be exhibited in their essential character in such a method. No science that has to do with the events of a real history in which rational and moral agents are recognized as acting with true liberty can be constructed by *a priori* deduction of logical consequences from abstract necessary first principles. The dogmatic theologian therefore, who maintains the freedom alike of the human and of the divine will, is shut up to the *a posteriori* method of induction. Even though the existence and attributes of God could be satisfactorily demonstrated by reasoning from necessary truths and laws of thought, as Anselm, Descartes, Clarke, and others thought possible, yet when we come to inquire what God has done, and on what principles He acts, we must, if the world's history is not a mere nature-process, learn from experience and testimony the facts, and ascend inductively from them to the principles or laws that direct them. The inductive method, therefore, is the one proper for Protestant evangelical dogmatic. This is recognized by writers so different in many respects as Dr

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[1] This view of the nature and function of Christian consciousness is that taken by Martensen, *Dogm.*, sec. 29; J. T. Beck, *Einleitung in das System der Christlichen Lehre;* Oosterzee, *Dogm.*, sect. 10.

[2] *Theologische Ethik*, sec. 2.

[3] *Die Christliche Lehre von der Sünde,—Einleitung.*

Chalmers,[1] Julius Müller,[2] Hodge;[3] and it has been practically followed by most evangelical divines. They have indeed sometimes disguised the real nature of their method by the arrangement of topics adopted, for the almost universal practice has been to begin the systematic exhibition of Christian doctrine with the loftiest and most recondite part of the subject, which would come first in a really deductive treatment, and to descend from them to those that are more immediately verified by experience. This has tended to produce the impression that these systems are properly chains of logical demonstration, especially as doctrines once held to be established are often appealed to as forming part of the proof of other doctrines. In many cases, however, this appearance is deceptive; and the system, though wearing a deductive garb, is not really of that nature. Each of the doctrines is established on its own proper basis of Scripture testimony and Christian experience; and the order of progress, from above downward, does not show the order in which the doctrines have been ascertained, either by the church in general or by the individual theologian, but only the order in which it is thought best that they should be exhibited and taught.

Besides these two distinct methods, the speculative or deductive, and the empiric or inductive, a third is recommended by Beck, and approved also by Oosterzee, called by the former the *real-genetic*. This proceeds on the assumption that the object of theological knowledge is faith, *i.e.*, according to Beck's use of the term, spiritual life in the soul apprehending as its object God in Christ. This faith or spiritual life has, he points out, a principle of development and growth; and theology grows by following the growth of faith in the soul. But the life of faith in us is not perfect; it is liable to hindrances and abnormal development; hence this by itself is not a safe guide for theology. There is, however, a perfect archetype (*Urbild*) of the true and normal development of faith in the soul, and that is to be found in revelation. The revelation of which we find the record in Scripture has the same course of development as the subjective life of faith is the soul; and the growth of revelation is the perfect pattern of what the growth of faith within us should be. In order, therefore, to be a representation of the faith or spiritual life of the Christian in its ideal condition, theology has to follow the development of revelation as presented to us in Scripture, and must first go back to its primary source, and trace from thence its growth and development. Hence the designation of the true dogmatic method as *real-genetic*. Now whether or not the results of theological inquiry will come out in this particular form depends on the truth or falsehood of a number of positions, and these can only be established by the examination of facts and evidence bearing on the case. This method, therefore, does not in principle differ from the inductive or empiric one; it is only a special form which that method will assume, if the views of Beck as to the relation of revelation to the life of faith in the soul are true and borne out by evidence. It does not, therefore, seem proper to regard this as a distinct kind of method, and we may legitimately claim those who follow it as disciples in general of the inductive school.

On the whole, there appears no reason why the principles of inductive philosophy, which have been so fruitful in their application to the sciences of external nature, should not be applied to materials, bearing on the relation of man and the world to their Author, that are furnished by the phenomena of nature, the dictates of conscience, the facts of revelation, and the experience of the Christian life. Surely, too, the endeavour to do this is neither a hopeless nor an impossible one. Those who have objected most strongly to the application of logic to theology, such as Isaac Taylor[4] and Bishop Hampden,[5] will be found at bottom to object chiefly to the use of a merely verbal and deductive system of logic, and not to that inductive method which is the mighty instrument of the progress of modern science. But it must be admitted that the processes of theologians have too often been, and too often still are, of that merely formal and logical kind that cannot really increase our store of knowledge. If dogmatic is to hold its ground as a true science at all, it must frankly and consistently adopt the inductive method; and it must take as the objects of its analysis, classification, and induction, not merely the statements of Scripture, but the religious realities which those statements, as well as our own experience, make known to us.

Progressive nature o dogmatic

Further, if a scientific character is to be vindicated for dogmatic, it must also accept the position of a variable and progressive study. This does not imply that nothing is certain within its domain, or that there must be a constant flux and reflux of opinions about its contents. It is as much characteristic of science that it has certain well-established principles and results, which are not to be overthrown by any future inquiries, as that it is constantly advancing to further acquirements and discoveries. Those who claim an absolutely fixed and unprogressive character for theology, though they may seem to do honour to its divine authority, really degrade it from the rank of a science; and if they retain any reverence for it at all, can only do so on the principles and in the spirit of Roman Catholicism. Thus Macaulay's brilliant statements to that effect,[6] which are sometimes quoted by those who defend an immobile orthodox theology, imply as their basis either a contemptuous dismissal of theology altogether as a tissue of uncertainties, or a lurking belief that the one unchanging system is to be found in the faith of the Church of Rome. What has tended, and still tends very powerfully, to obscure the idea of progress in dogmatic theology is the want of a clear apprehension of the distinction between religion and theology, and the notion that the Bible is directly a revelation of theological dogmas, which need only to be correctly interpreted and arranged in logical order. If this were so, then we should be able at once to construct a complete system of theology, by simply applying the laws of grammar and logic to Scripture; and this could be done as correctly and well in the 2d century as in the 16th or 19th. There would be no room, or the very narrowest conceivable, for progress. In that case, then, if it were found that students dealing thus with Scripture came to widely different conclusions as to the system of doctrine to be drawn from it, we should be obliged to conclude that the revelation was not complete or unambiguous, and therefore that it must either be supplemented and checked by a living authority in the church to determine its true meaning, or that no certain knowledge in regard to doctrine can be attained. The former is the Roman Catholic, the latter the sceptical or anti-dogmatic alternative; but both alike proceed from the same premises, and indicate the impossibility of carrying them out without either giving up the practicability of dogmatic, or seeking it in an infallible church.

But this difficulty disappears when the Bible is regarded as a revelation, not solely or directly of doctrine, but of religion. On this view, it is the inspired record of the great historical events by means of which the religious fellowship of man with God has been established, and gradually elevated to its perfect form in Christianity, and of the inward experience of that fellowship in a new life produced by a moral and spiritual renovation of the soul of man. Doctrines, or general principles bearing on the relation of God to man, are indeed contained in the Bible, but only as they are involved in the great realities that the Bible makes known to us. The Bible is to the theologian what the telescope is to the astronomer, or the microscope to the physiologist. Many of the laws of these sciences could not have been known without the help of these instruments,—not because the telescope discovers to us laws of astronomy, or the microscope enables us to see the principles of physiology, but because they bring within our ken the phenomena from which these laws and principles may be ascertained. So the Bible does not directly reveal dogmatic principles; but its function is to reveal to us that great work of renovation by God in Christ, from which the principles of Christian dogmatic are to be derived. On this view, while the Christian religion is ever one and the same, unalterable in all ages, Christian theology, or the scientific knowledge of that religion, is constantly progressive. All its truths are indeed contained implicitly in the Bible; but they have to be drawn from it, not by a mere process of interpreting and systematizing the words of Scripture, but by apprehending and experiencing the realities made known to us by the words, and so coming to understand what they are and in what relations they stand one to another. It is in this way that all the great doctrines in theology have been established,—not merely by the application of grammar and logic to the text of Scripture, but by the apprehension and experience of the renovating change, and the comparison and understanding of its different parts. So, for example, the doctrine of the Logos was formulated by men like Justin Martyr, who, after vainly searching for truth in all the schools of philosophy, found that there is in Christianity, when sincerely received, a light that dispels the darkness and doubt of the mind. So Augustine learned the doctrines of original sin and divine grace, by finding in his own experience the power of inward corruption on the one hand, and the deliverance wrought by the gospel on the other. So Luther discovered the truth of justification by faith, through learning by sore and bitter conflicts how impossible it was to find peace of conscience, as long as he trusted to any works of his own, and how fully he obtained it by faith in Christ. In this way the system of dogmatic has been built up, one doctrine after another being added, as it was discovered and verified by the experience of the church. None of these developments was any addition to the Christianity of true disciples of the Lord; that remains substantially the same in all ages, and contains implicitly all true doctrines of religion. But all Christians are not conscious of what is involved in their religion and experience, and some are very imperfectly aware of it. The men who have made their mark in theology have been those who have been led by circumstances, and enabled by their intellectual powers, to discern elements in Christian life not previously seen; and the body of the church, coming after them, have verified and accepted the results of their experience. In this way dogmatic theology hitherto has been progressive, and no man or church has a right to say that the goal has been reached beyond which no further progress is possible.[1]

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[1] *Institutes of Theology*, bk. iii. ch. 10.

[2] *Ubi supra.*

[3] *Syst. Theol.*, Introd. ch. i.

[4] *Logic in Theology.*

[5] "Scholastic Philosophy in Relation to Christian Theology," *Bampton Lectures* for 1832.

[6] Essay on Ranke's History of the Popes.

There is one condition always to be borne in mind, with which alone such progress is sound and genuine. It is that what is added to the system of doctrine be really an expression of the Christianity which is revealed in Scripture. Anything that is not such may be a fancy of men, or an abnormal development of spiritual life, but it is not really a discovery of Christian truth. There have been opinions held and widely prevalent that are of this character, and it is part of the work of the theologian to detect and remove what is false as well as to build up what is true. There have been false developments of doctrine; there have been exaggerations and maladjustments of important truths. It is not probable that any minute and elaborate system consists of pure and absolute truths unmixed with any error. The work of progress in theology, therefore, must sometimes consist of undoing what has been laboriously built up in past ages. But if any true progress is possible now, it is not to be expected that all the old beliefs will have to be swept away, and an entirely new system put in their place. For if nothing had been ascertained in the course of the ages during which so many great minds have been directed to the study of theology, there would seem to be little hope of anything certain being discovered now. Those who think theology to be a progressive science can most consistently hold that some progress has been made already, and some conclusions have been reached that are not to be overturned by any new inquiries. They do not look for an entire reversal of old beliefs, and a new theory of the universe and its relation to God to be put in their place; they expect that what has been most generally agreed upon in former ages will be maintained and confirmed, and that any new truth that may be brought to light will fit in to the old foundations; though in some cases former modes of statement may have to be reconsidered and adjusted to larger and deeper views, and exaggerated or one-sided doctrines may have to be given up or modified. There are some doctrines in every system that are merely sectarian, adopted by one particular branch of the church, but not recognized by others as correct expressions of Christian faith and life, *e.g.*, the Anglican dogma of baptismal regeneration, or the Lutheran tenet of the communication of attributes in the person of Christ, or the supralapsarian and sublapsarian theories of Calvinists; in regard to such points there is no just ground of confidence of their permanence; they are like plausible but unproved hypotheses in science. But there are many leading doctrines which, ever since they have been distinctly formulated, have been accepted by the great mass of Christians in all branches of the church, these may be said to be established results of theological investigation, which no further progress of the science is likely to overthrow.

The progressive character of dogmatic, and the manner of its progress in the past, may be seen from a brief sketch of its history from the end of the apostolic age to the present day. The apostolic writings themselves do not properly fall within the range of such a history; for they are not of the nature of human science but of divine revelation. No doubt several of them present to us conceptions and trains of thought that are very analogous to the systems of later times, and have sometimes been employed as the basis of dogmatic systems. But the inspired writers do not stand in the same line as the thinkers who came after them; their aim in writing was not the scientific one of investigating the principles of Christianity in their mutual relations, but the more primary religious one of presenting Christianity itself to the world. This they have been enabled to do, by the working of the Spirit in them, with a power and fulness and insight that throw much light on the scientific study of Christian doctrine; but their writings are not doctrinal systems, and do not come into the line of the rise and progress of the human science of dogmatic. Its history begins with the attempts of men to comprehend the revelation of Christianity, and presupposes that revelation complete, though not completely understood, as its starting point. From that point onward it may be regarded as passing through six pretty well defined periods or stages.

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[1] *Cf.* Candlish's *Cunningham Lectures*, Lect. vi. Note A; Rainy's *Cunningham Lectures*, "On the delivery and development of doctrine," Lect. v.

I. The first may be called the apologetic age, extending from the apostolic time to the death of Origen (254 A.D.), in whom it may be said to have culminated. During this period the intellect of the church was gradually awakening and coming into activity; but it was only by degrees, and in the course of several generations, that its efforts led to any properly doctrinal results. The very earliest Christian literature is simply practical and hortatory, chiefly in the form of epistles (Apostolic Fathers). From the middle of the 2d century, however, the need was felt of defending the church's faith against argumentative attacks, whether popular, literary, or philosophic. Hence the chief mental power of the Christian community was turned in the direction of "apologies," by which these attacks were repelled, and attention was directed mainly to the evidences of the truth and divinity of Christianity. This, however, indirectly led to the articulate statement of some of the most essential doctrines of Christianity, and to the beginnings of a dogmatic system. The great apologetic question was generally and rightly conceived in the form of a search for some true and reliable teaching about God and divine things; and the Johannine idea of Christ as the light of the world, the Logos or Word of God, naturally occurred to the apologists as that which most exactly met the want. Thus the doctrine of the Logos, in some at least of its aspects, was brought out. Then in the conflicts with Gnosticism, which may be said to be as really apologetic as those with Judaism and heathenism, certain aspects of Christianity were very distinctly brought into consciousness, such as the creation of all things by God, the reality of the human nature, death, and resurrection of Christ, the universality of the gospel, and the responsibility of man. The apostolic creed probably shows us how the original baptismal formula became the basis of more definite articles of faith, shaped in the light of the apologetic necessities of the age. But while there was thus an inevitable tendency towards dogmatic development and definition, there was not for long any direct interest in doctrine as such, still less in the ordering of doctrines into a system. Origen was the first in whom this impulse was strong and active, and his work *De Principiis* (Περὶ Ἀρχῶν) may be said to be the earliest attempt in the field of dogmatic.

II. The second great period in the history of dogmatic, extending from Origen (who died 254) to John of Damascus (who died 754), is distinguished from the first by its being occupied mainly with controversies within the church, and thus may be called the polemic age. As the gospel spread more and more throughout the world, and gained the victory over paganism in the minds and hearts of the most enlightened of the day, the defence of Christianity against external assaults gradually ceased to be the one all-engrossing duty of the church's theologians; and at the same time heresies so thoroughly and manifestly antichristian as those of the Gnostics ceased to have any prevalence among Christians, and other divergent views, of a less openly hostile nature, began to appear. As the doctrine of the Logos had been one of the first that the church was led to think out in the apologetic period, it not unnaturally became the point at which varying conceptions first came into conflict. On this, as on many other subjects, the Christian redemption is so full and many-sided that it is no wonder that its entire contents could not be grasped at once and by all minds, or that some were led to accept some aspects of it more readily than others, and to give these an exaggerated predominance. Hence the progress of Christian thought to the right understanding of divine truth has been through a series of controversies and oscillations from one extreme to another. This process may be said to have begun about the middle of the 3d century, from which time to the end of the 7th there stretches a continuous series of controversies on questions relating to God and the Trinity, the incarnation and person of Christ, original sin, and regenerating grace. In the course of these, successive forms of opinion on these subjects were discussed, condemned, and stamped as heresies—the Sabellian, Arian, Apollinarian, Macedonian, Nestorian, Pelagian, Monophysite, Semi-pelagian, Monothelite doctrines. In sharp contrast with these opposing heresies, and sometimes in a narrow strait between them, the doctrine of the church was defined more and more precisely. As authoritative expressions of this doctrine we have the first six œcumenical councils, with the provincial ones in the West that condemned Pelagianism and Semi-pelagianism, and the creed of Nicæa (325) as enlarged and altered at Constantinople (381), with the decisions of Chalcedon (451) against Monophysitism, Orange and Valentia (529) against Semi-pelagianism, and Constantinople (1st Trullan, 680) against Monothelitism.

This long series of keen and varied controversies on the loftiest doctrines represents a vast amount of intellectual activity in the field of dogmatic, and some of the greatest names in the church's history belong to this period. Athanasius, Basil, the two Gregories, the two Cyrils, and Chrysostom in the East, and Ambrose, Augustine, and Hilary in the West, are but a few of the more outstanding and best known of the church's teachers during these controversies. On the whole it may be said that they have done their work satisfactorily and well, in establishing the true Christian view on the special doctrines they had to discuss; and the decisions of the church on these points have been very generally accepted in after times. The Reformers adopted either tacitly or expressly the whole body of them as in accordance with Scripture; and even in the immense upturning of opinions on all theological doctrines that has been going on in modern times, the faith of Nicæa has been maintained by the majority of theologians. Even the more detailed creed of Chalcedon is questioned by comparatively few, though the still more minute discussions and definitions after that have ceased to command the respect and interest of the modern church. But while the theologians of this polemic period were thus successful in establishing and defining some of the more important doctrines of Christianity, and by so doing contributed very valuable materials for dogmatic, they did little or nothing towards the construction of the system as an organic unity. Very few of their works even attempt such a task. The *Catecheses* of Cyril of Jerusalem contain an exposition of the various articles of the creed, and so may be said to exhibit a body of divinity such as was then generally held; but they do so not in a scientifically theological manner, but rather in that of simple popular teaching. Augustine's *Enchiridion, de Fide, Spe, et Caritate*, is a more properly theological attempt to lay the basis of a connected and organic system; but it is very brief and summary, and holds a very subordinate position among the writings of that great father in comparison with his argumentative and controversial treatises on the particular doctrines that he did so much to elucidate and defend. Perhaps a more real evidence of a sense of the organic connection of all the doctrines of Christianity is to be found in the recognition of the affinity between the apparently unconnected heresies of Nestorianism and Pelagianism, which were both alike condemned by the council of Ephesus in 431.

The results of the polemic discussions of nearly five centuries were gathered by John of Damascus into a series of dogmatic propositions in his work *ἀκριβὴς ἔκδοσις τῆς ὀρθοδόξου πίστεως*, which remained for the Eastern Church the chief authority in theology for a thousand years after. There has been, however, no living onward movement in the comprehension of Christian doctrine in the Greek Church; and if on this account that great section of Christendom has escaped the rigid formulating of the many corruptions in doctrine, government, and life that took place in the Western Church, it has been at the expense of resting in a system of mere dead orthodoxy that could neither hinder nor heal practical corruption. In the West, however, there was a powerful intellectual life, even in what are generally called the Dark Ages; and that being directed towards the doctrines of the church gave a continual progress and a new epoch to theology, though in a peculiar and not the most healthy form.

holastic
riod.

III. The third period in the history of dogmatic, extending from the 8th century to the beginning of the 16th, may be called in general, from its most remarkable development, the scholastic age; though scholasticism, strictly so called, is usually reckoned to extend only from the 11th century to the middle of the 15th. But the times before and after these narrower limits were characterized, only in less degree, by the same general tendency of thought. The doctrines of the church were established as of indisputable authority, and had begun to be collected in the form of books of sentences (*Sententiarum Libri*) from the fathers, by Isidore of Seville, and others; and by means of such compilatory labours the learning and theology of former ages were preserved through the devastating flood of the barbarian immigrations. Any fresh theological discussions in this age were few and unimportant, tending for the most part in the direction of sacerdotalism, as in the formation of the dogma of transubstantiation. But by and by a mighty intellectual force took hold of the whole collected dogmatic material, and reared out of it the great scholastic systems, which have been compared to the grand Gothic cathedrals that were the work of the same ages. The character of these systems of dogmatic may be understood by bearing in mind the two leading principles of the scholastic thinking. One was the acceptance as of absolute authority of whatever had been decided in Scripture or by the church; and the other was the application of the notions and syllogisms of formal logic to these doctrines, for the purpose of demonstrating their truth to the understanding.[1] With such principles, it was natural that the systems constructed should be lacking in unity and a real grasp of the essence of Christianity. They attempted, indeed, the harmonizing of philosophy and theology, of reason and faith, but they could only do so in a mechanical way, and by a kind of compromise. On the one hand, reason was entirely subjected to faith in the acceptance of all the doctrines of the church as so many decisions or sentences that were not to be criticised or called in question. This made it impossible to grapple with the fundamental and general principles underlying the particular opinions that were received as authoritative; and it was only in regard to their details and application that free inquiry was allowed. Hence in the scholastic works we find a series of doctrines or questions on different subjects following one after another, but not connected in any natural way as parts of one organic whole. On the other hand, however, reason was allowed such full scope in deducing consequences from the established doctrines, and that by purely formal processes, that a rationalistic character was imparted to a large extent to the whole body of the scholastic theology. At the same

time, as reason was excluded from the great qu
principle, by the absolute authority accorded to th
decisions, it could only find scope in questions
and the more intellectual vigour was applied to
the more minute, subtle, and unprofitable did i
become. The scholastic age produced no
Christian doctrine that has, as a whole, retained
in after ages; though in it some doctrines were
tinctly articulated than before,—particularly th
atonement, by Anselm; and the keen and subtl
to which all doctrines and conceptions were sub
produced many distinctions that have been found
later times as conducing to clearness of thought.

The decline and fall of scholasticism was d
gradually awakening consciousness of the unsou
the principles on which it rested. The nomina
troversy shook men's faith in the absolute id
thought and being, reason and authority;
identification of theology and philosophy came t
The latter refused to be any longer the mere ha
the church; and from the assertion of its fre
history of modern philosophy dates. This was
a fatal blow to the scholastic theology; and at
time the great religious movement of the Re
made a reconstruction of the system of church
necessary.

IV. The age of the Reformation, occupying t
part of the 16th century, may be said to form
fourth period in the history of dogmatic, f
animated by a spirit that distinguishes it both
preceding and from the following time. The Re
was a movement too full of spiritual life and
many directions to be adequately described by
phrase; but for the present purpose it may c
sively enough be said to be the reassertion of th
of the direct and personal relation of the believ
This involved the sweeping away of all ecclesiast
rity and mediation, and the assertion of the sole a
God's word and of justification by faith, which
called the formal and material principles of Prot
This also necessarily brought with it a new co
theology. Christianity was no longer a new law,
faith was no longer the intellectual assent to c
trines; Christianity was a new life, offered in
and received by the soul's trust (*fiducia*) in Chris
when the Reformers came, as some of the greate
did, to give a systematic statement of Christian
they not only rejected those tenets which had be
the mediæval church on no higher authority th
tradition and ecclesiastical decisions, but they
that they could exhibit a much more organic u
body of Christian doctrine, because they regarde
a necessary means or step towards spiritual life,
outcome and systematic presentation of that lif
obtained and preserved directly by faith in Ch
great theological works of the Reformation age
for the most part written purely in the interest
or system, but for more practical purposes, for t
of the new doctrines against attacks made upo
for the guidance of ministers in the practical
the people. But it is nevertheless true that in
were produced works which had more of the sym
unity of a complete system than any that had
appeared. This can only be accounted for by
that the Reformers had laid hold of the right p
theology, and that the new life of the Reform
carried them above and beyond the mistal
of Christianity that had long hindered a right co
of dogmatic. The *Loci Communes Theologici* of
thon (1st ed. 1521, final form 1550), and the

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[1] See Hampden's *Bampton Lectures*, p. 46, 347; Schwegler's *History of Philosophy*, sect. xxii.; Baur, *Versöhnungslehre*, p. 147, *foll.*; Hagenbach, *Dogmengeschichte*, sect. 149.

is Christianæ of Calvin (1st ed. 1535, final form re the two chief systematic works of this period, e formed the starting-points of the Lutheran and d dogmatic respectively. The system expounded in summarily set forth in the several Protestant Con- of this era, and various special doctrines were d and defended by other leaders of the Reforma- he Reformers accepted the doctrinal statements of nt creeds and of the first four general councils as l and true; they also adopted with great earnest- Augustinian doctrines of grace, while they added the principle with which Luther's name is insepar- ociated of justification by faith, and that of the authority of the Bible as the rule of faith and life,— hese being in their view witnessed and guaranteed estimony of the Holy Spirit. Maintaining these s, they rejected the authority of the church, the ation and magical efficacy of the sacraments, the good works, monastic vows, penance, purgatory, r corruptions of the Middle Ages. In their hands, lost the merely objective character that it had patristic and mediæval times, and was brought er connection with religious and Christian life, by nition and cultivation of its subjective side. The tter with them was, not to have right opinions e Trinity and the hypostatic union, but to be sure e way of salvation by Christ. Their writings are l by a warmth of spiritual life, as well as by s of theological thought, that mark them as the products of a creative age in the history of Christian

The Reformation age may be said to have closed final fixing of the Protestant doctrines in the y-accepted symbolical books, which took place for eran church in the adoption of the *Formula Con-* n 1580, and for the Reformed churches in the s of the Synod of Dort in 1618–19. Even earlier, , a declension may be observed from the lofty and it of the first Reformers; and a somewhat different r began to mark the theology of both the branches rotestant church.

fifth period in the history of dogmatic, which may l the confessional one, extends from the beginning 7th till near the end of the 18th century. During e the doctrinal systems, of which the foundations a laid by Melanchthon and Calvin, were elaborated ied into details with great learning and acuteness; ous doctrines were most carefully and precisely distinguished, and defended. The 17th century age of theological controversy. The Roman Church had recovered from the shock of the tion, and by the aid of the Jesuits and the power- tion inaugurated by them, had regained strength materially but intellectually. Controversialists like ne, Petavius, and Bossuet taxed the learning and y of Protestantism to meet them. There were also s necessary and profitable controversies among Pro- themselves; and almost every theologian was led e his energy to the attack of what he held to , and the maintenance of true doctrine. Much argument was brought into use in the course of cussions, and the system of dogmatic was more rked out than it had been before. The great dog- orks of the 17th century, such as those of John Calovius, Quenstedt, and Baier in the Lutheran and of Francis Turretin, Mastricht, and De Moor e Reformed, are more minute, precise, and full in hibition of the doctrines of the faith than the of the Reformers, and they contain a great deal of and profound thought. Never probably have the which they handle been so ably and thoroughly discussed. They were, however, treated somewhat in the scholastic method that had prevailed before the Reformation. The theologians of the 17th century did indeed clearly perceive and firmly maintain the principle of the sole authority of Scripture, which was one of those involved in the revolt against the authority of the church and hierarchy of Rome. Hence, in point of matter, their systems are vastly superior to those of the schoolmen, freer from traditional and sacerdotal dogmas, and far more in harmony with apostolic teaching. But they failed to apprehend a deeper principle that was implicitly contained in the Reformation movement, viz., that Christian doctrine, instead of preceding Christian life as a necessary means to it, must come after its actual experience. Sound doctrine was regarded as the preliminary condition of spiritual life; and as it had thus to be established apart from the living experience of Christianity in the soul, it must rest on purely external authority. This was found in an extreme and one-sided view of the inspiration of Scripture, as equivalent to verbal or literal dictation, and in an uncritical and indiscriminate use of proof texts from all portions of Scripture, without due regard to their historical connection and scope. These became to many of the divines of that age very much what the sentences of the fathers and councils had been to the schoolmen; and an undue weight was sometimes allowed even to the avowedly human forms in which Protestant doctrine had been expressed. An excessive subtlety and minuteness of definition were also often adopted; and when these were made matters of faith in different parts of the church, numerous schisms and separations took place. The rigid exclusiveness of the Lutheran divines on the basis of the *Formula Concordiæ*, the intolerant zeal of the Anglicans for episcopacy and ceremonies, the extreme doctrinal minuteness of the *Formula Consensus Helvetici* of 1675, and the narrowness of some of the English Puritans and Scottish Presbyterians are instances of this tendency; and the disastrous effects of many of these are well known. The issue of this form of theology was very similar to that of the scholastic system. It was gradually undermined by the spirit of rationalism calling in question the validity of its minute definitions. This tendency had been active from the time of the Reformation in various forms; and though for long it was controverted and excluded from the Protestant Churches, in the course of the 18th century it brought about a general disintegration of their dogmatics. It was found that there was not sufficient evidence to maintain the too minutely articulated systems in the face of a more critical study of the Bible; and the orthodoxy that had rested on an insecure foundation was for a time almost entirely overthrown. In nearly all the churches there came, in various forms, an age of indifference and even unbelief in the old doctrines of the gospel; and this was generally accompanied with a declension in spiritual life. It was in Germany that the sceptical movement took the most pronounced form; and there, accordingly, the break with the theology of the 17th century has been most complete. In this country the triumph of rationalism has never been so absolute, and the transition to a new era in the history of theology has not been so marked.

Modern period.

VI. But a new period has undoubtedly come, since the beginning of the present century. A reaction has set in against the rationalism that overthrew the older dogmatics In some cases, indeed, this has taken the form of a simple reassertion and re-establishment of the old systems of doctrine, as in the school of Hengstenberg, Hävernick, Philippi, and others, who maintain the Lutheran orthodoxy in all its rigidity, and in many British and American divines, who reproduce the Calvinistic system in its precise 17th century form. But by many the need is felt of more thoroughly carrying out the principles of the Reformation than was done in the succeeding age, so as to place the dogmatic system on a surer basis. Schleiermacher exercised great influence on theological thought; and though he did not succeed in emancipating himself from the pantheistic principles of his philosophy, his mode of conceiving Christianity and its relation to theology has been fruitful of good results. By a large number of divines it has been felt to be unsatisfactory to base, as was practically done formerly, the whole system of theology on the one doctrine of the inspiration of Scripture; and a broader foundation, as well as a more living conception, has been sought for it, by recognizing as its subject-matter, not merely the sayings of Scripture, but that living Christianity which it is the direct object of the Bible to produce and reveal. This is really a taking up and carrying out more fully of the principles of the Reformation; and it is in this line that dogmatic seems to be cultivated with most prospect of success and stability. There is in the present day much confusion in this as in many other departments of theology, and systems of the most diverse contents and on the most diverse principles are produced in abundance; but the line in which such men as Nitzsch, Martensen, Julius Müller, Ebrard, Oosterzee, Ritschl, and others have been labouring is that which at once maintains the substance of what has been gained in former ages, and is free to welcome modifications and developments on sound and firmly based principles.

Literature.—The literature of dogmatic is exceedingly rich and varied, and only the more important and influential works can be mentioned here. Before the Reformation, however, though there are many treatises of primary importance on particular doctrines, and though the more comprehensive works have an historical value, yet there is no complete system constructed on sound principles, so as to be of much direct use. Calvin's *Institutio Religionis Christianæ* is the first great work, embracing the whole subject, that is still of direct and primary importance. It is distinguished by a depth of insight into the principles of Christian doctrine, a comprehensive grasp and clear arrangement of their details, a reverence and sobriety in the interpretation and application of Scripture, and a spirit of Christian earnestness and piety that have never been surpassed. Of the later dogmatic systems in the Reformed Church, some are brief compends, among which the *Theologiæ Medulla* of William Ames, the English puritan, is specially distinguished for precision of thought and power of construction; others are much larger, and greatly exceed in the length and minuteness of their discussions the work of Calvin. Among them Francis Turretin's *Institutio Theologiæ Elencticæ* (1679) is remarkable for the logical power with which he maintains the strict Calvinistic doctrine on all the points controverted in his day. Peter Van Mastricht's *Theoretico-Practica Theologia* (1682-7), is a favourable specimen of the Dutch theology of the time—laborious, accurate, and at the same time profound and spiritual. Of the federal school, as it is called, which exercised great influence on the popular theology of this country, Hermann Witsius's *Œconomia Fœderum* is a very able and suggestive production. The Arminian system is well represented by the *Theologia Christiana* of Philip Limborch (1686), a work written in a clear, biblical, and conciliatory style.

The Lutheran dogmatic works are even more colossal and voluminous than the Reformed; the greatest of them, John Gerhard's *Loci Theologici* (1609-22), shows a spirit of piety, as well as great learning, exactness of thought, and logical skill. He occupies a middle position between the more rigidly orthodox such as Hütter and Calovius, and the so-called syncretism of Calixtus. Of the same general character are the *Institutiones Theologiæ Dogmaticæ* of John Francis Buddæus (1724). A very fair idea of the contents of the Lutheran dogmatic works may be obtained from Schmid's (of Erlangen) compendious *Dogmatik der evangelisch-Lutherischen Kirche* (1853), which consists mainly of quotations from the old divines on the different doctrines of the system, and from Luthardt's *Compendium der Dogmatik*. In this country no important systematic treatise on dogmatic as a whole appeared till the publication of Dr George Hill's *Lectures in Divinity* in 1821, a work distinguished by lucid arrangement of topics, and clear and cautious statement of doctrines and exposition of their evidence, though lacking somewhat in spiritual warmth. Dr Chalmers's *Institutes of Theology* (1849) have this last quality in a very high degree, and follow a method that brings dogmatic into closer connection with Christian experience than had been usual; but the system is very imperfectly filled up, and is marked more by brilliant and suggestive thoughts amply illustrated, than by thorough and minute investigation.

The modern era of dogmatic may be said to have been opened by Schleiermacher's *Christliche Glaube* (1821), a work of great genius, learning, and power, which did good service in putting an end to the previously prevalent rationalism, though in some essential respects of a doubtful and defective character. Nearly all who have worked at dogmatic since have been stimulated and influenced more or less by Schleiermacher; but those who have received most from him have in general left behind the pantheistic and emotional elements of his system, and approached nearer to the old faith of the church. Among other works on dogmatic may be mentioned Nitzsch's *System der Christlichen Lehre*, containing in short compass much clear, profound, and enlightening thought, and Martensen's *Christian Dogmatics*, with his comprehensive, philosophic, and suggestive views. One part of Schleiermacher's system which is given up by these and most modern theologians—his determinism—has been rigorously carried out by Alexander Schweizer in Zürich (*Glaubenslehre der Reformirten Kirche*) and Scholten in Leyden (*Dogmatices Christianæ Initia*; *De Leer der Hervormde Kerk*). Against the former Ebrard has made a vehement and keen protest in his *Christliche Dogmatik*; while the latter has, since publishing these works, given up belief in supernaturalism entirely. Oosterzee's *Christian Dogmatics* is a very useful and judicious exhibition of a moderate Calvinistic system.

Of the theologians who endeavour to reproduce more exactly the old Lutheran orthodoxy, the chief are Philippi, whose *Kirchliche Glaubenslehre* is very strictly confessional, and Kahnis, who in his *Lutherische Dogmatik* displays a more liberal and critical spirit.

In a similar way, Dr Charles Hodge of Princeton has restated the Calvinistic system of the 17th century in his *Systematic Theology*, which shows a wonderful acquaintance with the multifarious modern literature of the subject, great logical power, and an adherence to the old doctrines that is not in the least shaken by all the diverging views and arguments with which he is so familiar.

For fuller accounts of the literature and history of dogmatic, reference may be made to Hagenbach's Encyclopädie u. Methodologie der theologischen Wissenschaften, *to the same author's* Dogmengeschichte, *and to Dorner's* Geschichte der Protestantischen Theologie. (J. S. C.)

DOGWOOD (according to Prior, Ang. Sax. *dalc*, a brooch-pin), the name applied to plants of the genus *Cornus*, of the natural order *Cornaceæ* or cornels. The common dogwood, prick-wood, skewer-wood, or so-called dogberry, *C. sanguinea*, is a shrub reaching a height of 8 or 9 feet, common in hedges, thickets, and plantations in Great Britain. Its branches are dark-red; the leaves egg-shaped, pointed, about 2 inches long by 1½ broad, and turning red in autumn; and the flowers dull white, in terminal cymes. The fruits are of a black purple, are bitter, and one-seeded, and contain a considerable percentage of oil, which in some places is employed for lamps, and in the manufacture of soap. The wood is white and very hard, and like that of other species of the genus is used for making ladder-spokes, wheel-work, skewers, forks, and other implements, and gunpowder charcoal. The red berries of the dwarf species, *C. suecica*, of the Scotch Highlands are eaten, and are reputed to be tonic in properties. *C. mascula*, the Cornelian Cherry, a native of Europe and Northern Asia, bears a pulpy and edible fruit, which when unripe contains much tannin. It is the Akenia of the Greeks, and the Kizziljiek of the Turks; by the latter the wood is employed for giving a red dye. The bark of the handsome Flowering Dogwood, *C. florida*, and of other American species, is valued as a stomachic and febrifuge, and is administered as a substitute for Peruvian bark. The Jamaica Dogwood, the root-bark of which is poisonous, is the species *Piscidia Erythrina*, of the natural order *Leguminosæ*.

DOL, a town of France, in the department of Ille-et-Vilaine, about 15 miles by rail from St Malo, on an eminence in the midst of a marshy plain, protected from the inroads of the sea by a dyke of the 12th century, which extends for a distance of 22 miles. A quiet, sombre, agricultural little place, with nothing more remarkable in its modern life than the corn-market which is held in the old Carmelite church of Notre-Dame-sous-Dol, it preserves, in the remains of its ramparts and its ditch, the memory of the time when it was one of the most important fortresses on the frontier between Brittany and Normandy. The streets are still rendered picturesque by the dark houses of the 14th and 15th centuries, which form deep arcades by the projection of their upper stories; and, high above all, in spite of its five hundred years, rises the grey granite of the cathedral, which formerly ranked as the metropolitan church of all Brittany, and still keeps fresh the name of that old Bishop St Samson, who, having fled, as the legend tells, from the Saxon invaders of England, selected this spot as the site of his monastery. To the architect it is interesting for the English character of its design, and to the antiquarian for its stained glass windows of the 13th century, its tombs, and its carvings. The town was twice besieged by William the Conqueror, had thrice to defend itself during the wars of the League, and in 1793 witnessed the defeat of the republican forces by the Vendeans who had taken refuge within its walls. About a mile and a half from the town is the *pierre du champ dolant*, a menhir about 30 feet above the ground; not far off stands the great granite rock of Mont Dol, about 200 feet in height, and surmounted by the chapel of Notre Dame de l'Espérance; and about 10 miles to the south is the castle of Combourg where Chateaubriand spent his early days. Population in 1875, 3356.

DOLABELLA, Publius Cornelius, a Roman general notorious for his profligacy, was born about 70 B.C. His vicious character made itself apparent even in his early years. Before he attained his majority he is said to have been more than once guilty of capital crimes, from the punishment of which he was only delivered through the advocacy of Cicero. In the year 50 he forced his wife Fabia to leave him, and married Tullia, the daughter of Cicero, who strongly opposed the union. Dolabella's motive in establishing this connection was to prevent Cicero from giving evidence in favour of Appius Claudius, whom he had accused of having violated the sovereign rights of the people. In the following year, his numerous creditors having become clamorous, he was forced to quit Rome, and betook himself to the camp of Cæsar, to the great regret of his father-in-law. During Cæsar's absence in Spain, Dolabella commanded the fleet in the Adriatic, but he did not gain any distinction. He took part in the battle of Pharsalus (48), after which he returned to Rome, in the expectation, delusive as it proved, that Cæsar would give him a substantial reward for his services, and so enable him to pay his debts. To gain immunity from the urgent demands of his creditors, he procured his election to the tribuneship, which he had no sooner done than he introduced a bill (*rogatio*) proposing that all debts should be cancelled. This was strongly resisted by his colleagues, and two parties were formed, between whom more than one bloody encounter took place in the streets of the city. On Cæsar's return from Alexandria he saw the expediency of removing Dolabella from Rome, and accordingly took him as one of his generals in the expedition to Africa and Spain. Dolabella was ambitious of the consulship, and obtained a promise of it from Cæsar for the year 44. The latter, however, influenced partly by the strong opposition of Antony, assumed the office himself, and deferred the fulfilment of his promise to Dolabella until he should set out on his expedition against the Parthians. The assassination of Cæsar occurring before this arrangement could be carried out, Dolabella at once seized the insignia of the consulship, and, by making friends with Brutus and the other assassins, was confirmed in the office he had usurped. To ingratiate himself still further with the republican party, he caused an altar erected in honour of Cæsar to be thrown down, and many of those who had sought to offer sacrifices on it to be crucified or thrown from the Tarpeian rock. He did not hesitate at once to change sides, however, when Antony made it his interest to do so by offering him the command of the expedition against the Parthians and the province of Syria. An unduly protracted and circuitous march was signalized by rapacious extortion, which became still more rapacious when at length Dolabella reached Syria. His crowning iniquity was the murder of Trebonius at Smyrna, which, according to Cicero's account, was preceded by two day's torture for the purpose of discovering the locality and amount of the treasure contained in the town. On hearing of this gross abuse of power, the senate outlawed Dolabella, and declared him a public enemy. Cassius was appointed to supersede him, proceeded to Asia Minor, and had taken Laodicea, when Dolabella in despair caused himself to be killed by one of his own soldiers, 43 B.C.

DOLCE, Ludovico, or Luigi (1508–1568 or 1569), one of the most laborious and multifarious writers of Italy in the 16th century, was a native of Venice, and belonged to a family of honourable tradition but decadent fortune. He received a good education, and early undertook the task of maintaining himself by his pen. His life, even more destitute of outward events than such a life usually is, may be briefly summed up in one word—he wrote. Translations from Greek and Latin, epics, satires, histories, plays, and treatises on language and art followed each other in rapid succession, till the whole number amounted to upwards of 70 works. In his own day his industry was rewarded by no small amount of fame; but he is now mainly memorable as the author of *Marianna*, a tragedy from the life of Herod, which was recast in French by Tristan and by Voltaire, and still keeps a place on the stage. Four licentious comedies, *Il Ragazzo* (1541), *Il Capitano* (1545), *Il Marito* (1560), *Il Ruffiano* (1560), and seven of Seneca's tragedies complete the list of his dramatic efforts. In one epic—to translate the title-page—"he has marvellously reduced into *ottava rima* and united into one narrative the stories of the Iliad and the Æneid;" in another he devotes 39 cantos to a certain Primaleone, son of Palmerius; in a third he celebrates the first exploits of Count Orlando; and in a fourth he sings of the Paladin Sacripante. A life of the emperor Charles V. and a similar account of Ferdinand I., published respectively in 1560 and 1566, are his chief historical productions; and among his minor treatises it is enough to mention the *Osservazioni sulla lingua volgare*, 1550; the *Dialogo della pittura*, 1557; and the *Dialogo nel quale si ragiona del modo di accrescar la memoria*, 1552.

See Tiraboschi, *Storia*, &c., vii.; Klein, *Geschichte des Dramas*, vol. v.

DOLCI, Carlo, or Carlino (1616–1686), a painter of considerable celebrity, was born at Florence in May 1616. He was the grandson of a painter on the mother's side, and became a disciple of Jacopo Vignali; and when only eleven years of age he attempted a whole figure of St John, and a head of the infant Christ, which received extraordinary approbation. He afterwards painted a portrait of his mother, and displayed a new and delicate style which brought him into notice, and procured him extensive employment at Florence (from which city he hardly ever moved) and in other parts of Italy. Dolci used his pencil chiefly in sacred subjects, and bestowed much labour on his pictures. In his manner of working he was remarkably slow. It is said that his brain was affected by seeing Luca Giordano, in 1682, despatch more business in four or five hours than he could have executed in as many months, and that he hence fell into a state of hypochondria, which compelled him to relinquish his art, and soon brought him to the grave. His works are not very numerous. He generally painted in a small size, although there are a few pictures by him as large as life. He died at Florence in January

1686, leaving a daughter (Agnese), who arrived at some degree of excellence in copying the works of her father.

Carlo Dolci holds somewhat the same rank in the Florentine that Sassoferrato does in the Roman school. Without the possession of much genius, invention, or elevation of type, both these artists produced highly wrought pictures, extremely attractive to some tastes. The works of Dolci are easily distinguishable by the delicacy of the composition, and by an agreeable tint of colour, improved by judicious management of the chiaroscuro, which gives his figures a striking relief; he affected the use of ultramarine, much loaded in tint. "His pencil," says Pilkington, "was tender, his touch inexpressibly neat, and his colouring transparent; though he has often been censured for the excessive labour bestowed on his pictures, and also for giving his carnations more of the appearance of ivory than the look of flesh." All his best productions are of a devout description; they frequently represent the patient suffering of Christ or the sorrows of the Mater Dolorosa. Dolci was, in fact, from early youth, exceedingly pious; it is said that during passion week every year he painted a half-figure of the Saviour. His sacred heads are marked with pathetic or at least strongly sentimental emotion. There is a want of character in his pictures, but the general tone accords with the idea of the passion portrayed. Among the best works of this master are the St Sebastian; the Four Evangelists, at Florence; Christ Breaking the Bread, in the marquis of Exeter's collection at Burleigh; the St Cecilia in Dresden; an Adoration of the Magi; and in especial St Andrew praying before his crucifixion, in the Pitti Gallery, his most important composition, painted in 16[illegible]5; also several smaller pictures, which are highly valued, and occupy honourable places in the richest galleries.

DÔLE, a town of France, at the head of an arrondissement in the department of Jura, 28 miles N. of Lons-le-Saulnier, occupying the declivity of a hill on the right bank of the Doubs, which is there accompanied by the canal between the Rhone and the Rhine. It is the seat of a tribunal of primary instance, and has a Jesuit college, an agricultural society, a school of design, a theatre, a museum, and a public library of upwards of 40,000 volumes. The principal public buildings are the court-house, originally a Franciscan monastery dating from 1572; the church of Notre Dame, a Gothic structure of the 16th century; the Hôtel-Dieu, the prison, the barracks, two hospitals, and the ancient tower of Vergy. Among the manufactures of the town are straw hats, hosiery, chemicals, leather, and agricultural implements; and it carries on a good trade in agricultural produce, wood, iron, and marble. Dôle is believed to have been a station on the Roman road from Lyons to the Rhine, and it still preserves what seem to be remains of an aqueduct, a bridge, and a theatre, of Roman construction. From 1423 to 1481 it was the seat of a university; but there can have been but little study in the year 1479 when the town was taken by Louis XI., and so completely sacked that only Jean Vurry's house, as it is still called, and other two buildings were left standing. It subsequently came into the hands of the Spaniards, and in 1530 was fortified by Charles V. In 1636 it was able to hold out against the prince of Condé; but in 1668 and 1674 it was captured by the French, and on the latter occasion was deprived of its defences. Till Besançon was incorporated with the province, Dôle ranked as the capital of Franche Comté, and was the seat of a *parlement*.

DOLET, ÉTIENNE (1509–1546), a French scholar and printer, whose fame is due as well to the painful romance of his life as to the high importance of his labours. A tradition, of what authority it is hard to say, makes him the illegitimate son of Francis I.; and it is evident that he was at least connected with some family of rank [illegible] wealth. From Orleans, where he was born, he was tak[illegible] to Paris about 1521; and after enjoying there the instr[illegible]tion of Nicolas Bérauld, the teacher of Coligni, he proceed[illegible] in 1526 to Padua. The death of his friend and mast[illegible] Simon de Villanova, led him, in 1529, to accept the p[illegible] of secretary to Jean de Langeac, French ambassador to [illegible] republic of Venice; but he managed, in spite of his [illegible] occupation, to attend the lectures of the Venetian sch[illegible] Battista Egnazio, and to write Latin love poems to [illegible] Venetian Elena, who died, however, before he left the [illegible]ity. Returning to France in 1530 he proceeded to Toulous[illegible] for the study of law; but there he soon became involved i[illegible] the violent disputes then raging between the different "nati[illegible]" of the university, roused the anger of the public autho[illegible]ities by his keen condemnation of some of their measures[illegible] was thrown into prison, ran the risk of being assassinated[illegible] and was finally banished by a decree of the *parlement*. In 1535 he entered the lists against Erasmus in the f[illegible] Ciceronian controversy, by publishing, through Se[illegible] Gryphe at Lyons, a *Dialogus de Imitatione Ciceroniana*; and the following year saw the appearance of his two folio volumes *Commentariorum Linguæ Latinæ*. In 1537 he obtained from Francis I. a privilege to print during te[illegible] years any works in Latin, Greek, Italian, or French which were the product of his own pen or had received his supervision; and accordingly, on his release from an imprisonment occasioned by his justifiable homicide of a painter Campanini, he commenced at Lyons his typographical and editorial labours. That he was not altogether unaware of the dangers to which he was exposed from the bigotry and fierce-heartedness of the times is shown not only by the tone of his mottoes—*Préserve moi, Seigneur, des calomnies des hommes*, and *Durior est spectatæ virtutis quam incognitæ conditio*—but also by the fact that he endeavoured first [illegible] all to conciliate the theological wolves by publishing a *C[illegible] christianus*, or Christian moralist, in which he made p[illegible]fession of his creed. The catholicity of his liter[illegible] appreciation, in spite of his ultra-Ciceronianism, was [illegible] displayed by the variety of the works which proceeded fr[illegible] his press—ancient and modern, sacred and secular, from [illegible] New Testament in Latin to Rabelais in French. But l[illegible] before the term of his privilege expired his labours [illegible] interrupted by the machinations of his enemies, who neit[illegible] shrank from bringing against him what was then the [illegible] terrible of all accusations, nor relented in their pursuit till their purpose was completely realized. From a [illegible] imprisonment of fifteen months their victim was rel[illegible] by the advocacy of Pierre Duchatel, bishop of Tulle; [illegible] from a second he escaped by his own ingenuity; [illegible] venturing back from Piedmont, whither he had fled, [illegible] order that he might print at Lyons the letters by which he appealed for justice to the king of France, the quee[illegible] Navarre, and the parlement of Paris, he was again arr[illegible], hurried up to the capital, branded as a relapsed athei[illegible] by the theological faculty of the Sorbonne, and on the [illegible] August 1546 put to the torture, strangled, and bu[illegible] in the Place Maubert. On his way thither he is sai[illegible] to have composed the punning pentameter—*Non dolet [illegible] Dolet, sed pia turba dolet*. As if in prophetic mock[illegible] their own proceedings, the doctors of the Sorbonne [illegible] their decision on the three words *Rien du tout* or "No[illegible]thing at all," inserted by Dolet in a passage of the *Axioch[illegible]* of Plato, which even without them denied, if not so emp[illegible]tically, the immortality of the soul; and this they [illegible] in spite of the fact that according to their own showing, his works must have been full of most damnable heresies, and had already in 1543 furnished excellent fuel to the hangman's fire. Whether Dolet is to be classed with the representatives of Protestantism or with the advocates of

istian rationalism has been frequently disputed ;
rincipal Protestants of his own time he was not re-
, and by Calvin he is formally condemned, along
rippa and his master Villanova, as having uttered
s blasphemies against the Son of God ; but, to
the religious character of a large number of the
hich he translated or published, such a condemna-
ltogether misplaced. His repeated advocacy of the
of the Scriptures in the vulgar tongue is especially
le.

works already mentioned the following must be added :—
published by Simon Finet, without the author's know-
taining *Orationes duæ in Tolosam, epistolarum libri duo,*
libri duo, and *epistolarum amicorum liber*, 1533 ; *De*
liber, 1537 ; *Genethliacum Claudii Doleti*, 1539 (a
of Latin poems on the birth of his son, translated into
L'Avant-Naissance de Claude Dolet, 1539) ; *La manière*
aduire d'une langue en une autre, and *De la ponctuation*
1541 ; *Le Manuel du Chevalier Chrétien* and *Le vrai*
se bien confesser, both translated from Erasmus's Latin,
f Discours de la République française, 1544 ; *Second Enfer*,
oem giving an account of his escape from prison, which
nted in 1836 by Techener. See Née de la Rochelle, *Vie*
Dolet, Paris, 1799; Joseph Boulmier, "Estienne Dolet,"
vue de Paris, 1855, and a separate work, *Estienne Dolet*,
., Paris, 1857 ; A. F. Didot, *Essai sur la Typographie*.
ès or trial of Dolet was published in 1836, by A. H.
r from the registers of the parlement of Paris.

ELLY, a market and assize town of Merionethshire,
Wales, situated at the junction of the Aran with
ion, and at the northern base of Cader Idris, 19
W. of Bala and 9 miles E. of Barmouth, with both
it is connected by railway. The town consists of
of small squares and narrow streets, the houses
uilt of stone. It contains a market hall, assize hall,
aol, and parish church. An old building, described
arliament House, is said to have been the place in
wen Glendower assembled his parliament in 1404.
, which is the principal town of Merionethshire,
local board district. There is an inconsiderable
ture of coarse flannels and tweeds carried on by the
nts. Population in 1871, 2357.

LOND, John (1706–1761), the celebrated optician,
son of a French refugee, a silk-weaver at Spital-
here he was born, June 10, 1706. He was early
to his father's occupation, but made leisure for the
ion of a knowledge of mathematics, physics, Greek,
he elements of anatomy, and other subjects. In
abandoned silk-weaving in order to join his son
ho had entered upon business as an optical instru-
aker in Vine Court, and before long he became uni-
celebrated as an optician. His last and most im-
contribution to the *Philosophical Transactions*, for
e, in 1758, received the Copley medal of the Royal
gave a description of the various experiments,
arly in 1757, on the combined effect of water and
nd lenses of glass, by which he was led to the dis-
f a means of constructing achromatic lenses. Sir
ewton had stated in his *Optics* "that all refracting
ces diverged the prismatic colours in a constant pro-
to their mean refraction," and consequently "that
n could not be produced without colour," for which
'no improvement could be expected in the refract-
scope." Dollond, however, found that as flint glass
greater dispersion in proportion to its refractive
han crown glass, achromatic magnified images could
ined by using a combination of a doubly concave
the former substance with a doubly convex lens of
er. As the two glasses to be combined were the
s of spheres of considerable curvature, the aberra-
om their surfaces were very great, but by varying
aces he was enabled to make the aberrations equal,
as the refractions of the two glasses were contrary, they corrected each other. In 1761 Dollond was appointed optician to the king, and became a fellow of the Royal Society. On September 30th of that year, whilst reading a work by Clairaut on the theory of the moon, he had an attack of apoplexy, of which he died in a few hours.

Dollond's published papers are "A letter to Mr James Short, F.R.S., concerning an Improvement of Reflecting Telescopes ;" a second letter to Mr Short "Concerning a Mistake in M. Euler's Theorem for Correcting the Aberration in the Object-Glasses of Refracting Telescopes ;" and "A Description of a Contrivance for measuring Small Angles"—*Phil. Trans.* 1753, pp. 103, 287, 178 ; "An Explanation of an Instrument for measuring Small Angles," *ibid.* 1754, p. 551 ; and "An Account of some Experiments concerning the different Refrangibility of Light," *ibid.*, 1758, p. 733.—See Kelly, *Life of John Dollond*, 3d ed. 1808.

DOLOMIEU, Déodat-Guy-Silvain-Tancrède Gratet de (1750–1801), a celebrated geologist and mineralogist, was born at Dolomieu, near Tour-du-Pin, in the department of Isère in France, June 24, 1750. He was admitted in his infancy a member of the Order of Malta. When in his 19th year he quarrelled with a knight of the galley on which he was serving, and in the duel that ensued killed him. In consonance with the statutes of his order, Dolomieu was condemned to death for his crime, but in consideration of his youth the grand master granted him a pardon, which, at the instance of Cardinal Torrigiani, was confirmed by Pope Clement XIII., and after nine months' imprisonment he was set at liberty. Throughout that period he had solaced himself with the study of the physical sciences, and during his subsequent residence at Metz he continued to devote himself to them. In 1775 he published his *Recherches sur la pesanteur des corps à différentes distances du centre de la terre*, and two Italian translations of mineralogical treatises by Cronstedt and Bergmann. These works gained for him the honour of election as a corresponding member of the Academy of Sciences at Paris. To obtain leisure to follow his favourite pursuits Dolomieu now threw up the commission which, since the age of fifteen, he had held in the carabineers, and in 1777 he accompanied the bailli De Rohan to Portugal. In the following year he visited Spain, and in 1780 and 1781 Sicily and the adjacent islands. Two months of the year 1782 were spent in examining the geological structure of the Pyrenees, and in 1783 the earthquake of Calabria induced him to go to Italy. The scientific results of these excursions are given in his *Voyage aux îles de Lipari ; Mémoire sur le trèmblement de terre de la Calabre ; Mémoire sur les îles Ponces, et catalogue raisonné des produits de l'Etna*, and other works. In 1789 and 1790 he busied himself with an examination of the Alps, his observations on which form the subject of numerous memoirs published in the *Journal de Physique*. The mineral dolomite, which was named after him, was first described by Dolomieu in 1791. He returned to France in that year, bringing with him rich collections of minerals. On September 14, 1792, the Duc de la Rochefoucault, with whom he had been for twenty years on terms of the closest intimacy, was assassinated at Forges, and Dolomieu retired with the widow and daughter of the duke to their estate of Roche Guyon, where he wrote several important scientific papers. The events of the 9th Thermidor (July 27, 1794) having restored the country to some tranquillity, Dolomieu recommenced his geological tours, and visited various parts of France with which he had been previously unacquainted. He was in 1796 appointed engineer and professor at the school of mines, and was chosen a member of the Institute at the time of its formation. At the end of 1797 he joined the scientific staff which in 1798 accompanied Bonaparte's expedition to Egypt. He had proceeded up the Nile as far as Cairo when ill health made his return to Europe necessary, and on March 7, 1799, he set sail from

Alexandria. His ship proving unseaworthy put into Taranto, and as Naples was then at war with France, all the French passengers were made prisoners. On May 22, they were carried by ship to Messina, whence, with the exception of Dolomieu, they embarked for the coast of France. Dolomieu had been an object of the hatred of the Neapolitan court since 1783, when he revealed to the grand master of his order its designs against Malta, and the calumnies of his enemies on that island served now as a pretext for his detention. He was confined in a pestilential dungeon, where, clothed in rags, and having nothing but a little straw for a bed, he languished during 21 months. To the complaint that if unsupplied with some necessary he should die, his jailer replied, "What does it matter to me if you do? I have to give account to the king of nothing but your bones." Dolomieu, however, did not abandon himself to despair. Deprived of writing materials, he made a piece of wood his pen, and with the smoke of his lamp for ink he wrote upon the margins of a Bible, the only book he still possessed, his *Traité de philosophie minéralogique* and *Mémoire sur l'espèce minérale*. Friends entreated, but in vain, for his liberty; it was with difficulty that they succeeded in furnishing him with a little assistance, and it was only by virtue of a special clause in the treaty between France and Naples that, on March 15, 1801, he was released. On his arrival in France he commenced the duties of the chair of mineralogy at the museum of natural history, to which, after the death of Daubenton, he had been elected in January 1799. His course of lectures concluded, he revisited Switzerland. Returning thence he reached the residence of his brother-in-law at Chateau-Neuf, in the department of Saône-et-Loire, where he was seized with a fever, to which in a few days he succumbed, November 25, 1801. Dolomieu's geological theories are remarkable for originality and boldness of conception. The materials constituting the primordial globe he held to have arranged themselves according to their specific gravities, so as to have constituted a fluid central sphere, a solid crust external to this, next a stratum of water, and lastly the atmosphere. Where water penetrated through the crust, solidification took place in the underlying fluid mass, which enlarging in consequence produced rifts in the superincumbent rocks. Water rushing down through the rifts became decomposed, and the resulting effervescence occasioned submarine volcanoes. The crust of the earth he believed to be continually increasing in thickness, owing to the deposition of aqueous rocks, and to the gradual solidification of the molten interior, so that the volcanic eruptions and other geological phenomena of former must have been of far greater magnitude and frequency than those of recent times.

Lacépède, "Éloge historique de Dolomieu," in *Mémoires de la Classe des Sciences de l'Institut*, [illegible]; Thomson, in *Annals of Philosophy*, vol. xiii. p. 161, [illegible].

DOLPHIN (*Delphinus delphis*), the common name of a species of whale belonging to the family *Delphinidæ*. It usually measures from 6 to 8 feet in length, and is thickest near the centre, where the dorsal fin rises to a height of 9 or 10 inches, and whence the body tapers towards both extremities. The forehead descends abruptly to the base of the slightly flattened beak, which is about 6 inches long, and is separated from the forehead by a transverse depression. The mouth is armed with sharp, slightly curved teeth of uniform size, varying in number from 40 to 50 on each side of either jaw, and those above locking exactly with the teeth below. The aperture of the ear in dolphins is exceedingly minute; the eyes are of moderate size and the blow hole is crescent shaped. The colour of the upper surface is black, becoming lighter on the flanks, and perfectly white on the parts beneath. Like many other cetaceans, the dolphin is gregarious, and large herds are often seen following ships in full sail, and disporting themselves on the surface of the water as if delighted at the near proximity of man. In such exercises they exhibit the most remarkable agility, individuals having been known to leap to such a height out of the water as to fall upon the deck. Their aquatic gambols and apparent relish for human society have attracted the attention of mariners in all ages, and have probably given rise to the many fabulous stories told of dolphins by ancient historians. Their appearance at sea was formerly regarded as a good omen by sailors, for although it presaged a tempest, yet by thus giving warning of its approach, it enabled them, in those days when the mariner's compass was unknown, and navigators had consequently to keep within sight of the coast, to steer for a place of safety. The dolphin is exceedingly voracious, feeding on fish, cuttlefishes, and crustaceans. On the south coast of England it is said to live chiefly on pilchard and mackerel, and when in pursuit of these it is often taken in the fishermen's nets. The female brings forth a single young one, which she nurses with the greatest care. Her milk is both abundant and rich, and during the operation of suckling the mother floats in a slightly sidelong position, so as to allow of the necessary respiration in herself and her young. The dolphin was formerly supposed to be a fish, and as such was allowed to be eaten by Roman Catholics on those occasions when the use of flesh was prohibited, and it seems to have been esteemed as a great delicacy by the French. It is said to show great fondness for music, and according to the ancient fable, Arion was said to have escaped on the back of a dolphin which he had first charmed by his music. It is an inhabitant of the temperate regions of the North Atlantic and the Mediterranean Sea, and has been observed as far north as the coast of Greenland. It is much more common in English than in Scottish waters. Among the seafaring population of Britain the name "dolphin" is most usually given to the beautifully coloured fish *Coryphæna hippuris*—the dorado of the Portuguese, and it is to the latter the poet is alluding when he speaks of "the dying dolphin's changing hues"—while the true dolphin is usually spoken of as the "bottlenose" or "bottlehead." This species occurs as a fossil in the sandy downs of the French coast.

DOMAT, or DAUMAT, JEAN (1625–1696), a celebrated French jurisconsult, born at Clermont in Auvergne, on the 30th November 1625. He was closely in sympathy with the Port-Royalists, was intimate with Pascal, and at the death of that celebrated philosopher was intrusted with his private papers. He is principally known from his elaborate legal digest, in four volumes 4to, under the title of *Lois Civiles dans leur Ordre Naturel Suivies du Droit Publique* (1689),—an undertaking for which Louis XIV. settled on him a pension of two thousand livres. This is one of the most important works on the science of law that France has produced. Domat endeavours to found all law upon ethical or religious principles, his motto being *L'homme est fait par Dieu et pour Dieu*. An English translation of the *Lois Civiles* by Strahan, was published in 1722, and passed through several editions. Besides the *Lois Civiles*, Domat made in Latin a selection of the most common laws in the collections of Justinian. This work, however, did not appear until after his death, when it was published separately (Paris, 1700, Amsterdam, 1703) under the title of *Legum Delectus*, and was subsequently appended to the *Lois Civiles*. It was translated into English by [illegible]. Domat died at Paris on the 14th March 1696.

See in the *Journal des Savants* for 1843 several papers on [illegible] by Victor Cousin, giving much information not otherwise accessible.

DOMBROWSKI, Jan Henryk (1755–1818), Polish general, was born at Pierszowice in the palatinate of Cracow, August 29, 1755. He was of noble family, and his father was an officer in the Saxon army. Brought up in Saxony, he entered and for some years served in the army; but when, in 1791, the Polish Diet recalled all Poles serving abroad, he returned to his native land. Placed then under the orders of Poniatowski, he took part in the campaign of 1792 against the Russians. In 1794 he distinguished himself in command of the right wing under Kosciusko assisted in the defence of Warsaw, and reunited the scattered Polish forces after its fall. He was compelled, however, to capitulate and to surrender himself prisoner of war at Radoszyce, November 18. Suwaroff offered him a post in the Russian army, but this he declined, and for two years he lived in retirement. In 1796 the rank of lieutenant-general in the Prussian army was offered to him by the king; but this he likewise declined. He then went to Paris. The formation of a Polish legion was at this time in contemplation by the French authorities; and in January 1797 Dombrowski was formally authorized by the Government of the Cisalpine Republic to organize it. This task he executed at Milan. In command of his legion he played an important part in the war in Italy, entered Rome in May 1798, and distinguished himself greatly at the battle of Trebbia (June 19, 1799). On this occasion he narrowly escaped death, being struck by a ball the force of which was broken by a volume of Schiller which he carried with him. He next served under Saint-Cyr and Masséna; but being severely wounded he was for some time incapacitated for action. After Marengo he was intrusted by Napoleon with the organization of two new Polish legions; and at the head of the new levies he captured, in January 1801, the fortified post of Casa Bianca, near Peschiera. After the peace of Amiens he passed, as general of division, into the service of the Italian republic. Summoned by Napoleon after the battle of Jena to promote a rising in Poland, he returned there, took command of the Polish army, and distinguished himself at the siege of Dantzic (1807). He fought and was wounded at Friedland, and took an active part against the Austrians in the campaign of 1809. In the Russian campaign of 1812 he commanded a division of the great French army, and was wounded at the passage of the Beresina. He fought under General Marmont at the battle of Leipsic (1813), and in the following year returned to Poland. He was one of the generals entrusted by the emperor Alexander with the reorganization of the Polish army, and was named in 1815 general of cavalry and senator palatine of the new kingdom of Poland. He retired, however, in the following year to his estates in Posen, and employed himself in preparing for publication his *History of the Polish Legions in Italy*, which was published some years after his death. General Dombrowski died at his seat of Wina-Gora in Posen, in June or July 1818.

DOME is usually understood to mean a roof which is round or polygonal horizontally, and of which any vertical section is either a round or a pointed arch. There happen to be none of elliptical or any other section than these. But some, especially in the East, have what is called an ogival outline, convex below and concave towards the top, and these are generally called *cupolas*, though there is no real distinction. Most of the great European domes have an opening or eye at the top, on which stands a lantern, except in the Pantheon at Rome, where the eye is open. Until modern times all the domes worth notice were of masonry, *i.e.*, stone, brick, tiles, or pots, which last were used for lightness. Probably the first large wooden dome was St Paul's, of which the construction is peculiar, the inner dome visible in the church being of brick only 18 inches thick, except near the bottom where it grows out of a cone of the same thickness going up outside it and carrying the stone lantern, which looks right down into the church through an eye in the internal dome. Outside the cone is built a wooden dome covered with lead. The domes of St Peter's at Rome and Florence Cathedral are of two stone shells near together, and connected by some vertical ribs, and also carrying lanterns. But Wren's construction is infinitely stronger, since a cone sufficiently tied at the bottom cannot give way until it is absolutely crushed, while the bursting pressure of a weight on the top of a dome increases the bursting force enormously. St Peter's dome is cracked in several places, and held together by bands, and it is covered with lead, and therefore looks no better than St Paul's, and indeed on the whole not near so well, for various reasons which may be seen in architectural books; and the lantern is smaller in proportion. The only full mathematical investigation of the theory of domes with practical results, that we know of, is in a paper by Sir Edmund Beckett (then Mr Denison) in the *Memoirs of the Royal Institute of British Architects* of February 1871, and two shorter ones by Mr E. W. Tarn, architect, in the *Civil Engineer's Journal* of March 1868, which substantially agree, so far as they deal with the same points. The investigation is long and complicated, and can only be done approximately, because the introduction of the thickness deranges all the ordinary trigonometrical relations, and so we only give the principal results of those calculations. Some more of them are given in Sir E. Beckett's *Book on Building*. It is easy to prove by strict mathematics that the upper 52° (nearly) of a hemispherical dome would be absolutely stable, or have no tendency to fall in or burst out, without any sensible thickness, if only tied strongly enough round the base, where the tension would be ·3 of the weight of the complete hemisphere, disregarding the bonding effect of mortar and friction. The weight of a thin hemispherical shell is the same as that of a cylinder of the same height and thickness standing on the same base, and is twice that of the area which the dome covers, of the same thickness, provided that bears only a small proportion to the diameter. The weight of any zone of the dome is proportional to its height. A hemisphere of ordinary stone 100 feet wide at mid-thickness and 1 foot thick weighs about 1000 tons. It is also demonstrable that a dome spreading at the bottom a little more than a hemisphere, so as not to start vertically, and rather flattened at the top, would stand without any sensible thickness; and so would sundry other curves, and especially an inverted *catenary*, which will stand even as an independent arch without thickness, for a dome is far more stable than an arch or a barrel vault of the same thickness.

The essential difference between them is that the mathematical *element* of a dome is not an arch of any uniform breadth, but one whose breadth, and therefore weight, decreases upwards to nothing, being in fact a *lune* enclosed between two meridians very close together. And it was shown in the R.I.B.A. paper, and also by models exhibited, that a dome is stable with a thickness of only ·023 of its diameter, while an independent round arch or a barrel vault requires three times as much thickness, or ·072 of its diameter. Therefore a barrel vault 100 feet wide must be 7 feet thick to be stable, while a dome of that diameter need only be 27 inches; besides which, the strength of the dome can be increased to almost any extent by building in iron bands in the lower courses, while a barrel vault cannot be so helped. Bands would be of no use whatever in a dome above 52° from the top, as the pressure above that point is entirely inward, assuming it to be tied there, and from thence it gradually increases towards the bottom, where the tension is ·215 of the weight of the hemisphere. It may seem paradoxical that it should be less there than at 52°; but the explanation is that the tension bears a higher proportion to the weight in a thin dome than a thick one, and it was an infinitely thin one which had the tension of ·3 of its weight at 52°; and such a dome cannot be carried lower without bands. In a dome of the required thickness ties would have very little to do above 68°.

As the tension at the bottom is rather more than a fifth of the weight, a dome of proper thickness would be stable standing on a conical *drum*, with a slope inwards of about 1 to 5, or 12°, of which the tangent is ·215, if the drum itself has foundations which cannot spread. The thickness requisite, and also the tension at the bottom, may evidently be greatly diminished by gradually tapering the dome upwards. If it is half as thick at the top as at the bottom, with the thickness increasing downwards as the height, it need only weigh $\frac{9}{16}$ of the lightest uniform dome of the same size, and only need be 20 inches thick at the bottom for 100 feet diameter.

Pointed domes are also much stronger than hemispheres, having lost the flat top which has the greatest bursting pressure. A dome generated by the revolution of an equilateral arch, or one of 60°, requires a thickness only = ·0137 diameter, or 16½ inches for 100 feet; and one of 70° requires 20 inches. The tension at the bottom of a 60° dome is only ·15 of its weight, which weight, however, is 1·372 of a hemisphere on the same base, their heights being as 1·73 to 1.

For the same reason pointed domes are fittest for carrying a lantern, but they are not much benefited by tapering, having already lost the most oppressive part. The Florence dome, across the flat sides of the polygon, is about 70° of the circle of its curvature. It is shown in the R.I.B.A. paper that both in hemispherical and pointed domes the weight of the lantern they will carry varies practically as the cube of the thickness. Moreover a lanterned dome requires tieing much higher up than a plain one. In short, the cone is the only proper way of carrying a stone lantern. The cone at St Paul's has a great chain round the base, which is probably superfluous, as the drum below it seems thick enough to contain the requisite slope, and visibly leans inwards besides.

Ribs inside a dome weaken more than strengthen it, as some persons imagine, unless they are themselves deep enough to be stable as independent arches, or unless they decrease in width and weight upwards like a lune, as those in the Pantheon do, which also is so enormously thick at the haunches that it has superabundant stability. Some of the Indian domes are thick enough for arches, and they have neither eyes nor lanterns. Polygonal domes may be considered as composed of a small number of widish lunes, and only differ from round ones in being rather weaker for any given thickness and size.

Domes require no wooden centring to build them on as arches do, until you get near the top, *i.e.*, so long as each stone laid on the ring of stones below it will not slide inwards. And if they are notched to prevent sliding the whole dome may be built without centring. The dome of Mousta in Malta was so built in this century by a common mason, who must, however, have been a man of genius. There would be no difficulty in building a dome of almost any size of bricks or stones, with the help of hoop iron in all the lower courses up to about 22° from the bottom, and then less up to 52°, and higher if it has to carry a lantern. There is no masonry dome in the world wider than 142 feet. But there have been several larger iron ones, which are an easy piece of engineering, inasmuch as iron has enormous tensile strength, while stone has very little, and mortar practically none; and all the calculations above mentioned assume the domes to be composed of [illegible] row lunes having no lateral bond or tie; but on the [illegible] hand all the stones are assumed to go right through [illegible] thickness and not to be liable to crush at the [illegible]. Building the lowest courses with horizontal beds, [illegible] some architects suggested, was shown to be exactly [illegible] opposite of what is mathematically required, as there [illegible] be nothing to prevent their sliding over each other, [illegible] as the essence of dome-construction is that the lower courses should confine the upper. It is not however practically expedient to make the beds lean inwards so much as to involve acute angles of the stones, as such angles in stone will bear very little pressure. Brick domes over wells or tanks, which should always be round for strength, are usually built on mere mounds of earth for centring, and they are always of flat section, or only about the upper half of a hemisphere, and are consequently stable with very little thickness, as the earth round them forms a strong abutment.

The following inside diameters of the largest domes in the world are given in Sir E. Beckett's *Book on Building*:—

		Feet.
Vienna Exhibition, 1873	iron	360
1862 Exhibition		140
Albert Hall		219 × 185
Pantheon		142
Florence		138½
St Peter's		137½
Bijapore, Gol Gomuz		137
Mousta		124
St Sophia		105
Milan, S. Carlo		105
St Paul's		102
Invalides, Paris		92

(E. B.)

DOMENICHINO, or DOMENICO, ZAMPIERI (1581-1641), the celebrated painter, born at Bologna on 21st October 1581, was the son of a shoemaker. The diminutive form of Christian name by which he is known indicates his short stature. He was placed, when young, under the tuition of Denis Calvart; but having been treated with great severity by that master, he left him, and became a pupil in the academy of the Caracci, under Agostino. Towards the beginning of the 17th century he went to Rome, at the invitation of his fellow-pupil and intimate Albano, and prosecuted his studies under Annibale Caracci. The faculty of Domenichino was slow in its development. He was at first timid and distrustful of his powers; while his studious, unready, and reserved manners were misunderstood by his companions for dulness, and he obtained the nickname of "the Ox" (Bue). But Annibale Caracci, who observed his faculties with more attention, predicted, that the apparent slowness of Domenichino's genius would in time produce what would be an honour to the art of painting. When his early productions had brought him into notice, he studied with extreme application, and made such advance as to raise his works into a comparison with those of the most admired masters of the time. From his acting as a continual censor of his own works, he became distinguished amongst his fellow-pupils as an accurate and expressive designer; his colours were the truest to nature: Mengs, indeed, found nothing to desire in his works, except a somewhat larger proportion of elegance. That he might devote his whole powers to the art, Domenichino shunned all society; or, if he occasionally sought it in the public theatres and walks, it was in order better to observe the play of the passions in the features of the people—those of joy, anger, grief, terror, and every affection of the mind—and to commit them vividly to his tablets; thus, says Bellori, it was that he succeeded in delineating the soul, in colouring life, and calling forth heartfelt emotions, at which all his works aim. In personal character he is credited with temperance and modesty; but, besides his want of sociability, he became somewhat suspicious, and jealous of his master.

In Rome, Domenichino obtained employment from Cardinals Borghese, Farnese, and Aldobrandi, for all of

ıe painted works in fresco. The distinguished
n which he had acquired excited the envy of some
ntemporaries. Lanfranco in particular, one of his
eterate enemies, asserted that his celebrated Com-
of St Jerome (painted for the church of La Carità
1614, for a pittance of about ten guineas, now in
can Gallery, and ordinarily, but most irrationally,
f as the second or third best oil picture in the
ras an imitation from Agostino Caracci; and he
an engraving of this master's picture of the same
(now in the Gallery of Bologna), copies of which
ulated for the purpose of showing up Domenichino
giarist. There is in truth a very considerable
nce between the two compositions. The pictures
ampieri painted immediately afterwards, represent-
ects from the life of St Cecilia, only increased the
his competitors, and redoubled their injustice and
y. Disgusted with these cabals, he left Rome for
where he remained until he was recalled by Pope
XV., who appointed him principal painter and
to the pontifical palace. In this architectural
eems to have done little or nothing, although he
nexpert in the art. He designed in great part the
Belvedere at Frascati, and the whole of the Villa
, and some other edifices. From 1630 onwards
hino was engaged in Naples, chiefly on a series of
(never wholly completed) of the life of St Januarius
appella del Tesoro. He settled in that city with
ly, and opened a school. There the persecution
im became far more shameful than in any previous

The notorious so-called "Cabal of Naples"—
ters Corenzio, Ribera, and Caracciolo,—leagued
as they were to exclude all alien competition,
and decried the Bolognese artist in all possible
or instance, on returning in the morning to his
rk, he would find not unfrequently that some one
bed out the performance of the previous day.
l worry is believed to have brought the life of
hino to a close; contemporary suspicion did not
o speak broadly of poison, but this has remained
ned. He died in Naples, after two days' illness,
April 1641.

nichino, in correctness of design, expression of the
and simplicity and variety in the airs of his heads,
considered little inferior to Raphael; but in fact
the greatest gulf fixed between the two. Critics
t century adulated the Bolognese beyond all reason
tion; he is now regarded as commonplace in mind
ention, lacking any innate ideality, though
dly a forcible, resolute, and learned executant.
ist," says Lanzi, "despair to find paintings ex-
richer or more varied draperies, details of costume
utifully adapted, or more majestic mantles. The
re finely disposed both in place and action, con-
the general effect; whilst a light pervades the
hich seems to rejoice the spirit, growing brighter
ter in the aspect of the best countenances, whence
attract the eye and heart of the beholder. The
lelineated could not tell their tale to the ear more
han they speak it to the eye. The Scourging of
w, which he executed in competition with Guido
[a fresco in the church of San Gregorio], is a
illustration of this truthful expression. Of the
s of these masters, Annibale Caracci preferred
Domenichino. It is said that in painting one of
tioners the artist actually wrought himself into a
using threatening words and actions, and that
Caracci, surprising him at that moment, embraced
aiming with joy, 'To-day, my dear Domenichino,
teaching me.' So novel, and at the same time so natural, it appeared to him that the artist, like the orator, should feel within himself all that he is representing to others." Domenichino is esteemed the most distinguished disciple of the Caracci, or second only to Guido. Algarotti preferred him to the greatest masters; and Nicolo Poussin considered the painter of the Communion of St Jerome to be the first after Raphael. His pictures of Adam and Eve, and the Martyrdom of St Agnes, in the Gallery of Bologna, are amongst his leading works. Others of superior interest are his first known picture, a fresco of the Death of Adonis, in the Loggia of the Giardino Farnese, Rome; the Martyrdom of St Sebastian, in Santa Maria degli Angeli; the Four Evangelists, in Sant' Andrea della Valle; Diana and her Nymphs, in the Borghese Gallery; and the Assumption of the Virgin, in Santa Maria di Trastevere. His portraits are also highly reputed. It is admitted that in his compositions he often borrowed figures and arrangements from previous painters. Domenichino was potent in fresco. He excelled also in landscape painting. In that style (in which he was one of the earliest practitioners) the natural elegance of his scenery, his trees, his well-broken grounds, the character and expression of his figures, gained him as much public admiration as any of his other performances. (W. M. R.)

DOMESDAY BOOK, or simply DOMESDAY, is, in its commonest use, the name applied to the *Liber de Wintonia*, or Exchequer Domesday, a very ancient record containing a survey of all the lands of England, made in the time of William the Conqueror. It consists of two volumes—a greater and a less. The first is a large folio, written on 382 double pages of vellum, in a small but plain character, each page having a double column. Some of the capital letters and principal passages are touched with red ink, and some have strokes of red ink run across them, as if scratched out. This volume contains the description of the following counties:—Kent, Sussex, Surrey, Southampton, Berks, Wilts, Dorset, Somerset, Devon, Cornwall, Middlesex, Hereford, Bucks, Oxford, Gloucester, Worcester, Hereford, Cambridge, Huntingdon, Bedford, Northampton, Leicester, Warwick, Stafford, Salop, Cheshire, Derby, Notts, York, and Lincoln, together with the anomalous districts of Rutland and the land "inter Ripan et Mersham." The second volume is in quarto, written upon 450 double pages of vellum, but in a single column, and in a large but very fair character. It contains the counties of Essex, Norfolk, and Suffolk. This second volume, together with the Exon Domesday, which contains the fuller reports of the western counties, Wiltshire, Dorset, Somerset, Devonshire, and Cornwall, and the *Inquisitio Eliensis*, which relates to the lands of the abbey of Ely, seems to be the original record of the survey itself, which appears in the first volume of the Exchequer Domesday in an abridged form. "In both volumes of the Exchequer Domesday," writes Mr Freeman in his *History of the Norman Conquest*, "each shire is commonly headed with a list of the chief landowners in it. The king comes first, then the great ecclesiastical, and then the great temporal proprietors, followed in many cases by the smaller proprietors lumped in classes 'servientes regis,' 'taini regis,' 'eleemosynarii regis,' and the like, the list being numbered, and forming an index to the survey itself, which follows. Lastly, in several shires come the 'Clamores,' the records of lands which were said to be held unjustly, and to which other men laid claim." Then follows the survey itself. The lands of the king or other landowner are arranged under the hundreds in which they were placed, and the necessary particulars of which the survey was to be a record are put down under each manor or other holding.

The northern shires are not described in the survey. Northumberland, Cumberland, Westmoreland, and Durham are conspicuous by their absence. Lancashire does not appear under its proper name; but Furness and the northern part of the county, as well as the south of Westmoreland, with a part of Cumberland, are included within the West Riding of Yorkshire. That part of Lancashire which lies between the rivers Ribble and Mersey is subjoined to Cheshire; and part of Rutland is described in the counties of Northampton and Lincoln. The reasons which led to the omission of these northern counties from Domesday are not difficult to be understood. Durham and Northumberland had been laid waste by the merciless hand of conquest. The devastations of the Conqueror himself in the winter of 1069–1070, the various inroads of Malcolm, and the vengeance taken by Odo after the murder of Bishop Walcher in 1080, must have left very little in those districts worth the surveying. Lancashire did not then exist as a separate county. Cumberland and Westmoreland had no being as English shires,—their southern portions then formed part of Yorkshire, and they are surveyed in Domesday as such; whilst their northern portions did not become part of the kingdom of England till the reign of William Rufus, having been held by the Scottish kings as a fief ever since the grant by Edmund the Magnificent, on the final overthrow of the old kingdom of Strathclyde. The notion that the northern portions of Cumberland and Westmoreland were conquered in 1072 by William I. is derived from a careless blunder in the work of Matthew of Westminster, who has confounded William Rufus with his father.

The exact time of the commencement of this survey is variously stated. The Red Book of the Exchequer has been quoted as fixing the date at 1080; whereas the Red Book merely states that the survey was undertaken at a time subsequent to the total reduction of the island to the authority of the Conqueror. From the memorandum of the completion of the survey at the end of the second volume, it is evident, however, that Domesday was finished in 1086. Matthew Paris, Robert of Gloucester, the *Annals of Waverley*, and the *Chronicle of Bermondsey* give 1083 as the date of the record; Henry of Huntingdon places it in 1084; the *Saxon Chronicle* in 1085; Simeon of Durham, Florence of Worcester, Roger Hoveden, and Hemingford in 1086; whilst the *Ypodigma Neustriæ* and Diceto state 1087 as the year.

The reason given for taking this survey, as assigned by several ancient records and historians, was that every man should be satisfied with his own right, and not usurp with impunity what belonged to another. But besides this, it is stated by others that all those who possessed landed estates now became vassals to the king, and paid him so much money by way of fee or homage, in proportion to the lands they held. According to the false Ingulphus, the survey was made in imitation of the policy of Alfred, who, at the time he divided the kingdom into counties, hundreds, and tithings, had an inquisition taken and digested into a register, which was called, from the place in which it was deposited, the Roll of Winchester. But the compilation of such a survey in the time of Alfred may be more than doubted; for, with the exception of the statement of Ingulphus, no chronicler alludes to the existence of this register, nor is any mention of it to be found in the records of the time or in those of a subsequent period. Had it been extant in the century immediately preceding the Norman Conquest, it would have prevented the necessity of giving those minute descriptions of land so common among the later of the Saxon charters. Again, the separation of counties is known to have been a division long anterior to the time of Alfred. The confusion in all probability has arisen from a similarity in the title of the two works. The survey of the Conqueror was called Domesday
Book; the register of Alfred had the name of D
but the Dome-boc, instead of being a territorial a
is Domesday Book, was in reality the code of Sax

For the execution of the survey recorded in D
Book, certain commissioners, called the king's ju
were sent into every county and shire, and juries s
in each hundred, out of all orders of freemen, fro
down to the lowest farmers. These commissioner
be informed by the inhabitants, upon oath, of the
each manor and that of its owner, also by who
held in the time of Edward the Confessor; the n
hides; the quantity of wood, of pasture, and of
land; how many ploughs were in the demesne,
many in the tenanted part of it; how many mills
many fish-ponds or fisheries belonged to it; the
the whole in the time of King Edward, as well
granted by King William, and at the time of this
and also whether it was capable of improveme
being advanced in value. They were likewise di
return the tenants of every degree, the quantity
then and formerly held by each of them, what
number of villains or slaves, and also the number a
of their cattle and live stock. These inquisitio
first methodized in the county, were afterwards s
the king's Exchequer. So minute was the survey,
writer of the contemporary portion of the *Saxon C*
records—"So very narrowly he caused it to be tr
that there was not a single hide or yardland, not
cow, or hog that was not set down."

By the completion of this survey the king acq
exact knowledge of the possessions of the Cr
afforded him the names of the land-holders; it f
him with the means of ascertaining the military
of the country; and it pointed out the possibili
creasing the revenue in some cases and of less
demand of the tax-collectors in others. It was, m
a register of appeal for those whose titles to their
might be disputed.

So accurate has Domesday Book been considered
authority was never permitted to be called in q
and when it has been necessary to distinguish
lands were held in ancient demesne or in any other
recourse was always had to Domesday, and to
in order to determine the doubt. From this d
authority, from which, as from the sentence pron
Domesday, or the Day of Judgment, there coul
appeal, the name of the book is said to have been
Stowe indeed assigns another reason for this ap
namely, that Domesday Book is a corruption of
Dei book," a title given it because heretofore
deposited in the king's treasury in a part of the
Westminster or Winchester called *domus Dei*;
however, is plainly English. From the gr
formerly taken to preserve this survey, we m
the estimation in which it was held. In the
de Scaccario it is said, *Liber ille* (meaning Do
sigilli regis comes est individuus in thesauro.
formerly kept at Westminster with the king's s
side of the Tally Court in the Exchequer, under th
and keys, in the charge of the auditor, the cham
and deputy-chamberlains of the Exchequer, till in
was deposited among other valuable records in the
house. It is now carefully preserved beneath
glass case in the Public Record Office, and can be
without payment of any fee.

Various local Domesdays exist, as those o
Norwich, Ipswich, Chester, and Evesham. T
notable among them is the Domesday of St Paul
in 1181 by the Dean, Ralph de Diceto, and e
Archdeacon Hale.

3 Domesday Book was published in two volumes,
16 a volume of indices was printed by the Record
on, to which a very valuable "general introduc-
refixed." During the latter year another volume
containing the Exon Domesday, and the Inquisitio
already noticed; the Winton Domesday, com-
nds in Winchester between 1107 and 1128; and
n Book, or Survey of the Palatinate of Durham
Within the last few years the whole of Domesday
issued in parts, each part comprising a county,
ed by the process of photozincography, under the
superintendence of Mr W. B. Sanders, one of
ant keepers of the Public Records.

H. Ellis's *Introduction and Indexes to Domesday*, vol. i.
omesday Book, illustrated by Kelham; *Descriptive Cata-*
nuscripts relative to the early History of Great Britain;
istory of the Norman Conquest, by E. A. Freeman, vol. v.;
Records, by A. C. Ewald. (A. C. E.)

CILE, in law, may be defined generally as the
man's permanent abode; but a precise definition
ord is a matter of acknowledged difficulty. Its
risprudence is to fix the legal rights of a person in
ses where it is felt that the application of the law
ntry to which he owes allegiance on the one hand,
country in which for the moment he happens to
d be attended with inconvenience. Thus an
citizen who, for purposes of business, health, &c.,
any years permanently resided in France, has, let
se, died during a casual visit to Denmark. The
would arise under which of the three systems of
glish, French, or German—the validity of his will,
ssion to his estate, &c., would be determined.
, a French subject habitually resident in England,
naturalized, might sue for a dissolution of his
in the matrimonial courts of this country, and it
generally admitted that our courts in such a case
tled to exercise jurisdiction, and that their decision
be received as determining the status of the
oncerned, just as fully as if they had been natural-
jects of the Crown. In such cases there is a
greement that a man's legal character, so to speak,
e determined by his domicile, rather than by his
nationality or his residence for the time being.
notice briefly the conditions or residence under
micile may generally be established.

oman jurists defined domicile to be the place "ubi
m rerumque ac fortunarum summam constituit:
sus non sit discessurus si nihil avocet: unde cum
est, peregrinari videtur: quo si rediit peregrinari
itit." The general result of the definitions to be
writers on the civil law is to make that place the
which may be described as the head-quarters of
on concerned, or, as it is expressed in the Code
le lieu ou il a son principal établissement." But
racteristic difficulties embarrassed the civil lawyers.
habits of life might point equally to two places as
-quarters. It might be impossible to say which of
s the principal seat of his business. Which of the
uch a case is the legal domicile. Or can the same
t the same time have two domiciles? The two
things are residence and the intention of remain-
ory's definition is, "That place is properly the
of a person in which his habitation is fixed without
ent intention of removing therefrom." Change of
e not intended to be permanent would not create
omicile. Cases will readily suggest themselves in
he question of intention may be surrounded with
es.

ollowing summary follows the general rules laid
Story for determining the domicile of a person
(*Conflict of Laws*, sec. 46). The child takes the domicile of the father, except in the case of an illegitimate child, which takes the domicile of the mother. Minors follow the changes of the father's domicile; and a married woman follows the domicile of her husband. The place of residence is *prima facie* the domicile; and when a person removes to another place with the intention of making it his permanent residence, that place becomes his domicile. When a person has removed to another place with the intention of remaining there for an indefinite time, that is his domicile, though he may have a general intention of returning at some future time. In general the domicile of a married man is the place where his family permanently resides, even though he habitually transacts his business elsewhere. When a married man has two places of residence, that will be his domicile "which he himself selects or describes or deems to be his home, or which appears to be the centre of his affairs, or where he votes or exercises the rights and duties of a citizen." An unmarried man's domicile is where he transacts his business or exercises municipal duties or privileges. Compulsory detention will not create a domicile. A domicile once established remains until a new one has been acquired;[1] but ambassadors resident in a foreign country retain their domicile of nationality.

To these general rules may be added some of the principles laid down in recent cases by the English courts. The distinction between the question of domicile and that of naturalization or allegiance is clearly pointed out in Haldane *v.* Eckford (*Law Reports*, 8 Equity, 631) where it is said that to effect a change of domicile it is not necessary that a man should do all in his power to divest himself of his original nationality (*exuere patriam*), it being sufficient that there should be a change of residence of a permanent character voluntarily assumed. And in Udny *v.* Udny (*Law Reports*, 1 House of Lords, Scotch Appeals) Lord Westbury said: "To suppose that for a change of domicile there must be a change of natural allegiance is to confound the political and civil status, to destroy the distinction between *patria* and *domicilium*." So the lord chancellor: "A man may change his domicile as often as he pleases, but not his allegiance." In the British empire, composed as it is of communities having each its own system of law, there may be numberless domiciles under one allegiance. In the first of the cases above mentioned the question was as to the domicile of a testator, whose domicile of origin was Scotch, who was a servant of the East India Company for thirty-three years, and who on leaving India went to Jersey, where he lived continuously for twenty-five years till his death. The Scotch domicile reverted on his leaving India, but was held to have been lost by the residence in Jersey, where a new domicile was acquired. This is a fair sample of the cases which frequently arise in British courts on the question of domicile. In the second of the cases mentioned above it was held to be "a settled principle that no man shall be without a domicile, and to secure this end the law attributes to every individual as soon as he is born the domicile of his father, if the child be legitimate, and the domicile of his mother, if the child be illegitimate. This is called the domicile of origin, and is involuntary. It is the creation of the law, not of the party. It may be extinguished by act of law, as for example by sentence of death or exile for life, which destroys the *status civilis* of the criminal; but it cannot be destroyed by the will and act of the party. Domicile of choice is the creation of the party. When a domicile of choice is acquired, the domicile of origin is in abeyance, but is not absolutely extinguished or obliterated. When a domicile of choice is abandoned, the domicile of origin revives, a special intention to revert to it not being necessary. A natural-born Englishman may domicile himself in Holland, but if he breaks up his establishment there and quits Holland, declaring that he will never return, it is absurd to suppose that his Dutch domicile clings to him until he has set up his tabernacle elsewhere."—*Per* Lord Westbury. These extracts, it will be seen, state even more strongly than the corresponding rule adopted by Story the position that the original domicile differs from an acquired domicile, in being suspended rather than destroyed by the acquisition of a new domicile. One of the law lords in Udny *v.* Udny even finds fault with Story's use of the phrase "to reacquire a native domicile." The native domicile is not reacquired but restored *ipso facto* by the abandonment of the acquired domicile.

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[1] Some Roman jurists, however, maintained that a man might be without any domicile at all, as for example when he has definitely abandoned his old domicile, and is travelling in search of a new abode. It is said that when a domicile different from that of birth has been acquired and is abandoned, the domicile of birth reverts the moment the other is given up. "The native domicile easily reverts."

The intention necessary to effect a change of domicile may be illustrated by the following cases. In the case of Douglas *v.* Douglas (12 Equity, 617), R——, son of a domiciled Scotchman, entered the Home Office, London, in 1792, remained till 1802, thereafter having married an English lady, lived in England in hired houses, and finally settled in Scotland and died there. It was held that he had not lost his domicile of origin. The testator in the case, the son of R——, was born in London in 1803 during a visit of his parents to London, lived from the age of thirteen with his parents in Scotland, paying occasional visits to England till his mother's death in 1857, after which he let his family estate in Scotland, and lived chiefly in England in hired houses. It was held that his domicile was Scotch. The intention required to create a new domicile is an intention to settle in a new country as a permanent home, and this is sufficient without any intention to change civil status. In another case (Brunel *v.* Brunel, 12 *Equity*, 298), where a French subject had established himself in business in England, and resided there continuously for thirty years, making only occasional visits to France, but had refused to take out letters of naturalization on the ground that he might return to France, and would not give up his status as a French citizen, it was held, notwithstanding, that he had lost his domicile of origin, and had acquired an English domicile.

The effect of domicile on the rights and duties of parties is even more difficult to state. Continental jurists draw a distinction between personal and real laws,—the former being supposed to fix the legal character of the person and accompany him wherever he may be, the latter dealing with things only. In matters covered by the former, therefore, the domicile prevails; while things are governed by the law of the place in which they are. If the distinction were maintainable it would still be of little use in fixing the extent of the operations of the law of domicile, because one large class of real laws, that dealing with movables, is universally admitted to be governed by domicile; while a large but undefined class of personal laws would certainly not be acted on by foreign states, *e.g.*, where the law of domicile fixes with incapacity persons professing a religion contrary to that established by the state. There is no uniformity of practice or opinion on this point in modern jurisprudence. Story considers the following to be the best established principles in England and America on the point of personal capacity or status:—

1. The capacity, state, and condition of persons according to the law of their domicile, will generally be regarded as to acts done, rights acquired, and contracts made in the place of their domicile touching property situate therein. If valid or invalid there, they will be valid or invalid everywhere. 2. As to acts done, &c., in other countries touching the property therein, the law of such countries, as to capacity, &c., and not the law of domicile, generally prevail. Thus "in questions of minority or majority, competency to marry, incapacities incident to coverture, guardianship, emancipation, and other personal qualities and disabilities," the law of the *loci contractus aut actus*, and not the *lex domicilii* ought to prevail; *e.g.*, if a person over 21 but under 25 years of age has his domicil in a country which fixes majority at 25, he may make generally a valid contract, even of marriage, in a country which fixes majority at 21. 3. Personal disqualifications not arising from the law of nature, especially such as are penal, as disqualification for heresy, popish recusancy, &c., are not enforced in any other country. The refusal of non-slaveholding States to recognise the status of slavery is an example.[1] 4. Questions of legitimacy are generally to be decided by the law of the place where the marriage was celebrated. When issue born before marriage may by the law of the country of their birth be legitimated by the subsequent marriage of the parents, such legitimacy would be recognised in other countries. (But see BASTARD and MARRIAGE).

The operation of the law of domicile is most free from doubt in questions touching personal or movable property. Real property is governed by the *lex loci;* but personal property has in law no locality. On this point English law is now substantially in harmony with Continental jurisprudence. The principle that personal property is subject to the law of the owner's domicile is fully recognised in the distribution of the estate of a person deceased, whether with or without a will. The capacity of a person to make a will, the validity of the will, and its effect, are to be determined by the law of his actual domicile in the case of movable property. In the case of real property, on the other hand, these questions must be decided by the law of the country in which it is situated. It was doubted by Story whether a will valid according to testator's domicile at the time of its execution would be affected by a subsequent change of domicile. A recent case (Lynch *v.* Government of Paraguay) decided that personal property in England is governed by the law of testator's domicile at the time of his death. In this case the testator, a domiciled Paraguayan, died leaving personal property in England: and between his death and the application for probate a decree of the Government of Paraguay declared that all the property of the deceased, wherever situated, was the property of the state of Paraguay. The court, nevertheless, held that the property in England must be governed by the law of Paraguay as at the time of the death (2 Probate and Matrimonial Cases, 268). So in cases of intestate succession, the law of the actual domicile of the intestate at the time of his death governs his personal property everywhere. The persons entitled, the proportions in which they are to take, &c., must be settled by the law of the domicile, however different that may be from the law of the country in which the goods are.

The following statutes relating to the effect of domicile on wills were passed in 1861:—

24 and 25 Vict. c. 114. Wills made out of the United Kingdom by British subjects (whatever may be the domicile of such person at the time of making the same or at the time of death) shall, as regards personal estate be held to be well executed, if the same be made according to (1), the forms required by the law of the place where the same were made, or (2), the place where such person was domiciled when the same were made, or (3), by the laws in force in that part of her Majesty's dominion where he had his domicile of origin. Wills made by any British subject (whatever may be his domicile) shall, as regards personal estate, be well executed if they are according to the forms then required in that part of the United Kingdom in which they are made. No will or other testamentary disposition shall be held to be revoked or become valid, nor shall the construction thereof be altered by reason of any subsequent change of domicile.

24 and 25 Vict. c. 121 recites that by the operation of the law of domicile the expectation and belief of British subjects dying abroad with regard to the distribution of their property are often defeated, and enacts that when a convention has been made between

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[1] When the foreign law which would otherwise operate as lex *domicilii* is repugnant to the moral principles of the country in which it is sought to be enforced, the *lex domicilii* would not be allowed to prevail.

r Majesty and any foreign country, it may be declared and shall enacted that no British subject dying in such country shall be med to have acquired a domicile therein, unless he has been ident in such country for one year previous to death, and has de a declaration in writing of his intention to become domiciled; l British subjects so dying without having so resided and made h declaration shall be deemed for all purposes of testate or estate succession as to movables to retain the domicile he sessed at the time of going to reside in such foreign country. ilar exemptions are conferred on the subjects of the foreign state ng in Great Britain or Ireland. But the Act does not apply to eigners who have obtained letters of naturalization in any part of r Majesty's dominions. (E. R.)

DOMINIC, St, founder of the Dominican order of onks, was born at Calahorra, a village of Old Castile, in 70. His family name is said to have been Guzman, an ustrious name connected with many of the most honour-le families in Spain. Little is known of his father and other, but in the mediæval legends his birth is surrounded ith portents indicative of his future greatness. His other dreamed she gave birth to a boy with a torch in s mouth, which set the world on fire. At his baptism new sign was given. A starry radiance encircled the aptismal font. His followers delighted to recognize a imilar radiance in his countenance, which drew all hearts o him. His childhood gave evidence of his future devotion nd self-denial. He used to creep from his bed and prostrate imself on the hard boards. At seven years of age he uitted the paternal home for the house of his uncle, who as a churchman, and gave him his first lessons in divine hings. At fifteen he went to the university of Palencia, afterwards translated to Salamanca, where it attained reputation as the most famous university in Spain. He applied himself to letters and philosophy, but above all to theology,—opening his mind, according to one of his biographers, to the true knowledge, and his ears to the doctrines, of Holy Scripture. Two stories are told of him at this time, showing the intensity of his character, and indicating the future zealot in behalf of religion and the church. He sold his clothes to feed the poor in a time of famine, and, to a woman who complained that her brother had been made a slave by the Moors, he offered himself to be given in exchange. His career as a student is obscure. He appears to have remained at the university for about ten years, and it is only in 1195, when he was twenty-five years of age, that he begins to emerge into notice. He is then one of the canons of Osma, under the guidance of a new and zealous bishop, whose heart was full of extending the power of the church and reforming its abuses. He gradually became known by his fervour as a preacher and the severity of his austerities, although it was still nearly ten years later before the opportunity came for him to show his true character and abilities. In 1203 the bishop of Osma was delegated to negotiate the marriage of Alphonso VIII. of Castile with a Danish princess, and for this he undertook a journey to Denmark with Dominic as his companion. Accustomed to the obedience and reverence everywhere paid to the clergy in Spain, a very different spectacle presented itself to them as soon as they crossed the Pyrenees, and found themselves in the plains and cities of Languedoc. There a new spirit—half poetical and half spiritual—had sprung up in opposition to the church. The Provençal poets found much of their inspiration in a prevailing excitement at the worldly vices and corruptions of the clergy, as well as in the chivalric loves and gaieties of their time. And in addition to the poets there had arisen in this interesting and beautiful country multitudes of preachers of a new, more simple, and more liberal faith. Peter de Brueys and Henry the Deacon became the organs of popular indignation against the superstitious observances which the priests everywhere encouraged,—the worship of the cross, transubstantiation, prayers, alms, and oblations to the dead, and even infant baptism,—for, as in all such cases of popular movement, the church was attacked not merely in its abuses but in its essential rites and its very existence. The "Poor Men of Lyons" rejected the whole church system, and permitted women to officiate at the altars. The "Paulicians," a sect of Manichæans surviving from the 5th century, had spread from the East through the Greek provinces of Sicily and Italy, and settled amongst the other elements of disturbance in the south of France. "It was discovered," as Gibbon says (c. 54), "that many thousand Catholics of every rank and of either sex had embraced the Manichæan heresy;" and the flames consumed twelve canons of Orleans supposed to be tainted with the heresy. "The same vicissitudes of martyrdom and revenge as had been displayed in the East were repeated in the 13th century on the banks of the Rhone." The result of all was a state of heretical insurrection and confusion sufficiently startling to men like St Dominic or even St Bernard, who has left us a description of what he himself observed—"Churches without people, the people without priests, priests without respect, Christians without Christ, holy places denied to be holy, the sacraments no longer sacred, and holy days without their solemnities." (Quoted by Milman, *Hist. of Latin Christianity*, iv. 178.)

In such a country, and in such a state of things, St Dominic found his mission as a champion of the church and a preacher of Catholic truth. Painfully impressed by what he saw on his journey to Denmark, he was so aroused by the spectacle of abounding heresy on his return that he resolved to devote himself to the conversion of the inhabitants, and the revival of the church in a land which appeared to him so given over to evil. The Pope had sent legates thither for the correction and repression of the heretics, but after a year's labours they had met with no success, and were on their way back to report the failure of their mission at Rome. Dominic met with them on his journey, and, struck at once by their splendid retinue and their failure, he exclaimed,—"How can you expect success with all this secular pomp? These men cannot be touched by words without corresponding deeds. The heretics deceive them by their simplicity. You must throw aside all your splendour, and go forth, as the disciples of old, barefoot, without purse or scrip, to proclaim the truth." He acted without delay on his own principle, and betook himself to the profession of a mendicant preacher. Even the legates were shamed for a time to follow in the wake of the enthusiastic Spaniard. But their enthusiasm did not last long, and Dominic was left alone in his self-denying labours.

It is difficult to describe with any fidelity the character of St Dominic's career, which his mediæval biographers have enveloped in a haze of miraculous exaggeration. Apparently at first he confined himself in the main to moral and intellectual influences, preaching against the heretical errors, and inviting the heretics to conferences and reasonings. His modern biographer, Lacordaire, has even ventured to compare this early phase of his work with St Paul's conferences with the Jews, and St Augustine's expostulations with the Donatists and Manichæans. His arguments were of course powerfully enforced by miraculous tokens when otherwise likely to fail of their purpose. Wherever he moved the glory of the supernatural moved with him. Signs and portents, most of them too trivial and absurd for mention, gave emphasis to his preaching and triumph to his mission. But withal the success that awaited him as a preacher was disappointing; and the flames of war, kindled by the growing antagonism of the sects and the church, and fomented by the rival ambitions which are always at hand to make use of the fury of religious passion, soon swept over the country, and hid from view the figure of the missionary and the preacher. It was, as Milman says, a stubborn generation, which, besides preaching, argument, and miracles, needed the sword of Simon de Montfort to cure it of its heresies. The atrocious crusade known as the Albigensian war, the violent incident and picturesque display of character on both sides, the pleasant, vacillating, and humiliated Count Raymond, the intrepid and bloodthirsty Montfort,—all belong to history rather than to the life of Dominic. What part he really played in the war evades clear historical judgment. Did he share in its atrocities, as religious zealots in similar cases have often done, or did he mourn the interruption of his peaceful labours of conversion, and preach moderation to the conquerors, as well as penitence to the heretics? Facts fail us in the matter. All that is known is that he remained through all the friend of De Montfort, and obeyed the call to bless the marriage of his sons and the baptism of his daughter. This implies that the darker features of the crusade, and the conduct of its leader, awakened no such horror in him as they ought to have done; and when to this is added the glory (!) claimed for him of instituting the Holy Inquisition, the light which is thus thrown upon his character is far from pleasing. It is in no spirit of apostolic mildness, certainly, that he at last left the country in 1217, after the death of De Montfort. "For many years," he says, "I have spoken to you with tenderness, with prayers, and tears, but, according to the proverb of my country, where the benediction has no effect the rod may have much. Behold now we rouse up against you princes and prelates, nations and kingdoms, and many shall preach by the sword" This was a poor gospel for a people already decimated by the armies of the church, and the preacher of it was certainly no apostle of peace. Full of enthusiasm, of eloquence, of dogmatic zeal, with a genius for combination and the great power of inspiring devotion in his followers, Dominic fails in the higher virtues of patience, magnanimity, reasonableness, and moderation. He is a prince of the church, but not a saint save in its official calendar.

On leaving Languedoc Dominic repaired to Rome, and spent the remainder of his life in the organization of his order, which received the papal sanction in 1216, and which, under his generalship, had extended in the course of five years throughout most of the countries of Europe. He died at Bologna in 1221, in the fifty-first year of his age. See DOMINICANS. (J. T.)

DOMINICA, in French DOMINIQUE, a British West India island, the largest in the Leeward group of the Lesser Antilles, lying between the French islands of Martinique and Guadaloupe, 24 miles north of the former and about the same distance south of the latter, at the intersection of 15° 30′ N. lat. by 61° 30′ W. long. It has a length of 29 miles with a maximum breadth of 16, and its area is estimated at 291 square miles. The longer axis is formed by a chain of mountains, which attains in some parts a height of upwards of 5000 feet, and gives the whole island a strongly marked profile and great irregularity of surface. The results and symptoms of volcanic activity are abundant, in the shape of solfataras, emissions of subterranean vapours, and hot springs; and in the southern part of the island there exists a boiling lake of unascertained depth, in which the water is frequently projected 3 feet or more above the surface by the force of the ebullition. Besides a large number of minor rivulets, upwards of thirty streams of considerable size might be mentioned, and the abundance of natural irrigation develops great fertility in the rich volcanic soil. The hills are in many parts covered with valuable timber trees of the kinds commonly found in the West Indies; and the sugar-cane, coffee, cocoa, cotton, indigo, oranges, plantains, and arrow-root are grown in the lowlands. The island is botanically remarkable for the great number of peculiar species which it possesses in comparison with the poverty in this respect of Guadaloupe, Martinique, Montserrat, and Antigua: as many as 24 are mentioned by Grisebach. Game is abundant; the fisheries on the coast are productive; and large quantities of honey and wax are furnished by the wild bees, which were originally introduced from Europe. The coasts of the island are not much indented, and the only anchorages of importance are Prince Rupert's Bay and Roseau, both on the west side. The total tonnage of the ships that annually enter and clear amounts to 18,018 tons, according to the average of the fifteen years from 1860 to 1874 inclusive; and of this total only 3742 tons belong to foreign vessels. The imports in 1874 were valued at £56,714, and the exports of the same year at £67,720,—being a decrease since 1860 of £11,087 and £12,738 respectively. Since 1872 Dominica has formed part of the colony of the Leeward Islands, and sends its representatives to the general legislative council; but at the same time it retains its lieutenant-governor or president, a separate treasury, and its local legislature, consisting of seven elective members and seven nominees of the crown. In 1874 its public revenue amounted to £15,022, its expenditure to £17,456, and its debt to £4813. In common with the Virgin Islands it has attained complete religious equality by the abolition of the salaries paid from the public funds to the clergymen of the Church of England, who had a much smaller portion of the population under their jurisdiction than the Roman Catholic priests. Of the Carib aborigines there are no representatives; and the present inhabitants, numbering, according to the census of 1871, 27,178, consist mainly of descendants of the former negro slaves, with a certain number of Spanish and English families. The capital is Roseau, or Charlotteville, a fortified port near the southern end of the island, with about 5000 inhabitants. Dominica was so named on its discovery by Columbus in 1493, in commemoration of the date, which happened to Sunday (*Dies Dominica*) the 3d of November. It was ceded to England by France at the Peace of Paris in 1763, was captured by the French in 1778, regained by the English in 1783, again seized by the French in 1802, and finally surrendered to Britain in 1814. It was in the neighbouring sea that Rodney obtained his victory over Count de Grasse in 1782.

DOMINICANS, the name by which the disciples of Dominic became known. The Dominican order was founded, as stated in the article on the founder, in 1216 by a bull of Honorius III. It conformed to the general rule of the Augustinians, but further embraced a rule of absolute poverty or mendicancy, in addition to the usual vows of chastity and obedience. Its members were supposed to be exclusively devoted to preaching and public instruction, and were described as mendicant or preaching friars. The order held its first chapter in the year 1220 at Bologna, under the presidency of its founder. It adopted as its insignia within the cloister a white robe and white hood, to which it added outside a black cloak, hence the popular name of black friars by which the Dominicans became known in England. The novitiate was for a year, and candidates were mainly recruited from the schools founded by the order, which became the nurseries of great preachers and great theologians. The order speedily extended itself through the whole Christian world, and popes, cardinals, and learned doctors sprang from it in numbers. Its preachers and teachers addressed all classes, invaded "the high places of the human intellect," and were soon found, as Milman says, "disputing in the universities of Italy and Germany, in Cologne, Rome, and Oxford. Ere long they were to claim two of the greatest luminaries of the prevalent philosophy, Albert the Great and Thomas Aquinas."

DOMINIS, MARC ANTONIO DE (1566–1624), celebrated as a theologian and natural philosopher, was born in the island of Arbe, in 1566. He was educated in the order of the Jesuits at their college at Loretto, and afterwards studied at the university of Padua. He was employed for some time by the Jesuits as a teacher of rhetoric and mathematics, but he did not join the order. In 1596 he was appointed to the bishopric of Segni, and in 1602 he was raised to the archbishopric of Spalatro. His endeavours to reform the church soon after made him obnoxious to the papal authorities, and he was compelled to leave his native country. Having become acquainted with Bishop Bedell, whilst the latter was chaplain to Sir Henry Wotton, ambassador from James I. at Venice, he communicated to that prelate his treatise *De Republica Ecclesiastica*, which was afterwards (1617, 1620) published at London, with Bedell's corrections. The main argument of the work was directed against the superiority of the bishop of Rome to other bishops. He came to England with Bedell, where he was received with great respect, and preached and wrote against the Roman Catholic religion. In 1619 he published at London Father Paul's *History of the Council of Trent*, with a dedication to King James. He was favourably received by the king, who bestowed on him the deanery of Windsor and other ecclesiastical preferments. But on the promotion of Pope Gregory XIV., who had been his schoolfellow and old acquaintance, he was deluded by Gondomar, the Spanish ambassador, into the hopes of procuring a cardinal's hat, and thus of proving an instrument of great reformation within the church. Accordingly he returned to Rome in 1622, recanted his errors, and was at first well received; but he afterwards wrote letters to England recanting his recantation, and, these being intercepted, he was imprisoned by Pope Urban VIII., and died in 1624. There were suspicions that he had been poisoned. Being convicted of heresy after his death, his body was exhumed and burned, and the ashes were thrown into the Tiber. He is believed to have been the first to promulgate a true theory of the rainbow in a tract *De radiis visus et lucis in vitris perspectivis et iride* (Venice, 1611).

DOMITIAN (52–96). Titus Flavius Domitianus, the second son of Titus Flavius Vespasianus and Flavia Domitilla, twelfth of the Cæsars, and third of the Flavian dynasty, was born at Rome, 24th October 52 A.D. He enjoys an evil prominence as the only tyrant among the succession of good and just princes from Vespasian down to Commodus. According to Suetonius, he was brought up in squalor and ignorance, and led a degraded and miserable youth; but it is hardly credible that so good a prince and so indulgent a father in all his other acts should thus have neglected his son's education, and the story of his scandalous youth was more probably invented to suit his after life. When Vespasian was proclaimed emperor, Domitian escaped with difficulty from the burning temple of the Capitol, and lay in hiding from the Vitellians till his father's party proved victorious. After the fall of Vitellius he was saluted as Cæsar, or prince imperial, by the troops, obtained the city prætorship, and was intrusted with the administration of Italy till his father's return from the East. Intoxicated by this sudden rise from obscurity, he grossly abused the power committed to him, and conducted himself more like a Turkish pasha than the son of a sturdy Sabine soldier. Such were the airs of authority he assumed that Vespasian, as the story goes, wrote in irony to thank him for not having dismissed his own father. Certain it is that though in his father's lifetime he several times filled the office of consul, and after his death was nominally the partner in the empire with his brother, yet he never took any part in public business, but lived in great retirement, devoting himself to a life of pleasure and of literary pursuits till he succeeded to the purple. The death of Titus, if not hastened by foul means, was at least eagerly welcomed by his brother. His succession (13th Sept. 81) was unquestioned, and it would seem as if, when his ambition was sated, and before his fears were aroused, he intended, as far as his weak volitions and mean abilities would allow, to govern well. Like Augustus, he attempted a reformation of morals and religion. As chief pontiff he inquired into the character of the vestal virgins, three of whom were found guilty, while in the case of one the awful penalty of a living entombment was revived. He enforced the laws against adultery, mutilation, and the grosser forms of immorality. He forbade the public acting of mimes. He erected many temples and public buildings and restored the temple of the Capitol, on the gilding of which, if Plutarch is to be believed, he expended 12,000 talents, or nearly two and a half millions of our money. He passed many sumptuary laws, one of which is noticeable as showing the increasing dearth of corn, which was now grown mainly by the wasteful and inefficient process of slave labour. An edict was issued forbidding the withdrawal of arable land from the plough, and reducing existing vineyards by one half. Finally, he took a personal share in the administration of justice at Rome, and exercised a jealous supervision over the governors of provinces.

Such public virtues counterbalanced in the eyes of the people all his private vices, gross and glaring as they were from the first. Former emperors had been deified after their death, but Domitian was the first to arrogate divine honours in his lifetime, and cause himself in public documents to be styled *Our Lord and God*. Doubtless in the poets (such as Martial, who calls the emperor's minion the Ganymede of our second Jove) this deification was nothing but fulsome flattery, but in the case of the provincials it was a sincere tribute to the impersonation of the Roman Empire, as the administrator of good government, and the peacemaker of the world. Even when Rome and Italy felt his heavy hand, and smarted beneath his proscriptions and extortions, the provinces were undisturbed. Though he took the title of imperator more than twenty times, and enjoyed at least one triumph, his achievements as a general were insignificant. His campaign in 83 against the Chatti was "a mere summer promenade;" in Dacia (87) he received a severe check, and the peace concluded with this nation in 90 was due to the victories of his lieutenant Julianus. Juvenal hints that the flaxen-haired Germans who figured in his triumph were purchased slaves. His jealousy was provoked by the successes of Agricola in Britain, and the conqueror of Galgacus and the hero of the battle of the Grampians was recalled to Rome (84) in the midst of his conquests, condemned to retirement, and, as Tacitus is inclined to believe, removed by poison.

The revolt of Antonius Saturninus, the commander of the Roman forces in Upper Germany (93), marks the turning point in his reign. By a fortunate rising of the Rhine, which prevented his barbarian allies from coming to his assistance, and by the vigour of Norbanus, it was speedily crushed; but the fears of the emperor once aroused seem never again to have slept. A proscription as bloody as that of Sulla followed, and no man of eminence could feel his life safe. Before this he had sought out victims to gratify his cupidity and replenish his exhausted treasury. Now he struck at all that was conspicuous for talent or virtue, glutted himself with the blood of the Lamiæ, and sentenced to death his own cousin and nephew by marriage, Flavius Clemens. A conspiracy among his own freedmen—set on foot, it is said, by his wife, who knew her own life to be threatened—cut short his career of tyranny and bloodshed. He was stabbed in his bedroom by a freedman of Clemens named Stephanus, 18th Sept. 96. Had Domitian died after as short a reign as his brother he might have left behind him as fair a name, and the interesting problem for the historian is to connect the two portions of his reign, and account for the double part he played. Like Hamlet he was born to a position which he felt himself unequal to fill. So long as the popularity which he inherited from his brother lasted, and he felt himself secure on his throne, he carried on the traditions of his father's government, denounced delators, and administered even justice. After his unsuccessful campaign and the conspiracy of his general, he was seized with the common disease of absolute monarchs, the fear of assassination and distrust of all around him. The last three years of his reign witnessed the awful spectacle of the acts of a madman endowed with unlimited power.

DON, anciently TANAIS, a river of European Russia, which ranks immediately after the Volga and the Dnieper. It rises in the Ivan lake, a small basin in the government of Tula, which also sends a portion of its waters to the Volga by means of the Shat, a tributary of the Upa; its course has a general southern direction through the governments of Riasan, Tamboff, Orloff, Voronesh, and the Country of the Don Cossacks; its total length, inclusive of its various windings, is 1325 miles; and its drainage area is calculated at 170,000 square miles. The Ivan lake lying 586 feet above the level of the sea, the average fall in the river is about 5¼ inches to the mile. In the upper division of its course, which may be regarded as extending to the confluence of the Voronesh, the Don flows for the most part through a low-lying and fertile country, though in the government of Riasan its banks are rocky and steep, and in some places become even precipitous. The strata which it traverses belongs to the Devonian formation. In the middle division, or from the mouth of the Voronesh to the point when it makes its nearest approach to the Volga, it cuts its way to the S.E., for the most part through Cretaceous rocks, which in many places rise on either side in steep and elevated banks, and at intervals encroach on the channel. After passing Kachalinskaya it turns to the S.W., and maintains this direction till it falls into the Sea of Azoff, the first part of this division being still in the Cretaceous formation, but the latter part lying in an Upper Tertiary district. A short distance below the town of Rostoff it breaks up into several channels, of which the largest and most southern retains the name of the river, while the others are known respectively as the Mertvi Donetz, the Mokraya Kolоncha, and the Staraya Kuterma. Before it receives the Voronesh, the Don has attained a breadth of from 500 to 700, or even in a few places 1000 feet, while its depth varies from 4 to 20 feet; by the time it has reached its most eastern point, the depth has increased to from 7 to 50 feet, and the ordinary breadth to from 700 to 1000 feet, with an occasional maximum of 14,000 feet; in the lowest division the depth is frequently 70 feet, and the breadth in many places 1800 feet. Shallow reaches are not uncommon, and there are at least seven considerable shoals in the south-western part of the course. The river can be used for rafts as far up as the confluence of the Sosna; it becomes navigable after the addition of the Voronesh, and has four regular stations for traffic at Vilkoff, Pavloff, Masloff, and Mamon, in the middle part of its course; but partly owing to obstructions of the channel, and partly to the scarcity of ship-timber in the Voronesh government, it does not attain any great importance as a means of communication till it reaches Kachalinskaya. From that point, or rather from Kalatch where the railway from the Volga has its western terminus, the traffic is very extensive, and is carried on, not only by a variety of small river craft, but also by a regular system of steamboats. [illegible] the tributaries of the river, which are between 30 and [illegible] in number, the Voronesh, the Khoper, the Medvieditza, [illegible] the Donetz are navigable,—the Donetz having a cour[illegible] 678 miles, and affording during high water a passage to [illegible] government of Kharkoff. The lower section of the Do[illegible] subject to two annual floods, of which the first, know[illegible] the *cold water*, is caused by the melting of the snow in [illegible] country of the Don Cossacks, and the second, or the [illegible] *water*, is due to the same process taking place in the [illegible] drained by the upper parts of the river. About the m[illegible] of June (o.s.) the subsidence sets in with great rapidit[illegible] August it is very low water, and navigation almost [illegible] but occasionally after the September rains the traffic [illegible] small craft is again practicable. During the last hundred years there have been five floods of extraordinary magnitude,—namely, in 1748, 1786, 1805, 1820, and 1845. The river is usually closed by ice from November or December to March or April, and at rare intervals the freezing takes place in October. At Aksai it remains open on the average 250 days in the year, at the mouth of the Medvieditza for 239, and at Novo-Cherkask for 244.

DON COSSACK COUNTRY (in Russian, *Donskago Voiska Zemlya*, the Land of the Don Army), the south-west portion of European Russia, situated in the basin of the Don, and bounded in part by the Sea of Azoff. Its area, according to the military survey, is 59,650 square miles, or 135,761 square versts, but according to Schweizer 62,574 square miles, or 142,401 square versts. The most of the surface consists of an irregular steppe broken in some places by undulating elevations or conical hills, and traversed by the channels and ravines of the numerous tributaries and sub-tributaries of the principal river. The district to the north is especially flat, forming in fact, as is shown by the characteristics of its flora, a part of the great Aralo-Caspian depression. Cretaceous formations appear throughout the whole "country," Tertiary and Carboniferous formations especially to the south of the Donetz. Coal and anthracite are found in considerable abundance in several places, and iron ore occurs near the Miuss, the Donetz, and the Khoper. Limestone, chalk, and slate are common; and salt is obtained from various lakes. The upper soil is in general black earth, the subsoil usually clay. Agriculture is still in a backward state owing to the military prejudices of the Cossacks; but the virgin fertility of the ground, and the proximity of such seaports as Taganrog and Rostoff conduce greatly to its development. Wheat is the most generally cultivated cereal, but rye is pretty largely grown in the northern and millet in the southern districts. Flax and hemp have been introduced, and maize is sown in the gardens. Stock-rearing is extensively prosecuted: in 1860 there were about 373,000 horses, 991,000 cattle, and 2,242,000 sheep. The horses show a mixture of various Asiatic strains, those of the southern districts being the best. The cattle are usually of Calmuck or Tatar race, but sometimes of Hungarian or Dutch; and the sheep are, with slight exception, Russian, Calmuck, or Wallachian. The land of the Don Cossacks was divided in 1802 into the following seven districts—Cherkask, First Don, Second Don, Ust-Medvieditzki or Mouth of the Medvieditza, Khoper, Donetz, and Miuss; and in 1806 a new district, or *okrug*, was formed of the nomadizing Calmucks. The six first-mentioned are divided into *stanitzas*, to each of which belongs a definite territory; the Miuss district is occupied by regular landholders; and the Calmucks are arranged according to hundreds, or *sotnias*. The population in 1858 of the whole *Zemlya* was 896,870, and in 1867, 1,010,135. Novo-Cherkask is the seat of government and the residence of the directing ataman of the Don army. In ancient times the Greeks had a colony at Tanais on the Sea of Azoff, and rious factories on the Don; and the Scythians and rmatians nomadized throughout the district. Afterwards me the Alans, the Huns, the Ugrians, the Bulgarians, e Avars, and the Khazars, the last even building the all town of Sarkel; then followed the Pechenegs, the lovians, and finally the Tatars, whose power was gradually minished during the 16th and 17th centuries by the croachments of the Russian Cossacks.

DON JUAN, a legendary personage whose story, iginating in Spain, has found currency in various poetic d dramatic forms throughout most of the countries of urope. The character has a certain historic basis in so r as it is localized at Seville in the time of Peter the ruel, or, according to another version, of Charles V. Don uan, who belonged to the illustrious Tenorio family, lived life of unbridled licentiousness. In an attempt to abduct iralda, daughter of the governor of Seville, he was ncountered by her father, whom he subsequently killed in duel. In mocking defiance of the spirit world, in whose xistence his sensuality had destroyed all faith, he visited he tomb of the murdered man in the vault of San rancesco and challenged his statue to follow him to supper. he invitation was accepted; the animated statue appeared t table among the guests, and carried the blaspheming ceptic to hell. In a few later dramatic versions of the tory some features are introduced belonging to another personage of the same name, Don Juan of Marana, who, aving sold himself to the devil, passed the greater part of is life in debauchery and crime. His mother, however, ad provided that masses should be said for his salvation, nd, being converted through the influence of these, he nded his days in a monastery, where he subjected himself o the severest penance.

As a dramatic type Don Juan is essentially the personation of the scepticism that results from sensuality, nd is thus the complement of Faust, whose scepticism is he result of speculation. In its literary treatment it has ceived various degrees of intensity. In the hands of the arlier Spanish dramatists it becomes, without their innding it, a solemn and impressive moral beacon, while yron's Don Juan is a gay adventurer, with nothing in ommon with the legendary personage except his name and is libertinism. The first introduction of the story into ramatic literature seems to have been in Lope de Vega's *oney makes the Man*, where the incident of a walking tatue occurs; but the earliest occasion on which the story as dramatized as a whole was in the *Burlador de Sevilla* The Deceiver of Seville) of Gabriel Tellez, who published is secular works under the name Tirso de Molina. The on Juan of this play is almost heroic in his fearlessness, ndulging his cold grim humour without restraint even in he realized presence of the supernatural; but his unrelieved epravity revolts the moral sense. From Spain the drama as soon after 1620 transferred to Italy, where a translation f it was produced at Naples. A few years later it was ransferred to Paris, where it was frequently acted, someimes in the form of a translation of the work of Tellez, nd sometimes in more or less free imitations, of which everal were produced. A new aspect was given to the haracter in Molière's *Don Juan, ou le Festin de Pierre* 1665), where the hero, though as heartlessly depraved as n the Spanish original, loses some of the sterner elements oth of his wickedness and of his humour, and becomes ore seductive and more amusing. Into English literature he story was first introduced by Shadwell's *Libertine* 1676), a grossly indecent and, from a literary point of iew, worthless play. The continued popularity of the egend in the country of its birth is attested by the fact hat it has furnished the groundwork for a play—*Don Juan enorio* (1844),—and two poems—*El Desafio del Diablo* and *Un Testigo di Bronce* (1845),—by the celebrated poet Zorilla. During the present century it has also been a favourite subject with French writers of the romantic school, having been dealt with by Dumas the elder, Musset, Levasseur, Mallefille, and others. Its capacity for musical treatment has been tested by two composers of the first rank. Gluck made Don Juan the hero of a ballet, and Mozart's opera, *Don Giovanni*, the libretto of which was furnished by Da Ponte, has probably done more to popularise the story in the Molière as distinct from the severer early Spanish form than any other setting, literary or musical, it has ever received.

DONAGHADEE, a market town of Ireland, in county Down, situated near the mouth of Belfast Lough on the Irish channel, is the nearest port in Ireland to Great Britain, being 21½ miles S.W. of Port Patrick in Wigtownshire. It consists of two principal streets, and possesses a harbour which admits vessels of 16 feet in draught. On the north-east side of the town there is a *rath* 70 feet high, in which a powder magazine has been built. The town is frequented for sea-bathing in the summer months. Population (1871), 2226.

DONALDSON, JOHN WILLIAM, a philologist and biblical critic, born 1812, died February 10, 1861. He was educated at the London university and at Trinity College, Cambridge, of which college he was afterwards elected a fellow. He graduated in the year 1834, being placed in the second class of the mathematical tripos, and second in the classical tripos, when G. J. Kennedy was senior, and W. Forsyth, the author of *Hortensius*, third classic. After his degree he devoted himself with unremitting energy to classical philology, and the *New Cratylus*, which appeared five years later, is not only a work of wonderful erudition for so young a man, but forms a landmark in the history of philology in England. In 1841 he was elected to the head-mastership of King Edward's school at Bury St Edmunds, a position which he held for over ten years. On resigning this post he returned to Cambridge, where his time was divided between literary work and private tuition. At the time of his death, which was accelerated by over-study, he was engaged in the preparation of a Greek lexicon.

The *New Cratylus*, the work on which Dr Donaldson's fame mainly rests, is an attempt to apply the general principles of comparative philology to the Greek language. The book consists of two parts—a general introduction, in which the philosophy of language and the ethnographical affinities of the ancient Greeks are discussed, and a treatise on the grammatical structure and etymology of Greek. It is mainly founded on the comparative grammar of Bopp, but a large part of it is original, and it is but just to the English philologist to observe that the great German's grammar was not completed till ten years after the first edition of the *Cratylus*. In the *Varronianus*, which followed in 1844, the same method is applied to the classification and analysis of Latin and the other Italian dialects. It includes a critical commentary on the remains of old Latin, Umbrian, and Oscan. If we consider the recent birth and rapid strides of philology it is not wonderful that these early essays should have been superseded by the riper labours of such men as Curtius, Schleicher, and Mommsen. Distinguished as Donaldson's works are by wide and varied learning, much ingenuity, and independence of thought, they are deficient in soberness of judgment, and, most of all, in the ability to distinguish between certain inference and uncertain conjecture. More especially are these defects apparent in the ethnographical theories of the *Varronianus*. To take a single instance, the origin and affinities of the Etruscan language, problems which have yet to be solved, are stated no less confidently than those of modern French.

Before discussing his other works it is necessary to mention an unfortunate controversy which this book provoked. A charge of plagiarism was brought against the author by the late Professor Key, and a war of pamphlets followed as violent as those which were common in the days of Bentley and Porson. Without attempting to decide on the merits of this dispute, it is enough to state that though the obligations of Donaldson to Key ought in the first instance to have been more explicitly acknowledged, yet the strictures of the latter were needlessly sweeping and aggressive.

We pass on to Donaldson's work as a biblical critic. In 1854 he published his *Jashar, or Fragments of original Hebrew songs inserted in the Masoretic text of the Old Testament.* The book was written in Latin, as an appeal *ad clerum*, to the learned world in general, and especially to German theologians. It is an attempt to reconstitute the lost book of Jashar from the remains of old songs and historical records, which, according to the author, are incorporated in the existing text of the Old Testament. Here, too, we notice the same merits and defects as in the *Cratylus*, the same ingenuity and learning, the same rash and over-confident speculation. The bold views of the author on the nature of inspiration, and the free handling of the sacred text, provoked a storm of theological odium, but the only one of his numerous assailants who deserves mention is Dr Perowne. A full analysis of the book will be found in Smith's *Biblical Dictionary*, *s. v.* "Jashar."

Of his numerous other works the most important are *The Theatre of the Greeks*, *The History of the Literature of Ancient Greece* (a completion of K. O. Müller's work), an edition of *Pindar*, and a Hebrew, a Greek, and a Latin Grammar. Among his occasional writings the article "Philology" in the 8th edition of this *Encyclopædia* is the most important. Though much of what he wrote has already become obsolete, Donaldson will long be remembered as one of the pioneers of philology in England.

DONATELLO (1386–1466), the diminutive of Donato, was the son of Niccolo Bardi, and was born in Florence in 1386. In the struggle between the rival parties of the Albizzi and the Medici, the father took part with the former, and was involved in their ruin. He must have been a man of considerable property, judging from the decree by which his houses are confiscated. His son Donatello found protection and shelter and the means of early training from the Martelli family, and to this connection must be ascribed Donatello's introduction to the great Cosmo de' Medici, *pater patriæ*, who during the life-long relation between himself and the artist, did everything to efface, by kindness towards the son, the recollection of the sufferings which the house of Medici had inflicted on the father. He learned the goldsmith's trade under the father of the renowned Lorenzo Ghiberti, and the goldsmith's trade then included all kinds of bronze creations. At the age of seventeen he set out for Rome with his friend Brunellesco. At Rome the two young men maintained themselves by working as goldsmiths during the first half of the week, devoting the second half to the study of the ancient monuments, and to making excavations in search of lost works of art. The Romans, we are told, believed them to be treasure-seekers. The Romans of Donatello's time still reflected the feelings with which their forefathers, nearly three centuries before, had wondered when the agents of Henry of Blois, bishop of Winchester, dug up and carried away from their city similar artistic treasures. On their return to Florence, rich in artistic knowledge and treasures, the careers commenced in which Brunellesco was destined to hang above the Florence cathedral the dome of the Pantheon, and Donatello to impart to the multitudinous creations of his chisel the truthfulness and grace and power for which he was so largely indebted to his ancient models. There exist 40 works of Donatello of unquestioned authenticity, and 31 respecting which controversies have arisen; and 25, recorded by his contemporaries but no longer found, must be added to the number. When it is borne in mind that many of these works are life-size or colossal statues, or large bas-reliefs crowded with figures, an idea may be formed of the extent of his labours, prosecuted untiringly during a life which extended to eighty years. He was fortunate in the precise period of his labours. During the whole of the previous century Florentine art had concentrated its efforts on the creation of its grand architectural monuments. In the second half of the 15th century sculpture was cultivated, but chiefly to adorn the palaces and gratify the vanity of the rich. Donatello, placed between the two periods, could devote his genius to the execution of the great plastic works required for the completion and adornment of the public buildings of the state. Hence the statues of the church of St Michele, those on Giotto's belfry, the pulpit of St Lorenzo, those in the baptistry, as well as all the other works which still remain exactly where first placed—unhappily no longer the case with the St George—possess an exceptional beauty; for no sculptor ever studied more carefully than Donatello the exact relation of a work to its local destination. The varied and characteristic elements of Donatello's art, what he borrowed from the antique, what peculiar tricks of drapery he took from his immediate predecessors, how, from his first habit of painting his figures he passed into a phase of purely sculptured effects, how he was influenced by his friend Brunellesco in his treatment of proportion and perspective, how he imparted a more pictorial character by the greater flatness of the figures to his bas-reliefs, all this forms one of the most interesting chapters in the history of Renaissance sculpture. Besides Florence he worked also at Rome, Padua, Venice, Siena, Modena, Mantua, and Ferrara; and he visited Rome a second time. In Padua he produced, in 1432, the equestrian statue of Gattainelata with some minor works, and as almost his latest work we may consider the statue of St Louis of France, executed for St Croce. To English students of art it may be satisfactory to learn that, in the opinion of Semper, the South Kensington museum possesses seven undoubted specimens of Donatello, besides one, the Magdalen seated on clouds, probably by a scholar, and a virgin and child of doubtful origin. Donatello, though best known as a sculptor, was likewise a painter,—at least was admitted as such into the academy of St Luca in 1412. We find him paid for architectural drawings and opinions respecting the dome of the Florence cathedral in 1420, and he was sent as military engineer to the siege of Lucca in 1430. His first trade of goldsmith was never abandoned. Thus varied and versatile, we cannot but form the highest opinion of one respecting whom Vasari has said that he threw the same love of art into every work great or small, and that he always did more than he promised. His life-long attachment to his patron Cosmo was only equalled by his lavish kindness to his friends; for we read that the large sums received by him were kept in an open box in his workshop, and that his friends when wanting money were invited and expected to help themselves, no questions being asked or receipts given. In his last years he was provided for by Piero, the son of Cosmo. He died at Florence in 1466. Donatello's greatest works, his Baptist, David, Judith, St George, and Mark, are declared by some recent critics not to rise into the highest sphere of true Christian art. The sculptor, we are told, wanted the deep faith of Michelangelo. Perhaps the best corrective of this criticism is the language of Michelangelo himself, who, when gazing with generous admiration on the St Mark, exclaimed, "So noble a figure could indeed write a gospel."

DONATI, Giovanni Battista, professor of astronomy at the Royal Institution of Florence, was born at Pisa, December 16, 1826, and died at Florence, September 20, 1873. In 1852 he became an assistant at the Florentine observatory, of which in 1864 he was appointed director. On June 2, 1858, he discovered the comet which bears his name (see vol. ii. p. 815). Other comets were discovered by him on June 3, 1855, November 10, 1857, and July 23 and September 9, 1864. He made numerous spectroscopic observations of comets and the solar disc, and in 1862 published diagrams of three or four lines in the spectra of fifteen stars. The new observatory on the hill of Arcetri, near Florence, was erected under his superintendence, and was directed by him. At the time of his death Donati had just returned from Vienna, where he was the representative of Italy in the international meteorological congress.

DONATISTS, a powerful sect which formed itself in the Christian church of northern Africa in the beginning of the 4th century.[1] In its doctrine it sprang from the same roots, and in its history it had in many things the same character, as the earlier Novatians. The predisposing causes of the Donatist schism were the belief, early introduced into the African church, that the validity of all sacerdotal acts depended upon the personal character of the agent, and the question, arising out of that belief, as to the eligibility for sacerdotal office of the *traditores*, or those who had delivered up their copies of the Scriptures under the compulsion of the Diocletian persecution; the exciting cause was the election of a successor to Mensurius, bishop of Carthage, who died in 311. Mensurius had held moderate views as to the *quæstio vexata* of the treatment of the *traditores*, and accordingly a strong fanatical party had formed itself in Carthage in opposition to him, headed by a wealthy and therefore influential widow named Lucilla, and countenanced by Secundus of Tigisis, primate of Numidia. There were thus two parties each anxious to secure the succession to the vacant see. The friends of the late bishop fixed their choice on Cæcilian, the archdeacon, and secured his election and his consecration by Felix, the bishop of Aptungis, before the other party were ready for action. It had been customary, though probably it was not essential, that the Numidian bishops should be present at the election and consecration of the bishop of Carthage; Cæcilian's party had not waited for them, knowing them to be in sympathy with their opponents. Soon after Cæcilian's consecration, however, Secundus and seventy of the Numidian bishops arrived at Carthage, and steps were at once taken to displace the new bishop. A synod was formed before which Cæcilian was summoned; his consecration was declared invalid, on the ground that Felix had been a traditor; and finally, having refused to obey the summons to appear, he was excommunicated, and Majorinus, a dependent of Lucilla's, consecrated in his stead. Thus the schism became overt, and in a very short time there were rival bishops and rival churches in most of the cities of North Africa, as well as in Carthage.

The inevitable appeal to the civil power to settle the dispute was first made by the Donatists, who were incited to do so by receiving proof, in their exclusion from certain privileges conferred on the African church, that the sympathies of Constantine were with the other party. They accordingly petitioned the emperor to appoint a commission to try the case, indicating a preference for Gallic bishops, among whom there were no traditors, the Diocletian persecution not having extended to Gaul. The result was that a commission was issued to five Gallic bishops, under the presidency of Miltiades, bishop of Rome. The number of referees was afterwards increased to twenty, and the case was tried at Rome in 313. Ten bishops appeared on each side, the leading representative of the Donatists being Donatus of Casæ Nigræ. The decision was entirely in favour of Cæcilian, and Donatus was found guilty of various ecclesiastical offences. An appeal was taken and allowed; but the decision of the synod of Arles (314) not only confirmed the position of Cæcilian, but greatly strengthened it by passing a canon that ordination was not invalid because performed by a traditor, if otherwise regular. Felix had previously been declared innocent after an examination of records and witnesses at Carthage. A further appeal to the emperor in person was heard at Milan in 316, when all points were finally decided in favour of Cæcilian. As a necessary consequence of this the power of the state was directed to the suppression of the defeated party. Persistent Donatists were no longer merely heretics; they were rebels, and incurred the confiscation of their church property and the forfeiture of their civil rights.

The attempt to destroy by force a fanatical sect had its usual result in only intensifying its fanaticism and consolidating its sectarianism. Majorinus, the Donatist bishop of Carthage, dying in 315, was succeeded by Donatus, surnamed Magnus, a man of great force of character, under whose influence the schism gained fresh strength from the opposition it encountered. Force was met with force; the Circumcelliones, bands of fugitive slaves and vagrant (*circum cellas*) peasants, were enlisted as the champions of Donatism, and their violence reached such a height as to threaten civil war. In 321 Constantine, seeing probably that he had been wrong in abandoning his usual policy of toleration in this case, sought to retrace his steps by granting the Donatists liberty to act according to their consciences, and declaring that the points in dispute between them and the orthodox should be left to the judgment of God. This wise policy, to which he consistently adhered to the close of his reign, was not followed by his son and successor in the Western Empire, Constans, who, after repeated attempts to win over the sect by bribes, resorted to persecution. The renewed excesses of the Circumcelliones, among whom were ranged fugitive slaves, debtors, and political malcontents of all kinds, had given to the Donatist schism a socialist aspect; and its forcible suppression may therefore have seemed to Constans even more necessary for the preservation of the empire than for the vindication of orthodoxy. The power which they had been the first to invoke having thus declared so emphatically and persistently against them, the Donatists were led to adopt the theory known in more recent times as that of spiritual independence, which Donatus Magnus formulated in the question, "What has the emperor to do with the church?" (*Quid est imperatori cum ecclesia?*) Such a theory naturally aggravated the lawlessness of the Circumcellion adherents of the sect, and their outrages were in turn made the justification for the most rigorous measures against the whole Donatist party indiscriminately. Many of their bishops fell victims to the persecution, and Donatus and several others were banished from their sees.

With the accession of Julian (361) an entire change took place in the treatment of the Donatists. Their churches were restored and their bishops reinstated, with the natural result of greatly increasing both the numbers and the fanaticism of the sect. A return to the earlier policy of repression was made under Valentinian I. and

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[1] There were two Donatuses connected with the Donatist sect, Donatus of Casæ Nigræ, and Donatus surnamed Magnus, who succeeded Majorinus as the Donatist bishop of Carthage. The name of the sect was probably derived from the latter, who was the more influential of the two. It is to be observed that the Donatists themselves repudiated that designation, which was applied to them by their opponents as a reproach. They called themselves "Pars Majorini" or "Pars Donati."

Gratian, by whom the Donatist churches were again closed, and all assemblies of adherents of the sect forbidden. It was not, however, until the commencement of the 5th century that the sect began to decline, owing partly to the occurrence of a division within it, but still more to the arguments used against it by the greatest theologian of the early church. The division arose out of a quarrel between Maximian, a deacon in Carthage, and Primian, the successor of Parmenian in the (Donatist) bishopric. Maximian, being excommunicated, formed a party which, as Neander puts it, "stood in precisely the same relation to the body of the Donatists as the Donatists themselves did to the Catholic church." The dispute was a source of weakness in itself, and still more by the unanswerable arguments it furnished to the Catholic party, who during the reign of the emperor Honorius made repeated and determined efforts to secure the extinction of the schism. In 405 an imperial edict was issued commanding the Donatists, under the severest penalties, to return to the Catholic church. Meanwhile the more appropriate weapon of argument was being effectively wielded by the Catholic party, under the leadership of one of the ablest controversialists the Christian church has ever known. Augustine, bishop of Hippo, after several years' negotiation, found it possible to arrange a great conference between the Donatists and the orthodox, which took place under the orders of the emperor at Carthage in 411. There were present two hundred and eighty-six Catholic and two hundred and seventy-nine Donatist bishops. Before entering on the proceedings the Catholics pledged themselves, if defeated, to give up their sees, while in the other event they promised to recognize the Donatists as bishops on their simply declaring their adherence to the Catholic church. The latter proposal, though it was received with scorn at the time, had perhaps ultimately as much influence as the resistless logic of Augustine in breaking the strength of the schism. The discussion, which lasted for three days, Augustine and Aurelius being the chief speakers on the one side, and Primian and Petilian on the other, turned exclusively upon the two questions that had given rise to the schism,—first, the question of fact, whether Felix had been a traditor, and secondly, the question of doctrine, whether a church by tolerance of unworthy members within its pale lost the essential attributes of purity and catholicity. On the second point, to which alone abiding interest attaches itself, the Catholic view was stated and defended by Augustine with a force of argument, an aptness of quotation from Scripture (often, however, founded on misinterpretation), and a beauty of language that all but compel assent. Nowhere else in polemical theology are there to be found more valuable statements as to the connection between the divine and the human elements in the communication of grace, and as to the relative importance of the two attributes of catholicity and purity respectively as tests of the true church. It is to be observed, however, that on the side of Augustine as well as on that of his opponents there is the inevitable confusion of thought that arises from failure to apprehend the distinction between the visible and the invisible church.

The decision of Marcellinus, the imperial commissioner, was in favour of the Catholic party on both questions, and it was at once confirmed on an appeal to the emperor. As in the case of the similar decision almost exactly a century earlier, there followed the severest penal measures against the schismatics, the clergy being banished and the laity subjected to heavy fines. The extinction of the schism, which all the arguments of Augustine had failed to effect, was still less to be brought about by persecution. The Donatists continued to maintain an independent existence until the 7th century, when they disappear from history, along with the whole Christian church of North Africa, before the invading Saracens.

Sources.—1. Contemporary.—*Optatus Milevitanus De Schismate Donatistarum Lib. VII.*, (Dupuis's ed., Paris, 1700), and several of the works of Augustine. 2. Modern.—Walch's *Entwurf einer vollständigen Historie der Ketzereien*, Neander's *Kirchengeschichte*, Hagenbach's *Kirchengeschichte*, Herzog's *Encyclopädie*, art. "Donatisten," Robertson's *History of the Christian Church*.

DONATUS, ÆLIUS, a grammarian and rhetorician, who taught at Rome in the middle of the 4th century A.D., had the honour of numbering St Jerome among his pupils, and was the author of a number of professional works. We still possess his *Ars grammatica*, consisting of three parts, *De literis, syllabis, pedibus et tonis*, *De octo partibus orationis*, and *De barbarismo, solecismo, schematibus, et tropis*; the larger portion of his commentary on Terence, in a greatly interpolated condition; and a few fragments of his notes on Virgil preserved and severely criticised by Servius. The first of these works, and especially the section *De octo partibus*, though possessing little claim to originality, and in fact evidently based on the same authorities which were used by Charisius and Diomedes, attained such popularity as a school-book that in the Middle Ages the writer's name became a common metonymy for a rudimentary treatise of any sort, and bade fair to furnish as permanent an addition to the English vocabulary as has been obtained in French from the name of Calepinus. Avaricia, for example, in the Vision of Piers Plowman, tells how he "drowe among draperes his *donet* to learn;" and bishop Pecock published about 1440 a *Donat into Christian Religion*. On the introduction of printing the little book was one of the first rendered accessible by the new process, and editions were soon multiplied to such an extent that the bibliography of Donatus is nearly as intricate a subject as that of the Bible. Copies still exist, though in a mutilated condition, of impressions produced by the early wooden-block system, details about which may be found in Sotzmann's "Aelteste Geschichte der Xylographie" in the *Historische Taschenbuch* for 1837. The *Ars Grammatica* is reprinted by Putsch in *Gram. Latinæ Auctores Antiqui*, Hanover, 1605, and by Lindemann in *Corpus Grammaticorum Latinorum*, vol. [illegible]; and the *Commentaries on Terence*, first published at Rome [illegible] in 1472, may be found in Klotz's edition of the dramatist, 1838-40. The *Commentary on Virgil* discovered by J. Jovian Pontanus, and published by Scipio Capecius at Naples in 1535, is the work of a later grammarian of the same name, Tiberius Claudius Donatus.

See Teuffel, *History of Roman Literature*, vol. ii., and the writers there referred to.

DONAUWÖRTH, a town of Bavaria, in the circle of Swabia-Neuburg, 25 miles N. of Augsburg, on the left bank of the Danube, at the confluence of the Wörnitz. It is of some importance as a river port, and the centre of a considerable agricultural trade; but its main interest is historical. Having grown up in the course of the 11th and 12th centuries under the protection of the castle of Mangoldstein, it became in the 13th the seat of the duke of Upper Bavaria, who, however, soon withdrew to Munich to escape if possible from the *manes* of his wife Maria of Brabant, whom he had there beheaded on an unfounded suspicion of infidelity. The town received the freedom of the empire in 1308, and maintained its position in spite of the encroachments of Bavaria till 1607, when the interference of the Protestant inhabitants with the abbot of the Holy Cross called forth an imperial law authorizing the duke of Bavaria to inflict chastisement for the offence. In the Thirty Years' War which soon after broke out, it was stormed by Gustavus Adolphus in 1632, and captured by King Ferdinand in 1634. In the vicinity the Bavarians and French were defeated by Marlborough and Prince

Louis of Baden in 1704. The imperial freedom restored to the town by Joseph I. in 1705 was again lost by re-incorporation with Bavaria in 1714. The abbey of the Holy Cross is still standing, and the neighbouring chapel still preserves the sarcophagus of the unfortunate duchess Maria.

SIGILLUM COMMUNE BURGI DE DONCASTER

Arms of Doncaster.

DONCASTER, the *Danum* of Antoninus and *Dona Caster* of the Saxons, a municipal borough and market-town of England, in the west riding of Yorkshire, 32 miles S. of York and 156 miles N. of London by railway, in the line of the ancient Roman road of Ermine street or, as some write, Watling street, is situated on the right bank of the Don, over which and an arm of it called the Cheswold it has two bridges. The parish church of St George, occupying the site of an older structure of the same name destroyed by fire in 1853, was finished in 1858 at a cost of £43,128; its tower is 172 feet high. Among the other public buildings are Christ Church and St James's, the mansionhouse, market-hall, guildhall, theatre, grammar-school, infirmary, and jail. The commerce of Doncaster is mainly agricultural, and the corn market is of considerable importance. The manufactures are iron and brass ware, sacking and linen, spun flax, ropes, and agricultural machines. About a mile to the south-east of the town is the race course, which is nearly circular, and has a circumference of 1 mile 7 furlongs and 70 yards; the principal races held annually commence on the Tuesday after the 10th of September. The grand stand, erected in 1777, has been frequently altered and improved, but has lost much of its importance by the erection of minor stands. Races have long been held at Doncaster, and there was a stand on the course before the year 1615. The St Leger race takes its name from Lieut.-Gen. St Leger, who originated it in 1776; but it was not so named till 1778. Doncaster received its first charter from Richard I. In 1399, after landing at Ravenspur, Bolingbroke, subsequently Henry IV., lodged for a time in the town. In 1871 the population of the municipal borough was 18,768. The area is 1691 acres.

DONEGAL, a maritime county in the extreme north-west of Ireland, in the province of Ulster, bounded on the N. and W. by the Atlantic Ocean, on the E. by Lough Foyle, and the counties of Londonderry and Tyrone, and on the S. by Donegal Bay and the counties of Fermanagh and Leitrim. It covers an area of 1870½ square miles, or 1,197,154 acres, of which 22,880 are under water.

Coast.—The county possesses a large extent of sea-coast indented by numerous inlets. Ballyshannon harbour, the most southern of them, is small, and has a bar at its mouth, as have Donegal and Inver harbours farther west. Killibegs harbour is well sheltered, and capable of receiving large vessels. On the western coast are Bruckles or M'Swiney's Bay, and Teelin harbour, suitable for small vessels; and on the north is Sheephaven, within which is Dunfanaghy Bay, where the largest ships may lie in safety, as they may also in Mulroy Bay and Lough Swilly farther east. Lough Foyle, which divides Donegal from Londonderry, is a noble sheet of water, but is shallow and dry at ebb tide, contracted at its entrance, and encumbered with shoals. A few miles from Malin Head, the most northerly portion of the mainland of Ireland, the varied and extensive Lough Swilly runs far into the interior. From these two loughs much land has been reclaimed. Numerous islands and rocks stud the coast. The largest island is North Arran, about fifteen miles in circumference, with a lofty hill in its centre, and a gradual declivity down to the sea. On the northern coast are Tory Island, on which is one of those singular round towers marking the holy places of ancient times, and, further east, Innistrahul the *ultima Thule* of Ireland. The inhabitants of the islands obtain a precarious livelihood by fishing, kelp-burning, and rude husbandry, but are often reduced to extreme destitution.

Mountains.—Mountains and irregular groups of highlands occupy the whole interior of the county, and a considerable portion is bog and moor land. Arrigal mountain attains an elevation of 2462 feet above the level of the sea, and commands from its summit a fine view over a considerable portion of the country. Bluestack (2213 feet), Muckish mountain (2190 feet) in Kilmacrenan barony, and Slieve Snaght (2019) in Innishowen are, next to Arrigal, the highest mountains. The eastern and southern portions of the county are comparatively level, and contain the most fertile land. Occasionally the scenery attains a character of savage and romantic grandeur in the highland districts and on the sea-coast, and of much beauty in the eastern part of the county; but a considerable portion of the surface is occupied by bogs, and entirely destitute of timber.

Geology.—The main body of the county rests upon mica slate, which forms the eastern districts and most of the barony of Bannagh. From Sheephaven to Lochrusmore and the north-western coast, granite forms the surface rock; and quartz is very abundant, often forming mountains of considerable elevation. Carboniferous or mountain limestone occurs round Donegal Bay. The geological aspect of the county affords many indications of internal wealth; but very few attempts have been made to ascertain the mineral resources of the district. The minerals hitherto discovered are lead and iron. Steatite is worked to some extent at Gartan. Manganese, copper pyrites, and clay for potteries and brick-making are also found. Siliceous sand, raised in Muckish Mountain, was formerly conveyed in large quantities to Belfast and Scotland for the manufacture of glass. Indications of coal have been observed near Lough Swilly, and at Inver on the southern coast; and marble of fine quality exists in many places. Among the mountain streams the pearl-mussel (*Unio margaritifera*) is sometimes found. There are several mineral springs, the chief of which is the sulphureo-chalybeate water at Killymard near the town of Donegal.

Rivers.—With the exception of the tidal river Foyle, which forms the boundary between this county and Tyrone and Londonderry, the rivers, though numerous, are of inferior size. The branches of the Foyle which rise in Donegal are the Derg, issuing from Lough Derg, and the Finn, rising in the beautiful little lake of the same name in the highlands, and passing through some of the best cultivated land in the county. The Foyle, augmented by their contributions, and by those of several other branches from Tyrone and Londonderry, proceeds northwards, discharging its waters into the southern extremity of Lough Foyle, at the city of Londonderry. It is navigable for vessels of large burden to this place, and thence by lighters of fifty tons as far as Lifford. Boats of fourteen tons can proceed up the Finn river as far as Castlefinn. The fine river Erne flows from Lough Erne through the southern extremity of the county into the southern extremity of Donegal Bay. Its navigation is prevented by a fall of 12 feet, generally called the Salmon Leap, in the neighbourhood of Ballyshannon, and by rapids between Ballyshannon and Belleek, on the confines of Fermanagh. The Guibarra, the Awen Ea, and the Eask are the only other streams of any note.

Lakes, or rather tarns, are very numerous in Donegal.

[illegible] remarkable, and also the largest, is Lough Derg, containing within its waters several small islets, on one of which, Station Island, is the cave named Saint Patrick's Purgatory, a celebrated place of resort for pilgrims and devotees. The circumference of the lake is about nine miles, and the extent of the island to which the pilgrims are ferried over is less than one acre. The landscape around Lough Derg is desolate and sombre in the extreme, barren moors and heathy hills surrounding it on all sides.

Agriculture.—The modes of agriculture present little that is peculiar to the county, and the spade still supplies the place of the plough where the rocky nature of the surface prevents the application of the latter implement. The soil of the greater portion of the county, *i.e.*, the granite, quartz, and mica slate districts, is thin and cold, while that on the Carboniferous limestone is warm and friable. Owing to the boggy nature of the soil, agriculture has not made much progress, although in certain districts (Gweedore, for instance) much land has been brought under cultivation, through the enterprise of the proprietors. In 1871 about 43½ per cent. of the land was returned as bog and waste, about 35 per cent. under pasture, and 21 per cent. under tillage. As an indication of the stationary condition of the husbandry of Donegal, it may be stated that the number of acres returned as under crops in 1853 was 236,097, while in 1876 it was 236,015.

The following statistics will show the details of the agricultural acreage and the numbers of live stock in recent years:—

	Oats.	Flax.	Potatoes.	Turnips.	Meadow and clover.	Total under crops.
1873	[illegible]6,347	14,496	48,304	17,141	47,917	232,794
1876	[illegible]5,422	15,357	47,164	17,655	51,647	236,015

	Cattle	Sheep	Horses and mules.	Pigs.	Poultry.
1873	154,253	1[illegible]2,608	23,759	20,960	508,766
1876	157,547	171,394	23,146	35,623	637,441

Wheat and barley are quite an inconsiderable crop, and in this as well as in other respects Donegal is much behind the rest of Ulster in the extent of its crops. It bears, however, a more favourable comparison as regards its live stock, possessing, as it does, the largest number of cattle and sheep of any county in the province, and after Cavan the largest number of poultry.

As regards the division of the land, according to the Return of 1876, the county was held in 1874 by 2174 separate owners, whose holdings amounted in the aggregate to 1,17[illegible] acres, valued at £[illegible]0,632. There were 1171 proprietors of less than 1 acre of ground, forming a proportion of [illegible] per cent. of the total proprietors,—that of all Ulster being [illegible] per cent. The average size of the holdings was 539 acres, and the value per acre [illegible], while the averages for Ulster were respectively [illegible] acres and 15s. 8½d. Sixteen proprietors owned more than 15,000 acres each, and together owned an estate equal to about 45 per cent. of the whole land. They were the following:—Marquis of C[illegible], [illegible]; Earl of Leitrim, 54,[illegible]2; H. G. [illegible] Stewart, [illegible]; W. H. M. Style (Glenmore), [illegible] 39,306; John [illegible]; Lord G. A. Hill, [illegible]; Sir Samuel H. Hayes, [illegible] 2[illegible]; Church Temporalities [illegible], 21,[illegible]; Wybrants Olphert (Bally-[illegible]); J. G. Adair [illegible], 16,[illegible]; Duke of [illegible]; T. Y. [illegible], 15,134.

[illegible] of [illegible] while the [illegible] is carried on [illegible] manufacture [illegible] the county [illegible] its principal outlets through the port of Derry and the inland town of Strabane, county Tyrone.

Fisheries.—The deep sea fisheries are important. They comprise the three districts of Killybegs, Dunfanaghy, and Carndonagh—the last-named including a small part of the Derry coast—and extend to 395 miles of maritime boundary. In 1875 there were 777 boats registered in the fisheries, manned by 3053 men and boys. The salmon fishery is also prosecuted to a considerable extent, the principal seats of the trade being at Ballyshannon and Letterkenny.

Administration, &c.—The county is divided into the six baronies of Innishowen, Kilmacrenan, Boylagh, Raphoe, Bannagh, and Tyrhugh, and into 51 parishes. It contains seven poor law unions, and ecclesiastically it belongs for the most part to the diocese of Raphoe. It is included in the military district of Belfast, and the assizes are held at Lifford on the borders of Tyrone. The population has decreased within the last 20 years at a greater ratio than the rest of Ulster, and emigration has drawn off a greater proportion of the people than in other parts of the province. For the 24 years ending in 1875 the rate of emigration has averaged 2908 per annum. By the census of 1851 Donegal contained 255,158 persons, in 1861, 237,390, and in 1871, 218,334, of whom 106,080 were males and 112,254 females—thus showing a decrease within these 20 years of 14½ per cent. In 1875 the population was estimated at 208,667.

After Cavan, Donegal is the most Catholic county in Ulster. In 1871, 75 per cent. of the inhabitants belonged to that persuasion, while 12¼ per cent. were Episcopalians and 10½ per cent. Presbyterians. Education in the same year was conducted in 7 superior and 407 primary schools. There were, however, 93,285 persons above five years of age who were returned as illiterate, and 18,629 who could speak Erse only. The Donegal dialect is said to be the purest of the Irish language.

This county returned no fewer than twelve members to the Irish parliament,—two for the county at large, and two for each of the insignificant boroughs of Ballyshannon, Donegal, Killybegs, Lifford, and Johnstown. Since the union with Great Britain, it has been represented in the imperial parliament by two county members only.

Towns.—The towns are small in extent and importance. Lifford, the county town (population 660), and formerly a parliamentary borough, is practically a suburb of Strabane, in the neighbouring county of Tyrone. Ballyshannon (population 2958) is the most populous and important town in the county. It stands on both sides of the river Erne, but does not derive much advantage from its favourable situation in consequence of the fall of the river, usually called the Salmon Leap, above the town, and the bar at the mouth of the harbour. Letterkenny at the head of Lough Swilly, with 2116 inhabitants, is, next to Ballyshannon, the largest town in the county. Donegal (population 1422), is situated at the foot of a range of hills in the midst of scenery of great natural beauty, with a mineral spa in the neighbourhood, and sea-bathing close to the town.

History.—The greater part of Donegal was anciently called Tyrconnell, or the country of Conall; and it was sometimes called O'Donnell's country, after the head chieftains of the district. The other chieftains of note were the O'Doghertys, MacSweeneys, O'Boyles, O'Gallaghers, O'Gormaleys, O'Brealins, &c. Tyrconnell [illegible] with some of the earliest events recorded in Irish history or tradition. The chief castle of the O'Donnells, who became [illegible] of Tyrconnell in the 12th century, was at Donegal, [illegible] their inauguration the rock of Doune in Kilmacrenan. [illegible] Red Hugh O'Donnell, one of the most [illegible] of the race, in conjunction with the Earl of [illegible] a formidable opponent to the Government of [illegible] but being ultimately defeated, he sailed to Spain [illegible], was there seized with fever, and died at [illegible] who was promoted to the chieftainship [illegible] Government, and created Earl of Tyrconnell, a [illegible] ct, became afterwards disaffected to the Government and me, where he died in exile, his estates having been pre- onfiscated by James I. In 1608, Sir Cahir O'Dogherty, nishowen, deceived by hopes of aid from Spain, raised an on against the English Government in Ulster. He burnt rry and maintained his ground for a short period; but Deputy Chichester having offered a reward for his head, to the wilds of Kilmacrenan, and was shot by a Scotch his encampment on the rock of Doune. His extensive re confiscated and transferred to Chichester, the ancestor rls and marquises of Donegall. Shortly afterwards, the on of Ulster with English and Scotch undertakers and n pursuance of the scheme of James I., was partially t, and the baronies of Boylagh and Bannagh were allotted lurray; Sir James Cunningham, Sir John Stewart, and ceived the district of Portlough; the London Grocers' obtained Muff in Innishowen; Sir Roger Bingley, Sir gamill, and other English settlers the district round Sir William Stewart, Sir John Kingsmill, Sir George Captain Hart, Sir M. M'Swine, Turlogh Roe O'Boyle, Bannagh, MacSwine Fannet, and other servitors and e district of Kilmacrenan. Since the period of the settle- Ulster, no forfeitures have taken place in this county. olders remained loyal in the rebellion of 1641, and also war of the Revolution.

strict was formed into the county of Donegal in the reign Elizabeth, in 1585, by the Lord-Deputy Sir John Perrott.

ties.—The most noteworthy architectural remains of in the county are to be found at the head of Lough Swilly, iated on the summit of a hill 802 feet high, some remark- ns exist of a fortress or palace of the Northern Irish kings. known as the Grianan of Aileach, and evidently date iod prior to the 12th century. On Tory island there is best specimens of a round tower and some other interest- is.

ous ruins of ancient castles along the coast prove that ention was formerly paid to the defence of the country sion. The principal are—Kilbarron Castle, an ancient l of the O'Clerys, near Ballyshannon; Donegal Castle, he O'Donnells, anciently their chief residence, and now a tanding close to the water's edge; Burt Castle, built in of Henry VIII. on the shores of Lough Swilly by Sir ogherty, to whom is also attributed the erection of Green e of the strongholds of the clan on Lough Foyle.

e Castle of Doe, or M'Swiney's Castle, at Horn Head, is a erforation in the roof of a cave, called M'Swiney's Gun, the workings of the ocean into the overhanging cliff. wind blows due north, and the tide is at half flood, the gun pout up jets of water to a height of 100 feet, attended with heard occasionally in favourable weather at an immense Gulmore Fort, on the coast of Lough Swilly, supposed een erected by the O'Doghertys, having come into the of the crown, was granted in 1609 to the corporation of It was afterwards enlarged or rebuilt, and acted a pro- rt in the celebrated siege of Derry.

f religious houses, some existing only in traditionary or l records, are also numerous. Ashroe Abbey, on a small ar Ballyshannon, was of great extent. The ruins of that l, founded in 1474, also afford proofs of its ancient It was there that the celebrated collection of ancient ls were written, known by the name of the Annals of the ters, and sometimes called the Annals of Donegal, com- e year 1632, by Michael O'Clery and his coadjutors.

OLA, or DONKOLA, a town of Egypt, in the f the same name in the province of Nubia, situated ft bank of the Nile, about 45 miles above the Third It is frequently styled Dongola Makarah, or ngola, to distinguish it from Dongola Agusa, or gola, a now decadent village 75 miles further up which was formerly a flourishing fortified town, nto ruins after the devastation of the Mamelukes. ngola, or Castle Dongola, and El Ordeh, or The are also names in use. The town grew up round ary and administrative buildings established about he Egyptian Government; and it is now a thriving al centre, with well-furnished bazaars, an indigo nd public baths. The barracks were built after a the celebrated German naturalist Ehrenberg. n about 6000.

ZETTI, GAETANO (1798–1848). There is a strange n observable in the lives of the three most cele- alian composers of the present century. Rossini, Bellini, and Donizetti had no sooner established their reputations on the Italian stage than they left their own country for Paris, at that time the centre of the musical world. All three settled in France, and all three were anxious to adapt the style of their music to the taste and artistic traditions of their adopted country. The difference which exists between Rossini's *Tell* and his *Semiramide* may, although in a less striking degree, be noticed between Donizetti's *Fille du Régiment* and one of his earlier Italian operas. But here the parallel ends. As regards artistic genius Donizetti can by no means be compared with his illustrious countrymen. He has little of Bellini's melancholy sweetness, less of Rossini's sparkle, and is all but devoid of spontaneous dramatic impulse. For these shortcomings he atones by a considerable though by no means extraordinary store of fluent melody, and by his rare skill in writing for the voice. The duet in the last act of the *Favorita* and the celebrated *ensemble* in *Lucia* following upon the signing of the contract, are masterpieces of concerted music in the Italian style. These advantages, together with considerable power of humorous delineation, as evinced in *Don Pasquale* and *L'Elisir d'Amore*, must account for the unimpaired vitality of many of his works on the stage.

The life of Donizetti may be told in few words. He was born at Bergamo in 1798, the son of a Government official of limited means. Originally destined for the bar, he showed at an early age a strong taste for art. At first, strangely enough, he mistook architecture for his vocation, and only after an unsuccessful trial in that direction did he discover his real talent. He entered the conservatoire of his native city, where he studied under Simon Mayr, the fertile operatic composer. His second master was Mattei, the headmaster of the celebrated music school of Bologna, where Donizetti resided for three years. After his return to Bergamo the young composer determined to devote himself to dramatic music, but his father insisted upon his giving lessons with a view to immediate gain. The disputes arising from this cause ultimately led to Donizetti's enlisting in the army. But this desperate step proved beneficial against all expectation. The regiment was quartered at Venice, and here the young composer's first dramatic attempt, an opera called *Enrico Comte di Borgogna*, saw the light in 1818. The success of this work, and of a second opera brought out in the following year, established Donizetti's reputation. He obtained his discharge from the army, and henceforth his operas followed each other in rapid and uninterrupted succession at the rate of three or four a year. Although he had to contend successively with two such dangerous rivals as Rossini and Bellini, he succeeded in taking firm hold of the public, and the brilliant reception accorded to his *Anna Bolena* at Milan carried his name beyond the limits of his own country. In 1835 Donizetti went for the first time to Paris, where, however, his *Marino Faliero* failed to hold its own against Bellini's *Puritani*, then recently produced at the Théâtre Italien. The disappointed composer went to Naples, where the enormous success of his *Lucia di Lammermoor* consoled him for his failure in Paris. For Naples he wrote a number of works, none of which is worth notice. In 1840 the censorship refused to pass his *Poliuto*, an Italian version of Corneille's *Polyeucte*, in consequence of which the disgusted composer once more left his country for Paris. Here he produced at the Opéra Comique his most popular opera, *La Fille du Régiment*, but again with little success. It was not till after the work had made the round of the theatres of Germany and Italy that the Parisians reconsidered their unfavourable verdict. A serious opera, *Les Martyrs*, produced about the same time with the *Daughter of the Regiment*, was equally unsuccess ful, and it was reserved to *La Favorita*, generally considered as Donizetti's masterpiece, to break the evil spell. His next important work, *Linda di Chamounix*, was written for Vienna, where it was received most favourably in 1842, and the same success accompanied the production of *Don Pasquale* after Donizetti's return to Paris in 1843. Soon after this event the first signs of a fatal disease, caused to a great extent by overwork, began to show themselves. The utter failure of *Don Sebastian*, a large opera produced soon after *Don Pasquale*, is said to have hastened the catastrophe. A paralytic stroke in 1844 deprived Donizetti of his reason; for four years he lingered on in a state of mental and physical prostration. A visit to his country was proposed as a last resource, but he reached his native place only to die there on April 1st, 1848. The sum total of his operas amounts to 64, the more important of which have been mentioned in the course of this notice. The large number of Donizetti's works at the same time accounts for many of their chief defects. His rapidity of working made all revision impossible. It is said that he once wrote the instrumentation of a whole opera within thirty hours, a time hardly sufficient, one would think, to put the notes on paper. And yet it may be doubted whether more elaboration would have essentially improved his work; for the last act of the *Favorita*, infinitely superior to the proceding ones, is also said to have been the product of a single night.

DONNE, John (1573–1631), poet and divine of the reign of James I., was born in London in 1573 of Catholic parents. His father was a wealthy and influential merchant, a Welshman by descent; his mother claimed relationship with Sir Thomas More and Heywood the epigrammatist. Brought up under a tutor at home until his tenth year, he proceeded to Oxford, and was entered at Hart Hall about 1583. At the university his learning was extraordinary, and he was compared, for juvenile erudition, with Pico della Mirandola. In 1587 he was removed to Trinity College, Cambridge, but he took no degree there or at Oxford, his scruples as a Catholic standing in the way. In 1590 he went up to London and was admitted into Lincoln's Inn. His father presently died, and left his son £3000. Until he came of age, he was under his mother's care, and it is supposed that this was the period to which he refers in *Pseudo-Martyr*, in which an increasing conviction of the truth of Protestantism struggled with the old faith and the familiar surroundings. Walton has given an interesting account of Donne's change of faith, which probably took place about 1592. Before this he must have been writing, for many of the *Divine Poems*, and of these not the worst, are obviously written by a sincere Catholic. The rebound from Catholic asceticism was a severe trial to an ardent nature; it seems that he plunged into various excesses, and that his father's legacy was rapidly squandered. In 1593, however, he had already laid the foundation of his poetic reputation. The first three of his famous *Satires* exist in a MS. dated 1593, and the rest appear to have been composed at various times before 1601. In 1594 he commenced his travels, wandering over Europe, and accompanying the earl of Essex at the taking of Cadiz in 1596, and again in the expedition of 1597. It has been thought that he was engaged in military service in Holland in 1596. He did not return to England until he had seen Italy, and was planning an excursion into Palestine, when the difficulty of travelling in the East diverted his thoughts to Spain. In both Italy and Spain he took considerable pains to master the language and existing literature of each country, as the notes to his works testify. It is possible that the fantastic Spanish school of conceits, which takes its name from Gongora, may have affected the style of Donne. Returning to England, he secured the patronage of Sir Thomas Egerton, afterwards Lord Chancellor Ellesmere, who appointed him his chief private secretary, and took so much delight in his company and conversation that he made him lodge under his roof. The young poet was five years in Egerton's house, with every prospect of a successful career. He had the misfortune, however, to fall in love with the daughter of Sir George More of Loxly, lord lieutenant of the Tower, who was visiting in the house. Donne's love was returned, but her father violently objected. Recalling her to Loxly, he was enraged to find that the young couple had already been privately married. In his anger, Sir George More not only persuaded Lord Ellesmere to dismiss his secretary, but threw Donne, with his friend Christopher Brooke, the poet, who had given the bride away, into prison. They were soon released, but the father was inexorable, and the young couple would have suffered from penury if it had not been for the generosity of Sir Francis Wooley, who invited them to reside at his house. During these later years Donne had written much in prose and verse. He had completed his *Satires*, and in 1601 he had written his extraordinary poem of *The Progress of the Soul*, which De Quincey has so warmly praised. In 1602 ten sonnets, addressed to Philomel, were printed in Davison's *Poetical Rhapsody*. It is probable that many of his miscellaneous elegies and lyrics date from the same period of early manhood. Among his early works, too, we know was the singular treatise called Βιαθάνατος, in praise of suicide, of which he was afterwards ashamed, and which was not printed until long after his death, in 1648. The early follies of his career were now, however, played out, and his temperament was become so grave and earnest that it attracted the attention of Morton, afterwards bishop of Durham, who was staying in the house of Sir Francis Wooley in 1607, and he offered the poet certain preferment in the church, if he would only consent to take holy orders. Donne, however, had conscientious scruples against taking such a step. His generous patron soon after died; and the Donnes took a house at Mitcham, where they resided for two years. It was here that in 1610 he published his prose work against the Catholics, *Pseudo-Martyr*, and in 1611 a still more bitter polemical treatise, *Ignatius his Conclave*. In 1611, moreover, appeared Donne's first poetical work, *The Anatomy of the World*, of which revised and enlarged editions appeared in 1612, 1621, and 1625. This was but a pamphlet, however. He was urged by Sir Robert Drury to come with his wife and their eleven children to reside in his mansion in Drury Lane; after some demur this offer was accepted, but when, almost immediately after their arrival, Sir Robert desired Donne to travel on the Continent with him, Donne, who was in feeble health, strongly objected. It seems almost certain that this objection caused him to compose one of his loveliest poems—

Sweetest Love, I do not go
For weariness of thee.

He permitted himself to be persuaded, however, and accompanied his patron to Paris, where he is said to have had a vision of his wife, with her hair over her shoulders, bearing a dead child in her arms, on the very night that Mrs Donne, in London, was delivered of a still-born infant. This was in 1612. In 1613 he published *An Elegy on the Death of Prince Henry*. Efforts were made to gain him preferment at court, but James I., who had conceived a high opinion of Donne's theological gifts, refused to give him a single post out of the church. The poet's scruples were at last removed, and in 1614 he preached in orders before the king at Whitehall. Within a single year fourteen good livings were offered to him; but he refused them all, simply accepting the post of lecturer at Lincoln's Inn. In 1617 the death of his wife was a blow under which his health far suffered that he was persuaded by his friends to go road, and to spend more than a year in Germany. In 19 he returned, with the expectation of the deanery of Can- bury. This he did not gain, but in 1620 he was appointed n of St Paul's. To the kindness of the earl of Dorset owed the vicarage of St Dunstan in the West. In 1624 was elected prolocutor to Convocation, and the same r was attacked by an illness that threatened to prove nediately fatal, but from which he rallied. He continued feeble health for some years, and preached for the last e before Lent 1630, an oration which the king called ie Dean's own funeral sermon," and which was printed, ler the title of *Death's Duel*, in 1632. On the 31st of rch 1631, he died, having previously wrapped himself ais winding sheet to have his portrait taken. He was ied in St Paul's cathedral. Very few of Dr Donne's tings were published during his life-time. It is sup- ed that an edition of the *Satires* may have been printed ore the close of the 16th century, but if so, it has irely disappeared. His poems were first collected in 33, and afterwards in 1635, 1639, 1649, 1650, 1654, and 69, of which editions the second and last appear to be erably trustworthy. Of his prose works the *Juvenilia* peared in 1633; the *LXXX. Sermons*, with an admir- le life of the author by Izaak Walton, in 1640; the *ssays in Divinity* in 1650; and the *Letters to Several ersons of Honour* in 1651. No very excellent modern iography of the poet or edition of his works has been sued. Dr A. B. Grosart's privately printed edition of the oetical works is very complete.

It is singularly difficult to pronounce a judicious opinion n the writings of Donne. They were excessively admired y his own and the next generation, praised by Dryden, paraphrased by Pope, and then entirely neglected for a whole century. The first impression of an unbiassed reader who dips into the poems of Donne is unfavourable. He is repulsed by the intolerably harsh and crabbed versification, by the recondite choice of theme and expression, and by the ddity of the thought. In time, however, he perceives that behind the fantastic garb of language there is an arnest and vigorous mind, an imagination that harbours ire within its cloudy folds, and an insight into the mysteries f spiritual life which is often startling. Donne excels in rief flashes of wit and beauty, and in sudden daring phrases hat have the full perfume of poetry in them. Some of his rics and one or two of his elegies excepted, the *Satires* re his most important contribution to literature. They re probably the first poems of their kind in the language, nd they are full of force and picturesqueness. Their bscure and knotty language only serves to give peculiar rilliancy to the not uncommon passages of noble perspi- icity. To the odd terminology of Donne's poetic philo- phy Dryden gave the name of metaphysics, and Johnson, orrowing the suggestion, invented the title of the meta- hysical school to describe, not Donne only, but all the morous and philosophical poets who succeeded him, and ho employed a similarly fantastic language, and who ffected odd figurative inversions. (E. W. G.)

DONOVAN, Edward, naturalist, was author of many opular works on natural history and botany. In 1792 ppeared the first volume of his *Natural History of British nsects*, which extended to sixteen volumes, and was com- leted in 1816. Although now superseded, this compila- ion did good service in its time. During the same period Donovan published *Natural Histories of British Birds*, n 10 vols. 8vo. (1799–1819), *of British Fishes*, in 5 vols. (1802–1808), *of British Shells*, in 5 vols. (1800–1804), a series of illustrated works on *The Insects of India, China, New Holland, &c.*, in 3 vols. 4to (1798–1805), and *Excursions in South Wales and Monmouthshire* (1805). To these works must be added his periodical entitled *The Naturalist's Repository*, a monthly publication, of which three volumes were completed (1823–1825), and an *Essay on the Minute Parts of Plants in general.* Donovan was author of the articles on natural history in Rees's *Cyclopædia.* In his old age this hard-working student and writer published a *Memorial respecting my Publications in Natural History*, in which he complains of the small profits accruing to him from the sale of his books. We have searched in vain for any biographical particulars of Donovan,—the only facts apparently recorded being that he was a fellow of the Linnean Society, and that he died in London, February 1, 1837.

DORAT, JEAN. See Daurat.

Arms of Dorchester.

DORCHESTER (the *Durnovaria* of the Romans), a parliamentary and municipal borough and market town of England, capital of the county of Dorset, situated on an eminence on the right bank of the Frome, 8 miles N. of Weymouth, and 120 miles from London by the old coach road, but some 20 miles farther by railway. It stands within a wide open tract of land, containing 3400 acres, held under the duchy of Cornwall, called Fordington Field. It is governed by a mayor, four aldermen, and twelve councillors, and returns one member to parliament. The population of the borough in 1871 was 6915; the area 635 acres. The town, consisting chiefly of three spacious streets, is neat and pleasantly situated, and is nearly surrounded by fine avenues. St Peter's church is an ancient edifice in the Perpendicular style, containing some curious monuments. The grammar school has two exhibitions to St John's College, Cambridge, and one to each university. Of the other public buildings the principal are—the town-hall, with market-house, shire-hall, county prison, and county hospital; there is also a small county museum, containing many local objects of much interest. The cavalry barracks in the vicinity may also be noticed. There are also several almshouses and other charities, and a savings-bank. Market-days, Wednesday and Saturday. The woollen manufacture of Dorchester was once considerable, and it was noted also for its ale, of which there are still some popular breweries. It is a place of considerable trade, and large sheep and lamb fairs are held there annually. The borough includes four parishes—All-Saints, St Peter's, Holy Trinity, and Fordington. In the vicinity there are some interesting Roman remains, including an amphitheatre, the most perfect of its kind in England. The seats for the spectators are formed of masses of chalk, rising 30 feet above the arena. This amphitheatre when perfect is supposed to have been capable of accommodating 13,000 spectators. The camp called Poundbury, to the N.W. of the town, is probably Roman, and well worthy of examination. Durnovaria was one of the principal stations in England of the Romans, by whom it was surrounded with a wall and fosse, part of the former being still standing. Here Judge Jeffreys's "bloody assize" was held in September 1685, when 292 prisoners were sentenced to death.

DORDOGNE, an inland department in the S.E. of France, taking its name from the river which traverses its centre from east to west, and formed from nearly the whole of Périgord, a part of Agénais, and small portions of Limousin and of Angoumois. It is bounded on the N. by Haute Vienne, W. by Charente and Charente Inférieure, S.W. by Gironde, S. by Lot-et-Garonne, and E. by Lot and Corrèze, and lies between 44° 45′ and 45° 42′ N. lat., and from 0° 1′ 51″ to 1° 26′ 49″ W. long. Its surface is beautifully variegated, comprising small mountains,—some of which are covered with vines and crowned with wood, and others rocky and barren,—large plateaus, and a few pleasant valleys. In the north it is wild and sterile, and in the west is covered with forests of pine, but the splendid valley watered by the Dordogne is rich in vines, fruit trees, and cereals. The climate is generally agreeable and healthy, but rather humid, especially in the south. Dordogne is watered by 11 rivers and more than 600 streams, all tributaries of the Dordogne except the Bandiat and the Dropt. The Dordogne itself is formed by the union of two mountain streams, the Dor and the Dogne, which rise in Mont d'Or, Puy-de-Dôme, and unite after a short course. Sufficient corn is grown in the department for home consumption. The cultivation of the vine occupies about a tenth of its surface, and its red and white wines are in high repute. Its truffles are considered the best in France. In the forests the prevailing trees are the oak and chestnut. The fruit of the latter is much used both as food by the people and for fattening hogs. The walnut is extensively cultivated for making oil. Dordogne is rich in various kinds of minerals; iron is very abundant, and there are found also copper, lead, manganese, coal, marble, alabaster, lithographic stones, lime of gypsum, &c. The chief branches of industry are the working in metals, particularly iron and steel, the manufacture of paper, and boat-building; but there are also produced coarse woollens, serges, leather, earthenware, hosiery, vinegar, brandy, and liqueurs. Dordogne is divided into the arrondissments Périgueux, Bergerac, Nontron, Riberac, and Sarlat, with 47 cantons and 582 communes. The chief town is Périgueux. The total area is 3545 square miles, and the population in 1872 numbered 480,142.

DORIA, Andrea (1466–1560), the famous Genoese admiral, was born at Oneglia in 1466. He belonged to a noble family, several of whose members, both before and after his time, distinguished themselves in the history of Genoa. Having lost both his parents in his youth, he embraced the military profession, and served in the papal guards and under various princes of Italy. It was not until he was fifty years of age that he entered into the service of Francis I. of France, who gave him the command of his fleet in the Mediterranean. In this position he preserved that spirit of independence which is so natural to a sailor and a republican. When the French attempted to render Savona, long the object of jealousy to Genoa, its rival in trade, Doria remonstrated strongly against the measure; this irritated Francis to such a degree that early in 1528 he ordered his admiral Barbesieux to sail for Genoa, then in the hands of the French troops, to arrest Doria, and to seize his galleys. Doria, however, retired with all his galleys to a place of safety, and closing with the offers of the emperor Charles V., returned his commission to Francis, and hoisted the imperial colours. To deliver his country, now weary alike of the French and the imperial yoke, from the dominion of foreigners, was Doria's highest ambition; and the favourable moment had presented itself. Genoa was afflicted with the pestilence, the French garrison was ill paid and greatly reduced, and the inhabitants were sufficiently disposed to second his views. Before the close of the same year (1528) he sailed to the harbour with thirteen galleys, landed five hundred men, and made himself master of the gates and the palace with very little resistance. The French governor with his feeble garrison retired to the citadel, but was soon forced to capitulate; upon which the people speedily levelled the citadel with the ground. It was now in Doria's power to have declared himself the sovereign of his country; but, with a magnanimity of which there are few examples, he assembled the people in the court before the palace, disclaimed all pre-eminence, and recommended to them to settle what form of government they chose to establish. The people, animated by his spirit, forgot their factions, and fixed, with his approval, that republican form of government which, with little variation, subsisted until 1815. His disinterested patriotism won for him the appointment of censor for life and the title "Father and Liberator of his Country." Doria afterwards engaged in an expedition against the Turks, from whom he took Coron and Patras. He also co-operated with Charles V. in the reduction of Tunis and Goulette. In 1547 two successive attempts were made against his life by Fieschi and a Genoese emigrant of the name of Giulio Cibo. He resigned his command in 1556, and died at Genoa in November 1560, being then ninety-four years of age.

DORIANS, the name by which one of the two foremost races of the Hellenic or Greek people was commonly known, the other being the Ionic. These two races, if the term may here be rightly used, stand out in marked contrast, as exhibiting different types of character, which have their issue in different modes of thought and forms of government. But when from a consideration of their political and intellectual development we endeavour to work our way backward to the origin and early history of these races, we find ourselves confronted by traditions which show little consistency, or which even exclude each other. The writer who speaks with the greatest confidence on this subject is the perfectly truthful man who well earned his title to be known as the father of history; but Herodotus, although thoroughly to be trusted as to all that he relates from his own experience, could not rise much above the standard of his age in dealing with alleged matters of fact, nor could he see that the eking out of theory by conjecture is an illegitimate process. Herodotus then, in speaking of the Athenians and Spartans as standing at the head severally of the Dorian and Ionian races, states positively that the Ionian was a Pelasgic, the Dorian a Hellenic people; that the former had always been stationary, while the latter had many times changed its abode. In the time of Deucalion, he asserts, the Dorians, or rather the tribe or tribes which were afterwards to be called Dorians, inhabited Phthiotis, by which he probably understands the southern portion of the great Thessalian plain. Afterwards, under their eponymus Dorus, they occupied Histiæotis, which he describes as the region under Ossa and Olympus. They had thus migrated from the most southerly to the most northerly parts of the great plain which is drained by the Peneius. The next migration was to the highlands of Pindus, the chain which runs down at right angles from the Cambunian range, or the westward extension of Olympus. Here, he says, they were known not as Dorians, but as Macedonians. A later southward migration brought them into Dryopis, whence they made their way into the Peloponnesus, and it would seem were then only first known as Dorians (Herod. i. 56).

If we examine the statement thus boldly advanced, we shall find at each step that the ground becomes more uncertain. We may indeed, in order to explain it, assume that the Pelasgic race was closely akin to the Greek, and that their language stood midway between the Hellenic and the Latin; but if we do so we are reasoning strictly from the point of view of modern philology, and really abandoning that of Herodotus, who says that, if he may judge from the Pelasgian populations which he found at Placia, Scylace, and Creston, the Pelasgians generally must have spoken a barbarous dialect, *i.e.*, a dialect unintelligible to a Greek. He is thus driven to assume, first, that the Attic tribes had been Pelasgic before they became Hellenes, and that the change was accompanied by a change of language (Herod. i. 57). Elsewhere (ii. 51) he speaks of the Athenians as being already Greek or Hellenic before the Pelasgians became their neighbours, and adds that the latter came in time to be reckoned Hellenic also. We thus see, without going further, how vague and misty were the notions of Herodotus; but we have to note further that the account here given of the Dorians and Ionians is said to apply to the time of Crœsus, and thus, down to his age, the Ionians had been stationary in their original abodes, these abodes in his day being assuredly not in the Peloponnesus. Yet he can assert elsewhere that the Peloponnese had been their original home, and that they had been expelled from it by the Achaians (i. 145). But, apart from the fact that the poets of the *Iliad* and the *Odyssey* know nothing of any expulsion of Ionians from Peloponnesus, the difficulties are increased if we betake ourselves to the tribal genealogies which the Greeks regarded as undoubtedly historical documents. We have then, on the one side, the assertion that the Ionians were originally non-Hellenic and Pelasgian; on the other, the Iapetid genealogy speaks of Dorians, Achaians, Ionians, and Æolians, as being all sprung from Hellen,—Xouthus, the son of Hellen, being the father of Ion and Achaius. If, therefore, we were to argue from these data, we should have to conclude that, as the tribes just mentioned were all Hellenic, and as the Ionians were Pelasgians, some Pelasgians at least were Hellenes. But the whole process would be deceptive, for as Ion and Achaius are here the sons of Xouthus, the Ionians would be expelled from the Peloponnesus by their nearest brethren. It is, however, more important to note that the opinion of Herodotus respecting the Pelasgi was distinctly contradicted by another, which had the countenance of Strabo, Plutarch, and other writers. Strabo speaks of them as virtually nomadic tribes; and the story even went that they received their name, Pelasgi = Pelargoi, or Storks, from their wandering habits. It is difficult to resist the inference of Sir G. Cornewall Lewis that this radical inconsistency in the views respecting the Pelasgians is a proof that they rest on no historical basis (*Credibility of Early Roman History*, i. 282). Further, there is the extreme unlikelihood that the tribes afterwards known as Dorians should for a certain period have been called Macedonians, or rather, as Herodotus implies, that they should more than once change their name. The assertion that they were called Macedonians involves a fresh contradiction, for elsewhere Herodotus asserts that the Macedonians were not Hellenic at all, although they were governed by chiefs of genuine Greek descent. Nor is our position improved if we choose to prefer the statements of the genealogies in preference to those of Herodotus or other historians, on the ground that the national tradition by which these genealogies were handed down must be trustworthy, for the descent in one genealogy is often directly contradicted by that of another, and not unfrequently, and indeed even generally, the genealogy betrays the nature of the materials from which it has been made up. Thus, for instance, Dorus, the eponymus of the Dorians, has as his sister Protogeneia (the Early Dawn), who, being wedded to Zeus, the god of the gleaming heaven, becomes the mother of Aëthlius, the toiling sun, who is the father of Endymion, that is, of the sun-god who sinks to sleep in Latmus, the land of forgetfulness. Finally, we have to note the fact that, in the Hellenic world as elsewhere, tribes bearing the same name were found separated by great distances; and in such cases traditions always sprang up, not merely asserting their connection, but accounting for it. Thus they found Achaians in Thessaly and Achaians in the Peloponnese; and it was said, not merely that the former passed southwards across the isthmus of Corinth, but that they were led by the barbarian Pelops from Phrygia. The same process connected the Peloponnesian Dorians with the Dorian clans who dwelt between Œta and Parnassus, and spoke of the latter as the stock from which the Spartans sprang, to the great benefit of the insignificant clans, who thus acquired a foremost rank in the Hellenic world.

All that we can do, then, is to bring together the genealogies which refer in any way to Dorus and his supposed descendants the Dorians, and then gather from historians and geographers the various regions in which Dorians were found during ages which may reasonably be regarded as historical. The result of the former process will scarcely appear satisfactory. We have noticed one genealogy which represents Dorus as the son of Hellen; but in the Etolian genealogy he is the son of Apollo and Phthia, and is slain by Ætolus in the land which from him was called Etolia (Grote, *Hist. Gr.*, i. 140). The great tradition which connects the Dorians of the Peloponnesus with their more noteworthy namesakes is the legend which relates the return of the Heraclids, or descendants of Hercules, who, after the death of that hero, had been compelled to take refuge in Athens. Hyllus, in his exile, is adopted by the Dorian king Ægimius, the father of Pamphylus and Dymas, who with Hyllus become the eponymi or name-givers of the three tribes found in Dorian communities generally, and known as Hylleans, Pamphylians, and Dymanes, Hyllus being more particularly illustrious as the forefather of Eurysthenes and Procles, the progenitors of the two houses from which the Spartan kings were always elected. But this legend, like the rest, was variously related, and, according to the version of Plato, the return of the Heraclids would be rather a return of the Achaians to the Peloponnesus.

We cannot, however, question the fact that the Dorian race was widely extended, that it was found, like the Ionians, in various portions of the Hellenic world, separated by considerable distances of land or sea, and that the people who bore this name were singularly active in the work of colonization. They are found not only in all parts of the Peloponnese but in the islands of the Ægean, and on the coasts of Asia Minor; and from the foremost Dorian cities went forth, it is said, the colonists who were to carry the Hellenic name and Hellenic culture far to the east and the west. Thus Corinth became the mother city of Corcyra and Syracuse, and from these sprang Epidamnus, Camarina, Ambracia, Potidæa. The Dorians of Crete and Rhodes sent forth the settlers of the Sicilian Gela, and Gela in turn became the parent of the mightier Acragas, or Agrigentum, while to Megara is assigned the origin of Byzantium, the future home of Roman Cæsars and of Ottoman Sultans. These several communities exhibit a general likeness in their dialect, their art, and their polity. Their civilization assumed a magnificent phase in the splendour of Corinth and the great Dorian cities of Italy and Sicily. Their powers of resistance were attested by the success with which their colonies were planted in regions occupied by powerful and hostile tribes, who failed to overthrow them simply because they lacked the Dorian power of cohesion. Yet with the Dorians this power was subjected to strictly defined bounds of action. All Dorian cities might feel a pride in belonging to the great Dorian stock, and the parent city might claim certain prerogatives in its colonies; but each city was for them nevertheless an absolute unit, with whose independence no other city had any right to interfere, even though this interference might have for its object the establishment of a pan-Hellenic union. Any movements in this direction were sure to rouse the keenest and most persistent opposition of the Dorian Greeks; and thus we can understand the nature of the quarrel which was fought out between Sparta and Athens, and which ended in the ruin of the great Ionian city, whose imperial rule must otherwise have checked, and may perhaps have rooted out, this fatal instinct of isolation. The Spartans, who stood at the head of the Dorian portion of the Greek world, are regarded by K. O. Muller, in his *History of the Dorians*, as exhibiting in their institutions and government the true type of the race. This theory is strenuously combated by Grote, *History of Greece*, pt. ii. ch. 6; and at the least it must be said that if they displayed the true Dorian type, that type must have been completely lost among all the other Dorian tribes. The Spartans occupied Laconia strictly as an army of occupation, and carrying out inflexibly their rigid system, they opposed an uncompromising resistance, not only to luxury, but generally to art, refinement, and speculation (Cox, *History of Greece*, i. 72). No such condition of things is found even in Crete, from which Sparta was supposed to have derived her special institutions. Not only is their reputation as models of Dorism altogether undeserved, but it probably would have been exceedingly distasteful to the countrymen of Leonidas, Archidamus, and Agesilaus. (G. W. C.)

DORIS, the name which, in the time of Herodotus and later writers, designated the little territory which lay to the south-west of the Malian Gulf, and between the ranges of Œta and Parnassus, bounded by the lands of the Phocians on the east, of the Etolians on the west, of the Malians and Epicnemidian Locrians on the north, and of the Ozolian Locrians on the south, the whole being barely thirty miles in length by ten at its greatest width. The inhabitants were divided into the four townships of Boion, Cytinion, Erineus, and Pindus. Of their history down to the time of the invasion of Xerxes we know nothing, and probably they had none; nor is there more to be said than that they then consulted their interests by submitting to the Persian king. This confederacy of four little townships was honoured by the Spartans as their metropolis, or the home from which the Dorians had come who achieved the conquest of the Peloponnesus—a tradition which has been noticed in the article DORIANS. The political insignificance of Doris is to be ascribed to the fact that it had no seaboard. The only other Greek communities in like plight were those of Arcadia or the Peloponnesian highlands, and both Doris and Arcadia remained far in the rear of Hellenic development generally.

DORKING, a market town of West Surrey, England, situated on a small brook, a tributary of the Mole, 29 miles S. of London by rail. The town is well built and clean, and occupies a picturesque position in a sheltered vale near the base of Box Hill. The parish church of St Martin's is a handsome edifice rebuilt in 1873; and St Paul's district church, erected in 1857, is a building of some pretension. Lime of exceptionally good quality is burnt to a large extent in the neighbourhood, and forms an important article of trade; it is derived from the Lower Chalk formation. Dorking has long been famous for a finely-flavoured breed of fowl, distinguished by their having five claws. Several elegant mansions are in the vicinity of the town, notably that of Deepdene, containing a gallery of sculpture collected here by the late Thomas Hope, the author of *Anastasius*. The Roman road which crossed from the Sussex coast to the Thames, passed close to Dorking. The population of town is about 4800; that of parish in 1871 was 8567.

DORLEANS, LOUIS, (1542–1629), a minor French poet and political pamphleteer, and a prominent partisan of the Catholic League, was born in 1542, probably at Paris, though one of his biographers states that Orleans was his birthplace. He studied under Jean Daurat, and after taking his degree in law began to practise at the bar with but slight success. He added little to his reputation by writing indifferent verses, and it was not until the League had taken the daring step of arresting the royalist members of parliament, that he was brought into prominence by being appointed its advocate-general. He maintained the positions and claims of the League in language that was always strong and often insolent, going so far as to express regret that the king of Navarre and the prince of Condé had not been assassinated. He was, however, courageous enough to intercede with the duke of Mayenne for the inhabitants of Paris, but without effect. After this failure he continued the publication of violently-worded pamphlets intended to render the accession of Henry impossible. One of these, *Le Banquet et Après-dînée du Comte d'Arète*, in which he accused Henry of insincerity in his return to the Roman Catholic faith, was so scurrilous as to be disapproved of by many members of the League. When Henry at length entered Paris, Dorléans was among the number of the proscribed. He took refuge in Antwerp, where he remained for nine years. At the expiration of that period he received a pardon, and returned to Paris, where he had not been long before he was imprisoned for sedition. The king, however, ordered him to be set free after he had been three months in the Conciergerie, and this generous conduct had the effect of attaching him ever afterwards to the cause of Henry. His last years were passed in obscurity, and he died in 1629 at the age of eighty-seven. Dorléans's political pamphlets are now exceedingly scarce. His chief poem, *Renaud* (Paris, 1572), is a poor imitation or translation of part of the *Orlando Furioso*.

DORMOUSE, the common name of a family of small rodents (*Myoxidæ*), generally regarded as intermediate between mice and squirrels. It contains 12 species, distributed over the temperate parts of the great Palæarctic region from Britain to Japan, and throughout the greater portion of Africa. The Common Dormouse (*Myoxus avellanarius*) occurs in most parts of Europe, and is the only species found in Britain. It is an active little creature, measuring about three inches long, with a thick bushy tail of nearly similar length. Its posterior legs are slightly longer than those in front, and both fore and hind feet form prehensile organs, whereby the dormouse climbs along the twigs of the low bushes among which it lives, and in which it builds a neat round nest formed of leaves. It is a shy and timid animal, choosing the recesses of woods for its habitation, and seldom showing itself by day; in confinement, however, it is readily tamed and becomes very familiar. It feeds, as its specific name implies, on hazel-nuts, and is also partial to berries, haws, and grain. These it eats, either sitting on its haunches or suspended by its hind feet, and holding them between its forepaws like a squirrel. In autumn it grows very fat, and lays up a store of food for winter use,—retiring at the commencement of the cold season to its nest, and curling itself up into a ball, when it becomes dormant. A warmer day than usual restores it to temporary activity, and then it supplies itself with food from its autumn hoard, again becoming torpid till the advent of spring finally rouses it. Owing to this hybernating habit it is known as the Sleeper, while the name dormouse has reference to the same peculiarity. The young of the dormouse are generally four in number, and these, according to Bell, are produced twice a year. They are born blind, but in a marvellously short period are able to cater for themselves, and their hibernation begins later in the season than with the adult form. The fur of the dormouse is of a tawny colour above, and paler beneath, with a white patch on the throat. The Fat Dormouse (*Myoxus glis*) is larger than the British species, and is the one most commonly found in Southern Europe.

DORNBIRN, or DORNBÜHREN, a straggling but well-built township of Austria, in Tyrol, about six miles S. of Bregenz, situated on the right bank of a stream known as the Dornbirn Ach, which flows into the Lake of Con-ca. It has upwards of 8000 inhabitants, ranks as the cipal market-place in the Vorarlberg, and carries on and copper smelting and the manufacture of cotton and worked muslin.

OROGOBUSH, a town of Russia in Europe, in the rnment of Smolensk, about 55 miles E. of the city of name, on the banks of the Dnieper, in 54° 55′ N. lat. 33° 17′ E. long. It has twelve churches, and still erves its ancient earthen fortress, with its ramparts and , within the precincts of which are situated the edral, the courthouse, and two victualling stores. Its ufactures are of no importance, but it maintains an nsive trade with various parts of Russia, and even foreign countries, in tallow, leather, and hemp. First tioned in 1300 as the object of a contest between ander of Smolensk and Andrew of Viasma, Dorogobush inued through the 13th century to share in the situdes of the neighbouring principalities, passed in 15th successively into the power of the Lithuanians the Poles, and was finally united with Russia in 1667. as partially burned by the French on their retreat from cow. Population in 1873, 7905. of whom only a very are Catholics and Jews.

OROGOI, or Dorohoi, a town of Roumania, in the hern part of Moldavia, about 80 miles north-west of y, on the Shiska, a tributary of the Pruth. It has t 10,000 inhabitants, a large transit trade with the lucts of Northern Europe, and several important annual ; but its buildings are of a poor description.

OROTHEUS, a professor of jurisprudence in the law ol of Berytus in Syria, and one of the three commissers appointed by the emperor Justinian to draw up a k of Institutes, after the model of the *Institutes* of us, which should serve as an introduction to the *Digest* ady completed. His colleagues were Tribonian and ophilus, and their work was accomplished in 533. otheus was subsequently the author of a commentary he *Digest*, which is called the *Index*, and was published him in 542. Fragments of this commentary, which in the Greek language, have been preserved in the *olia* appended to the body of law compiled by order of emperor Basilius the Macedonian and his son Leo the e, in the 9th century, known as the *Basilica*, from ch it seems probable that the commentary of Dorotheus tained the substance of a course of lectures on the *Digest* vered by him in the law school of Berytus, although not cast in a form so precisely didactic as the *Index* Theophilus.

ORP, a town of Prussia, in the government of seldorf, 17 miles north-east of Cologne, which, like men and many other towns in the valley of the Wupper, since 1849 rapidly grown into importance as a centre nanufacturing industry. Tobacco, paper, steel, and iron es are the principal objects of its activity. In 1872 population amounted to 10,689.

ORPAT, in German frequently Dörpt, in Russian pt or Yurieff, in Esthonian Tartoma, a city of Russia in ope, in the government of Livonia, situated on both ks of the Embach, 157 miles north-east of Riga, in 58° N. lat. and 26° 23′ E. long. The principal part of the n lies to the south of the river, and the more important ldings are clustered round the two eminences known as Domberg and the Schlossberg, which, in the Middle s, were occupied by the citadel, the cathedral, the copal palace, the monastery, and the houses of the lthier inhabitants. Owing to the great conflagration of 7, the actual town is almost entirely of modern erection; its fortifications have been transformed into promades. Besides one Roman Catholic, three Lutheran, two Russian churches, a hospital, and an orphanage, a veterinary institute founded in 1846, the economical society of Livonia, an Esthonian learned society, and a medico-physical society, it possesses a famous university, with an observatory, an anatomical theatre, a botanical garden, and a library of about 250,000 volumes, which are housed in a restored portion of the cathedral, burned down in 1596.

This university, which renders the town the great intellectual centre of Livonia, preserves the Teutonic traditions of its earlier days, and is much more German than Russian in its culture. It was founded by Gustavus Adolphus in 1632; but in 1699 teachers and students removed to Pernau on the advance of the Russians, and on the occupation of the country by Peter the Great again took flight to Sweden. In spite of the stipulation of the treaty of 1710 and the efforts of the Livonian nobles, it was not till 1802 that its restoration was effected under the patronage of Alexander I.; but since that date its history has been one of considerable prosperity. It possesses 42 ordinary professors, a total teaching staff of 73 members, and upwards of 800 students. The astronomical department is especially famous, owing partly to the labours of Otto Struve, and partly to its possession of Frauenhofer's great refracting telescope, presented by the emperor Alexander I. The manufacturing industry of the town is very slight, but it carries on a good trade, and has six great markets in the year. Population in 1873, 20,780.

The foundation of Dorpat is ascribed to the grand duke Yaroslaff I., and is dated 1030. In 1223 the town was seized by the Teutonic Knights, and in the following year Bishop Hermann erected a cathedral on the Domberg. From that date till about 1559, the greatest prosperity was achieved under the patronage of the independent episcopal see, and the population reached as high as 50,000. In 1559, the town was captured by the Russians under Peter Ivan Shiuski, but in 1582 it was yielded by treaty to Stephen Bathori of Poland. In 1600, it fell into the hands of the Swedes, in 1603 reverted to the Poles, and in 1625 was seized by Gustavus Adolphus. The Russians again obtained possession in 1666, but once more yielded before the Swedes, and did not effect a permanent occupation till 1708. In 1708 the bulk of the population was removed to the interior of Russia; but before long the town began to receive better treatment from the victors, and when in 1777 it suffered so severely from the conflagration already mentioned, it obtained valuable assistance in the work of restoration from Catherine II.

D'ORSAY, Alfred Guillaume Gabriel, Count (1798–1852), a celebrated leader of society in Paris and London, who added to the attractions of dandyism those of high intellectual and artistic gifts, was born at Paris in 1798. He was the son of General D'Orsay, from whom he inherited the exceptionally handsome person which contributed so much to his social success. Through his mother he was grandson by a morganatic marriage of the king of Würtemberg. In his youth he entered the French army, and served as a *garde du corps* of Louis XVIII. In 1822, while stationed at Valence on the Rhone, he formed that acquaintance with the earl of Blessington and his family which affected the whole course of his future life. The acquaintance quickly ripened into intimacy, and at the invitation of the earl he accompanied the party on their tour through Italy. In the spring of 1823 he met Lord Byron at Genoa, and the published correspondence of the poet at this period contains numerous references to the count's gifts and accomplishments, and to his peculiar relationship to the Blessington family. A diary which D'Orsay had kept during a visit to London in 1821–2 was submitted to Byron's inspection, and was much praised by him for the knowledge of men and manners and the keen faculty of observation it displayed. On the 4th [illegible] ember 1827, Count D'Orsay married Lady Harriet Card[illegible] a girl of fifteen, the daughter of Lord Blessington by [illegible] first wife. The union, if it rendered his connection [illegible] the Blessington family less ostensibly equivocal th[illegible] fore, was in other respects an unhappy one, and a separation took place soon after the death of Lord Blessington, which occurred in 1829. When the widowed countess returned to England she was accompanied by Count D'Orsay, and the two lived under the same roof, first at Seamore Place and then at Kensington Gore. Their house soon became a resort of the fashionable literary and artistic society of London, which found an equal attraction in host and in hostess. The count's charming manner, brilliant wit, and artistic faculty were accompanied by benevolent moral qualities, which endeared him to all his associates. His skill as a painter and sculptor was shown in numerous portraits and statuettes representing his friends, which were marked by great vigour and truthfulness, if wanting the finish that can only be reached by persistent discipline. Count D'Orsay had been from his youth a zealous Bonapartist, and one of the most frequent guests at Gore House was Prince Louis Napoleon. It was to Paris, therefore, that he naturally resorted in 1849, after the breaking up of the establishment at Gore House in consequence of his bankruptcy. The countess of Blessington, who had accompanied him, died a few weeks after their arrival, and he endeavoured to provide support for himself by adopting the profession of a portrait painter. He was deep in the counsels of the prince president, but the relation between them was less cordial after the *coup d'état*, of which the count had by anticipation expressed his strong disapproval. His appointment to the post of director of fine arts was announced only a few days before his death, which occurred on the 4th August 1852.

Much information as to the life and character of Count D'Orsay is to be found in Madden's *Literary Life and Correspondence of the Countess of Blessington* (1855).

DORSET, an English county, situated on the south-western coast. In British times, previous to the landing of Cæsar, it was inhabited by a tribe which Ptolemy calls the Durotriges, and which, upon no good authority, but not without probability, has been identified with the Morini, the occupants of a part of the opposite coast (*extremi hominum Morini, Æn.* viii. 727), the two appellations being apparently of similar import, and referring to their location on the sea-shore. Under the Romans this county constituted a portion of *Britannia Prima*; and the Saxons called it Dornsæta, or Dorsæta (a word involving the same root, Dwr, water), and included it in the kingdom of Wessex.

On the north Dorsetshire is bounded by Somersetshire and Wiltshire, on the east by Hampshire, on the west by Devonshire and a part of Somersetshire, whilst the British Channel washes the whole of its southern coast. Its form is very irregular; the northern boundary has a considerable angular projection in the middle; its southern coast runs out into various points and headlands; and the western inclines towards Devonshire with an uneven line. Its greatest breadth from north to south is about 35 miles, and its length from east to west 55. Its circumference, including 627,265 acres, is nearly 160 miles. In 1871 the population was found to be 195,537,—having increased from 114,452 in 1801 and 175,054 in 1841. 111,731 acres were under corn-crops, and 60,633 under green-crops. The males numbered 95,616, the females 99,921.

Dorset is divided into 35 hundreds, containing more than 300 parishes, 8 boroughs, 22 liberties, and 12 market towns, the principal of which are Dorchester, Bridport, Sherborne, Lyme Regis, Shaftesbury, Weymouth and Melcombe-Regis, Poole, and Blandford. Only 10 members are returned to parliament, instead of 20 as before the first Reform Act. The county itself sends three; Dorchester, Bridport, Poole, Shaftesbury, and Wareham one each, and Melcombe-Regis and Weymouth two between them. Dorsetshire forms a part of the see of Salisbury. [illegible] originally fell under the wide jurisdiction of the ancient sees of Dorchester in Oxfordshire and of Winchester [illegible] the foundation of the bishopric of Sherborne, 705 A.D. [illegible] when that see was transferred to Salisbury it still remained a part of it, till in 31st Henry VIII. it was annexed to the newly-erected bishopric of Bristol, and so continued till 1836, when its ancient connection with Salisbury was revived, and still continues.

Branches of the London and South-Western Railway, or in connection with it, enter the county from Southampton, Salisbury, and Bath, meet near Wimborne, and continue to Poole, Wareham, Dorchester, and Weymouth, which last two places are also reached by a branch of the Great Western from Yeovil, with a drop-line to Bridport at Maiden-Newton. The main line of the London and South-Western likewise touches the north of the county near Shaftesbury, Gillingham, and Sherborne.

The surface of Dorsetshire is hilly and uneven. Throwing out for the present the consideration of the coast-line in Purbeck, Portland, and to the westward, and proceeding in the direction of from S.E., to N.W., we find a descending series of formations, commencing from the Tertiaries, which occupy an almost equilateral triangle, and include the towns of Wareham, Poole, Wimborne, and Cranborne; passing through a band of Chalk some ten or twelve miles in breadth, in which the chief town Dorchester and Blandford are situated, and which is fringed by a thin belt of Greensand; and thence to the Oolitic beds in the north-east, and the Lias at Bridport and the south-west. The three systems thus roughly indicated have been popularly divided into the Sands, the Chalks, and the Clays. It is, of course, the last which has won for this county the somewhat exaggerated, and not uncontested, designation of "the garden of England;" though the rich wide vale of Blackmore, and the luxuriant pastures and orchards of the extreme west may fairly support the claim. The Downs of the Chalk district, formerly so celebrated as sheep-walks, have been rapidly disappearing of late years under the influence of a more scientific system of agriculture, though still the stock of sheep pastured in the county amounts to between 500,000 and 600,000. Even in the sandy region, cultivation is advancing, and detached portions are improved, though there is still much waste land, dreary and barren, hardly supporting, even in the summer months, a few sheep and cattle, and supplying the scattered cottars with heath and turf for fuel.

Dorsetshire is not generally speaking a well-wooded county, though much fine timber may be seen, not only in the richer and deeper soils, but likewise in the sheltered valleys of the Chalk district, and more especially upon the Greensand. The views from some of the higher hills, which constitute, as it were, the back-bone of the county, are often vastly extensive, ranging on many points from the Needles to the very utmost limit of the Mendip and Quantock Hills, where they sink into the Bristol Channel.

The Dorsetshire air is remarkably mild and salubrious, and in some sunnier spots of the coast, such as Abbotsbury, even tropical plants are found to flourish. Weymouth has long been celebrated as a watering-place, and owing to the general calmness of the sea there, its pleasant situation, and commodiousness for bathing, it still maintains considerable consequence. The sea-side villages of Swanage, Lulworth, and Charmouth also, though more difficult of access, and affording less accommodation for visitors, abound with many quiet and enjoyable charms.

The chief port of the county is Poole, situated on an estuary formed by the mouth of the Frome. Its entrance is defended by Brownsea Castle,—not, however, a milit

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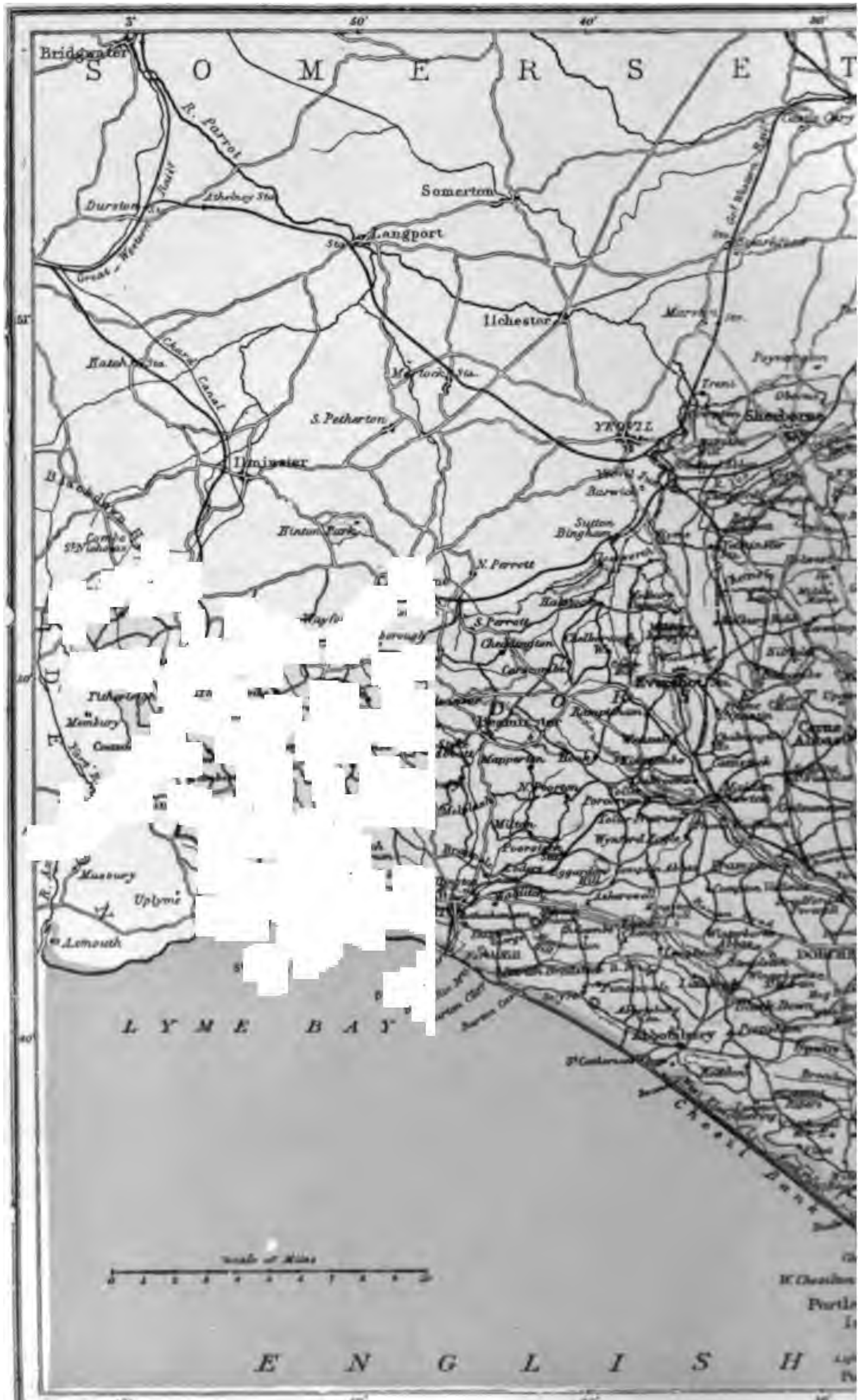
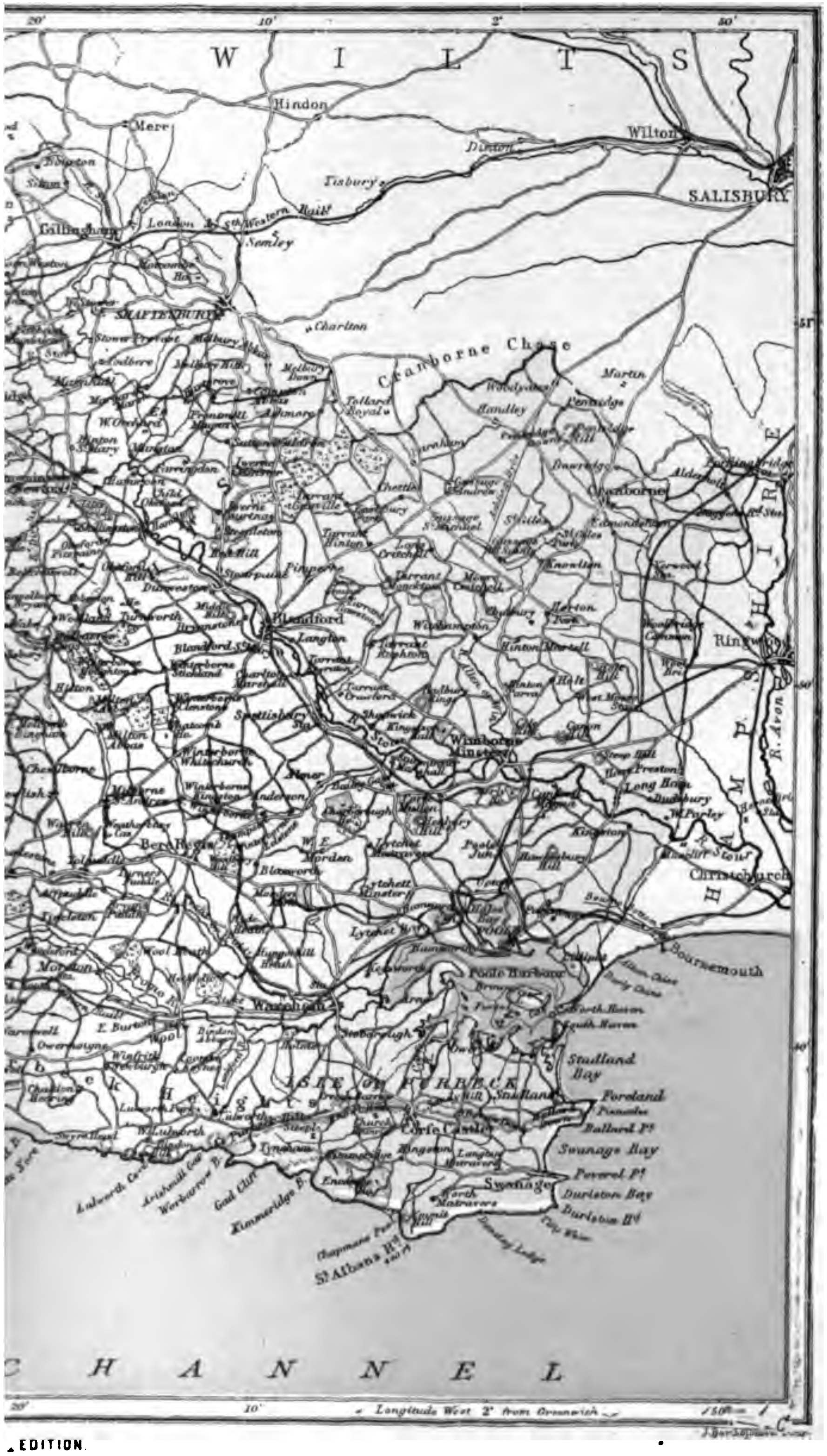

Bridgwater
S O M E R S E T
R. Parrot
Durston
Athelney Sta.
Somerton
Langport
Great Western Rail.
Ilchester
Chard Canal
Hatch
Martock Sta.
S. Petherton
Ilminster
Trent
Sherborne
YEOVIL
Barwick
Hinton Park
Sutton Bingham
N. Perrett
S. Perrett
Chedington
Corscombe
Evershot
Beaminster
Mapperton
Toller
Wynford Eagle
Netherbury
Powerstock
Bridport
Abbotsbury
Portesham
Chesil Bank
Cerne Abbas
Membury
Uplyme
Musbury
Axmouth
L Y M E   B A Y
Scale of Miles
0 1 2 3 4 5 6 7 8 9 10
E N G L I S H
W. Chesilton
Portl
50'
40'
30'
3°
51°
2°


20'
10'
2°
50'
W I L T S
Hindon
Mere
Dinton
Wilton
Tisbury
SALISBURY
Gillingham
London & S.th Western Rail
Semley
SHAFTESBURY
Charlton
Cranborne Chase
Martin
Cranborne
Blandford
Langton
Ringwood
R. Avon
H A M P S H I R E
Wimborne Minster
Spettisbury
Bere Regis
Morden
Kingston
Long Ham
Christchurch
Bournemouth
Poole
Poole Harbour
Wareham
Wool
Studland Bay
Studland
ISLE OF PURBECK
Foreland
Ballard Pt
Swanage Bay
Corfe Castle
Langton Matravers
Swanage
Peveril Pt
Durlston Bay
Durlston Hd
Worth Matravers
St Albans Hd
Chapmans Pool
Kimmeridge B.
Gad Cliff
Worbarrow B.
Arishmell Gap
Lulworth Cove
C H A N N E L
Longitude West 2° from Greenwich

EDITION

fortress, but simply a castellated mansion,—and it is very secure in all winds. It was formerly the chief place for equipping ships for the Newfoundland fishery; and a brisk trade was carried on from it with Spain, Portugal, and the Mediterranean; but it is now chiefly occupied with a coasting trade, and the export of potters' clay. Swanage, Weymouth, Bridport, and Lyme have harbours capable of admitting small vessels only. The magnificent breakwater at Portland, of which the first stone was laid by Prince Albert in 1849, provides a harbour of refuge which is nearly land-locked, and a secure anchorage of almost unlimited extent, and of easy access to the largest class of vessels.

The principal rivers of Dorsetshire are the Frome, the Stour, the Piddle, and the Ivel. The Frome rises in the north-western part of the county, near Evershot, and passing by Dorchester, reaches Poole, and falls into its bay. The Stour enters this county from Wiltshire, near Gillingham, and, pursuing a southern and south-eastern direction, enters Hampshire. The Piddle rises in the north, and, flowing to the south-east, falls into Poole Bay. The Ivel, anciently the Yeo, has its origin from several springs near Horethorn, in a hill north-east from Sherborne, from which town it flows into Somersetshire, and falls into the Parret, near Yeovil.

Although neither coal nor any metallic ores have ever been found in Dorsetshire, the stone quarries of Purbeck and Portland have long been celebrated. Purbeck, though called an island, is more properly a peninsula, of an irregular oval form, about twelve miles in length and seven in breadth. It consists, according to Mantell, of Cretaceous, Wealden, and Oolitic strata in their regular order of succession, and highly inclined in their section towards Swanage Bay, where they are easily detected. At Handfast Point the chalk is discovered, its lower division dipping at a considerable angle; then comes a layer of firestone, next gault, and then greensand—all inclined; then, at Swanage Bay, a thick wealden bed; to the south of which are the Purbeck Hills, with their peculiar strata, and, a little further on, the Portland Oolite. The soil is altogether calcareous, and for the most part a continuous mass of either white or a brownish limestone, the latter having a mixture of sea-shells. The quarries on the south side of the isle afford an inexhaustible fund of natural curiosities. The best quarries are at Kingston, Worth, Langton, and Swanage. The Swanage stone is white, full of shells, takes a polish, and looks like alabaster. All over the heaths, both here and on the mainland, blocks of indurated Tertiary grit, commonly called firestone, are found, and have been occasionally employed in the building of some of the neighbouring churches; and at Downshay and Quar, in the parish of Worth, and elsewhere, the beautiful Purbeck marble, so conspicuous in the monuments and shafts of many of our cathedrals and finest churches of the 13th century, and now often sought for their restoration, has been extensively quarried. One of the most valuable products of Purbeck is a white clay used for making pipes, and very largely applied to the manufacture of china. Large quantities of it are dug, and many vessels loaded with it for Staffordshire in the port of Poole.

The Isle of Portland, as it is called, is also a peninsula, rising at its highest point, the Verne, to nearly 500 feet above the sea-level, and sloping gradually to near the water's edge at its extreme southerly point, the Bill. Its famous quarries, about 100 in number, are scattered in all directions under heaps of rubble and unsaleable stone. They are Crown-property, and, except where the stone is taken for Government purposes, are leased to various firms, who pay a royalty of so much per ton. Some 50,000 tons are annually raised and exported. The stratum of stone that is worked for sale lies nearly parallel with the upper surface of the island, and without much earth or rubbish on it. The Portland stone (or freestone as it is sometimes called) is well known for its almost white colour, and as composing the materials of the most splendid erections in London, as well as in other parts of the British empire. The connection of Portland with the mainland occurs at some 10 or 11 miles' distance, at Abbotsbury, where a most remarkable beach of raised shingle, called the Cheşil (Anglo-Saxon *Ceosol*) or Pebble Beach, touches the shore, being thus far separated from it by a narrow estuary, famous for its swannery, called the Fleet.

The entire length of the beach is from 16 to 18 miles, with an average height of about 40 feet, and a breadth of some 180 or 190 yards, the pebbles constantly decreasing in size from 1 to 3 inches in diameter at Portland, to the size of peas at its termination.

Agriculture throughout the county has made very important advances within the last few years,—steam-cultivation and improved implements having been largely introduced, and the growth of root-crops abundantly stimulated by the use of artificial manures. The precarious crops of flax and hemp for the supply of the rope and twine works of Bridport are less cultivated than formerly. On the larger farms in the Chalk district a peculiar custom prevails of under-letting the dairies at so much per cow, the farmer finding the stock and the food, and the dairyman disposing of the produce. The horned sheep of Dorsetshire, long celebrated, have now become established as a useful and lucrative breed. Professor Bell, in his *History of British Quadrupeds*, gives a figure of this, as the typical English sheep, of "a handsome, though somewhat old-fashioned breed, principally esteemed for its producing lambs earlier perhaps than any other in this country." "To the eye of him who seeks for beauty in harmony and proportion (he adds) this sheep is one of the handsomest in any part of England. The strong well-formed body and limbs, the clear white fleece, the finely-curved horns, and other points will to him constitute a more pleasing combination of character than is to be found in those breeds which have become more changed from the old stock by repeated transmission of peculiarities, which, however advantageous to the breeder, whether for the sake of the fleece or the flesh, cannot be considered as adding to the abstract beauty of the animal." There are still many fine flocks of this characteristic breed existing in the county, though many farmers prefer the Southdowns or Hampshires, as better adapted to their particular holdings. There is a small breed in Portland, which fattens too highly upon richer pastures, but the mutton of which is an especial dainty, weighing only about 8 ℔ a quarter.

The old hardy race of long-horned cattle, formerly common in the hilly districts, are fast disappearing, and Devons, short-horns, and Herefords are almost exclusively now bred. Great quantities of butter are sent to the London market. The skimmed-milk cheese is often much esteemed, though little of it is exported from the county.

Vast numbers of mackerel are taken near Abbotsbury, and along the shore from Portland to Bridport. The season for taking them is from the middle of March till midsummer, in nets or seines.

The manufactures of Dorsetshire are not extensive. The principal are those of flax and hemp in the neighbourhood of Bridport and Beaminster, and of pottery and tiles in the district near Poole. Net-making, or braiding as it is called, and also gloving, are carried on in some of the villages; but the manufactures of lace, and of thread-buttons, formerly flourishing at Blandford and elsewhere, may be said to be now entirely obsolete. At Sherborne these industries have been succeeded by extensive silk-mills.

Few, if any, parts of England possess a more abundant treasure of prehistoric remains, than are to be found throughout this county, though the march of agricultural progress inevitably tends to their obliteration. Vestiges of peaceful British occupation may constantly be traced on those portions of the Downs which are still uninclosed, whilst a series of magnificent hill-forts crown all the most prominent heights, and probably served as camps of refuge for the harassed tribes and their cattle in times of war and invasion. The grandest of these, called Maidun Castle, is supposed to be the Dunium of Ptolemy, the stronghold or Acropolis of the Durotriges, whose gigantic ramparts may be seen outlined against the sky between the Weymouth and Bridport roads, about two miles south from Dorchester. Its inner area covers about 44 acres, its outer area about 116, the difference being absorbed in its stupendous double, and sometimes triple, entrenchments, some 60 feet high, and extraordinarily steep. Other grand examples of these hill-fortresses may be seen at Eggardun and Pilsdun to the westward, at Chalbury and Flowers-barrow to the eastward, and at Rawlsbury, or Bulbarrow, Hod (inclosing an equilateral Roman camp), and Hameldun, overlooking the valley of the Stour, and at Badbury, Woodbury, &c., in the more central parts of the county. It has been conjectured with great probability that some of these last were among the *oppida* subdued in the expedition of Vespasian; and it is not unlikely that in that remarkable chain of *tumuli*, or barrows, which are visible along the crest of the Ridgeway, now tunnelled for the lines of railroad which connect Weymouth and Dorchester, may have been deposited the ashes of certain nameless heroes who fought the battles either of invasion or resistance. Such barrows are widely distributed elsewhere through the county, and when opened have usually been found to contain little more than burnt bones, corroded metal, and rude cinerary urns, with occasional marks of subsequent Roman interments. A few monoliths, cromlechs, and stone circles have also been recorded.

Of the period of Roman occupation many relics exist. The *Via Iceniana*, or Icknield Street, with various vicinal off-shoots, passes through the centre of the county, and connects its chief town Dorchester, or Durnovaria, with Old Sarum and Exeter. An indisputable though scanty fragment of the Roman wall of Dorchester still exists; and the avenues, called the walks, which surround the town appear to follow its ancient course, the trees being planted sometimes on the *agger* and sometimes in the *vallum*. A tesselated pavement, some 20 feet square, was exhumed in 1858 in the grounds of the county prison, and is preserved in its chapel; and various fragments of a similar character, as well as many coins of the later emperors, and other metallic and fictile antiquities, have been and still are not unfrequently brought to light, wherever the ground is disturbed. Roman pavements have been found elsewhere,—one at Rampisham in 1799, one at Frampton of unusual size and beauty in 1794, and others at Weymouth, Sherborne, Dewlish, &c. The amphitheatre, near the Dorchester railway station, has been generally attributed to the time of Agricola, and constructed very probably for the amusement of the Roman soldiers by the enforced labour of their captives. It is more perfect than any other remaining in this country, and has been calculated to suffice for nearly 13,000 spectators. The Roman stations in Dorsetshire which antiquarians pretty nearly agree in identifying are *Landinis* or *Londinis*, Lyme Regis; *Canca-Arixa*, Charmouth; *Durnovaria*, Dorchester; *Clavinio*, Weymouth, or a place in the immediate neighbourhood; *Morinio*, Wareham, or Hamworthy; *Bolvelaunio*, Poole; *Vindogladia*, Wimborne, or (Sir R. C. Hoare) Gussage Cowdown; *Ibernio*, Bere. Of mediæval castles no considerable remains exist, except at Corfe and Sherborne, both o them brought to ruin in the great Civil War, but both retaining picturesque and highly interesting traces of thei former magnificence.

The three principal churches of the county are the abbey church of Sherborne, a rich specimen of Third Pointed architecture, restored in recent years at immense cost, and with admirable taste; Wimborne Minster, with its two stately towers of different periods and its massive Norman nave and the noble but unfinished abbey-church of Milton, now also carefully restored, and presenting some rich examples of the Decorated period. Besides these, there are noticeable churches at Bere-Regis, Dorchester (St Peter's), and Fordington, Maiden-Newton, Piddletrenthide, Cerne, Beaminster, Powerstock, &c.; but, generally speaking, the ecclesiastical buildings of the county, though not uninteresting, cannot boast of special grandeur or beauty.

At Milton abbey, originally founded by King Athelstan, and also at Forde-Abbey, handsome portions of the monastic buildings are incorporated in the modern mansions; and there are monastic remains of varying interest at Cerne, Abbotsbury, Bindon, and elsewhere. At Sherborne some of the conventual buildings are to be traced within the precincts of the flourishing grammar school.

The dialect of the county, perfectly distinguishable from those of Wiltshire and Somersetshire, yet bearing many common marks of its Saxon origin, has been admirably illustrated, both philologically and poetically, by a living author, the Rev. Wm. Barnes, whose poems in the vernacular have won the eulogium of several eminent critics, whilst their Doric simplicity and tenderness and truth is heartily appreciated by high and low in the county.

This county has afforded titles to various noble families, besides the dukes and earls of Dorset, duke of Portland to that of Bentinck, earl of Dorchester to that of Damer, Shaftesbury to that of Ashley-Cooper, Viscount Bridport to that of Hood, Baron Melcombe to Babb-Dodington; whilst Blandford, Weymouth, Woodsford, Encombe, &c., are swallowed in the higher titles of their noble possessors.

Amongst its more eminent natives may be reckoned Cardinal Morton, Archbishops Stafford and Wake, Bishops Sprat and Stillingfleet, Matthew Prior, Sir George Summers, Sir James Thornhill, &c.

The county rates have been recently assessed on an annual income of £1,095,736.

A curious ancient *Survey* of the county was written by a Rev. Mr Coker, about the middle of the 17th century, and published from his MS. in 1732. In 1774 a very valuable *County History* appeared, by the Rev. John Hutchins, in 2 vols. folio; a second edition in 4 vols. folio, in 1803; and a third, greatly improved, and brought down to the present date, also in 4 vols. folio, in 1874. No other county in England, perhaps, possesses so full and accurate a topographical and genealogical survey as this. The antiquities of the county have likewise been satisfactorily elucidated in various publications by Mr Sydenham, Mr C. Warne, F.S.A., Dr Wake Smart, and others. (C. W. B.)

DORSET, **Thomas Sackville, Lord Buckhurst, First Earl of** (1536–1608), was born in at Buckhurst in the parish of Withyham in Sussex. His father, Sir Richard Sackville, the friend of Roger Ascham, was connected with the Boleyn family, and thus distantly with Queen Elizabeth; his mother was Winifrede, daughter of Sir John Bruges or Bridges, of London. In his fifteenth or sixteenth year he was entered at Hart Hall, Oxford; but it was at Cambridge that he completed his studies and took the degree of maste of arts. On leaving the university, where he had already obtained the reputation of a poet, he proceeded to the Inne Temple, and though the statement made by some authorities that he became a barrister is not supported by the registers, his connection with the society was not without result. He had already at the age of nineteen married

Cecely, daughter of Sir John Baker of Sissinghurst in Kent, and in 1557 he entered public life as member of parliament for Westmoreland. In the following year he sat for East Grinstead in Sussex, and the record of his activity is still to be found in the Journals of the House of Commons. Queen Elizabeth, who had just come to the throne, was attracted by the handsome person, high culture, and evident ability of her young poet-kinsman, who was accordingly, to quote his own words, "selected to a continual private attendance upon her own person," which did not, however, prevent him from appearing again in the Parliament of 1563 as member for Aylesbury in Buckinghamshire. A visit to the Continent in 1565 was interrupted by an unexplained imprisonment at Rome, and terminated by the news of his father's death, which took place on 21st April 1566. On his return he was knighted in the queen's presence, and obtained the title of Lord Buckhurst, by which he continued to be known through the most of his life. Apartments were provided for him in the queen's palace at Shene, where his mother was in charge; but the simplicity of his mode of life is shown by the fact that, when in 1568 he had to entertain Odet de Coligni, Cardinal de Châtillon, at the queen's command, he failed to satisfy the luxurious desires of his guest, and thus fell under her majesty's displeasure. In 1571 he was sent to France to congratulate Charles IX. on his marriage with Elizabeth of Austria; in 1572 he was one of the peers who tried Thomas Howard, earl of Norfolk; and in 1586 he was employed to convey to Queen Mary of Scotland the sentence of death. A more difficult task was found for him in 1587; as ambassador to the Hague he was expected "to expostulate in favour of peace with a people who knew that their existence depended on war, to reconcile those to delay who felt that delay was death, and to heal animosities between men who were enemies from their cradles to their graves." With what fearlessness, fidelity, and sagacity he discharged his duty, has been told in detail by the historian of *The United Netherlands*, who asserts that there is not a single line in all the ambassador's correspondence which does not reflect honour on his name. But his expostulations with the queen on her parsimonious policy, and his independent conduct towards the royal favourite Leicester, procured him, on his return to England, instead of approbation and reward for his services, an order confining him to his house for nine or ten months in token of her majesty's displeasure. On the death of the earl, however, he was again received into favour; in 1588 he was presented with the Order of the Garter; in 1591 he was elected chancellor of the university of Oxford, his claims having been supported by a royal letter; and, in 1599, on the death of Lord Burghley, he succeeded to the office of Lord High Treasurer of England. In the following year he had to pronounce sentence as High Steward on the earl of Essex, who had been his rival for the chancellorship and his opponent in politics. The change of the dynasty which took place in 1603 left his position unimpaired; his office of Lord Treasurer was confirmed to him by King James, and on 13th of March 1604, he was created earl of Dorset. He died suddenly on April 19th 1608, while sitting at the council table in Whitehall, and left his earldom to his son Robert Sackville.

In the history of English literature Thomas Sackville occupies an honourable position. We no longer possess any of the "sonnets finely sauced" for which, in his student days, he was praised by Jasper Heywood, but we may still read the *Ferrex and Porrex* by which he takes rank as the first writer of genuine English tragedy, the *Induction to the Mirror of Magistrates*, and the *Complaint of Henry Duke of Buckingham*. The first was written with the assistance of Thomas Norton, during Sackville's connection with the Inner Temple, was acted before Queen Elizabeth in 1561, appeared without the author's permission in 1565, and again in authorized editions in 1570–1 and 1590. The second is a stately allegorical poem of the kind so much in vogue in the reign of Elizabeth, with elaborate personifications of sorrow, death, old age, &c., intended to stand as preface to a series of poems descriptive of the tragic fates of famous men; and the *Complaint* was to form the first of the series. They all display a lively fancy, and no small command of pure and sonorous English, but hardly awaken any regret that the author soon laid aside the poet's for the diplomatist's pen.

See *Sackville's Works*, edited by Reginald W. Sackville-West, 1859; and Arber's Reprint of the *Induction*.

DORSET, CHARLES SACKVILLE, SIXTH EARL OF (1637–1706), eldest son of Richard Sackville, the fifth earl, and Frances Cranfield, eldest daughter of Lionel, earl of Middlesex, was born January 24, 1637, and succeeded his father in 1677. His youth, spent partly in London and partly in Italy, was filled with all the madcap and libertine excesses of the period; but, owing doubtless to the nobler qualities which he none the less displayed, the graceful scapegrace found more favour with the public than the rest of the dissolute crew. He was high-spirited, generous, and humane; as years passed on his character ripened and refined, and he who had been the worthy rival of Charles II. lived to be laughed at by Etherege for fidelity to his wife. Though present as a volunteer under the duke of York during the Dutch war in 1665, and afterwards sent on more than one mission to the court of France, he took comparatively an unimportant part in politics until the commencement of the troubles which ended in the Revolution of 1688. Deprived in 1667 of his office as lord-lieutenant of Sussex, for his refusal to comply with James II.'s arbitrary demands, he soon after became one of the active members of the opposition, and in 1688 assisted the flight of the Princess Anne. After James had left the country, Dorset was a member of the council for the preservation of the public peace; and on William's accession he was appointed lord chamberlain. In 1691 he accompanied the new king to Holland; and, though he was afterwards involved in the accusations of infidelity brought forward by Preston, he retained and deserved the royal favour to the last. He died at Bath in January 1705–6, and was succeeded in the earldom by Lionel Cranfield Sackville, his only son by his second wife, Mary, daughter of James Compton, earl of Essex. Dorset keeps his place in the list of English poets in virtue of a few lyrical and satirical pieces, which, though extravagantly praised by his contemporaries, and, even according to Macaulay, displaying the easy vigour of Suckling and wit as splendid as that of Butler, are after all of no great moment in themselves, and only suggestive of what in happier circumstances the writer might have done. The best known is a pleasant careless song—*To all you Ladies now at Land*—written at sea shortly before the engagement with the Dutch, in which Admiral Opdam's ship was blown up. As a patron of literature, however, Dorset stands unrivalled,—judicious, impartial, and munificent. To him Prior was indebted for his education. Montague for promotion, and Wycherly for support against the disfavour of the public. Though compelled as lord chamberlain to deprive Dryden of his official laurel, he took care to make good from his private purse the pecuniary loss involved in the dismissal.

See Prior's dedication of his poems to the duke of Dorset; Johnson's *Lives of the Poets*; Walpole's *Royal and Noble Authors*; Macaulay's *History of England*, vol. iii. chap. viii.

DORT, or DORDRECHT, an important commercial city of Holland, at the head of a district in the province of South Holland, 10 miles S.E. of Rotterdam, on the railway between that city and Breda. The island of the Meuse or Merwe on which it stands is said to have been separated from the mainland in 1421, by an inundation which swept away 72 villages, and about 100,000 inhabitants. Concerning its origin there is no authentic information, but it is certainly one of the oldest cities of Holland, and probably dates from the 10th century. It was surrounded by walls in 1231 by Florent IV., count of Holland, who made it his residence, and granted it many important privileges. In 1457, almost the entire town, including the church of Notre Dame, founded in 1366, and other public buildings, was destroyed by fire. One of the first towns in the Netherlands to embrace the Reformed religion, and to throw off the yoke of the Spanish king, it was chosen in 1572 as the meeting-place of the deputies by whom the independence of the United Provinces was first asserted; and in 1618 and 1619 it became intimately associated with the theological history of Europe, as the seat of the great synod which declared against the Arminian party. Among its celebrities are the De Witts and Ary Scheffer the artist. The town-hall is a handsome building, and the principal church is an old Gothic structure 300 feet long by 125 wide, with a heavy square tower, and numerous monumental stones, some of great antiquity. The hall in which the synod was held is now demolished. The houses are generally of an antique fashion, with the gables turned outwards, and many of them date from the period of the Spanish occupation. Dort possesses a good harbour, from which two canals lead to the centre of the town. It carries on an extensive trade in corn, flax, salt fish, train oil, and the timber which is brought down the Rhine; and it has shipbuilding docks, saw-mills, sugar-refineries, tobacco-factories, linen-bleacheries, salt-works, and white-lead works. Population in 1850, 20,878, and in 1874, 25,577.

DORT, Synod of, an assembly of the Reformed Dutch Church, with deputies from France, Switzerland, the Palatinate, Scotland, and England, called to decide the theological differences existing between the Arminians (or Remonstrants) and the Calvinists (or Counter Remonstrants), was held at Dort or Dordrecht in the years 1618 and 1619. During the life of Arminius a bitter controversy had sprung up between his followers and the strict Calvinists, led by Francis Gomar, his professorial colleague at Leyden; and, in order to decide their disputes, a synodical conference was proposed, but Arminius died before it could be held. At the conference held at the Hague in 1610, the Arminians addressed a remonstrance to the States-general in the form of five articles, which henceforth came to be known as the five points of Arminianism. This conference had no influence in reconciling the opposing parties, and another, held at Delft in the year 1613, was equally unsuccessful. In 1614, at the instance of the Arminian party, an edict was passed by the States-general, in which toleration of the opinions of both parties was declared, and further controversy forbidden; but this act only served, by rousing the jealousy of the Calvinists, to fan the controversial flame into greater fury. Gradually the dispute pervaded all classes of society, and in nearly all the towns both parties began to hold large meetings, and to indulge in threatening words and gestures, until finally, in Nov. 1617, Prince Maurice of Orange, in order finally to decide the controversy, called a synod which met at Dort in Nov. 1618 This synod was strictly national—called by the national authority to decide a national dispute, and not intended to have more than a national influence. The foreign deputies were invited to attend, only to assist by their advice in the settlement of a controversy which concerned the Netherland church alone, and which the Netherland church alone could decide. At the fourth sitting it was decided to cite Simon Episcopius and twelve other Remonstrants to appear within 14 days before the synod,
to state and justify their doctrines. It was also agr
allow the Arminian deputies to take part in the del
tions, only on condition that they forbore to consult
or in any way assist, their cited brethren, but this
refused. During the interval between the citation a
appearance of the accused, the professorial members
synod were instructed to prepare themselves to be a
confute the Arminian errors, and the synod occupied
with deliberations as to a new translation of the Bib
which a commission was named, made arrange
regarding the teaching of catechisms, and granted p
sion to the missionaries of the East Indies to baptiz
children of heathen parents as were admitted into thei
lies. At the 25th sitting Episcopius and the others cit
peared, when Episcopius surprised the deputies by a bo
outspoken defence of his views, and even went so fa
say that the synod, by excluding the Arminian de
could now only be regarded as a schismatic assembly
Remonstrants were asked to file copious explanations
five points in dispute, but objecting to the manner in
they were catechized, they were, at the 57th sittin
missed from the synod as convicted "liars and dece
The synod then proceeded in their absence to judg
from their published writings, and came to the conc
that as ecclesiastical rebels and trespassers they sho
deprived of all their offices. The synodical decis
regard to the five points, and the sentence again
Remonstrants was, at the 144th sitting, read in Latin
a large audience in the great church. The Remon
were required to subscribe the condemnation, and m
them refusing were banished. The synod was con
on 29th April 1619, by a magnificent banquet giv
the chief magistrate of Dort.

DORTMUND, a town of Germany, capital of a
of the same name, in the district of Arnsberg, and Pr
province of Westphalia, is situated on the Emscher,
31′ 25″ N. lat. and 7° 27′ 9″ E. long. Among th
structures may be mentioned the large railway static
workshop and factories of which give employm
upwards of 1000 hands, the Reinoldikirche, with
built in 1421–1450, the old Marienkirche, and the
Dominican church. To the W. of the station is one
ancient linden trees of the Königshof, where the m
of the supreme court of the formidable Vehmgeri
secret tribunal of the Middle Ages, were held.
vicinity of Dortmund are collieries, in the working of
several thousands of persons are engaged. Since t
covery of iron-ore in the coal district, in 1850, many
and blast-furnaces have been erected. The manuf
include tobacco, iron and steel, machinery, po
earthenware, oil and flour, and woollen, linen, and
fabrics. In 1875 the town had 47 breweries, whic
nished more than 6½ millions of gallons of beer.
population in 1875 was 57,742.

Dortmund, the Throtmanni, Trutmanna, Trutmonia, Tr
and Trotmunde, of early history, was already a town of s
portance in the year 800. In 1005 it was the scene of an
astical council, and in 1016 and 1180 of imperial diets. T
was walled in the 12th century, and in 1387–88 successfull
stood the troops of the archbishop of Cologne, who besieged
months. About the middle of the 13th century it joined th
seatic League. At the close of the Thirty Years' War the po
had become reduced to 3000. In 1803 Dortmund lost it
as a free town, and was annexed to Nassau. The French o
it in 1806, and in 1808 it was made over by Napoleon to th
duke of Berg, and became the chief town of the depart
Ruhr. Through the cession of Westphalia by the king
Netherlands, May 31, 1815, it became a Prussian town.

DORY, or John Dory (*Zeus faber*), an Acanthopt
fish belonging to the family *Scombridæ*, held in such
by the ancient Greeks that they called it Zeus afte
principal divinity. Its English name is probably a

tion of the French *jaune dorée*, and has reference to the prevailing golden-yellow colour of the living fish. The body in the dory is much compressed, and is nearly oval in form, while the mouth is large and capable of extensive protrusion. It possesses two dorsal fins, of which the anterior is armed with long slender spines, and the connecting membrane is produced into long tendril-like filaments; while a row of short spines extends along the belly and the roots of the anal and dorsal fins. The colour of the upper surface is olive brown; the sides are yellowish, and are marked with a prominent dark spot, on account of which the dory divides with the haddock the reputation of being the fish from which Peter took the tribute money. It is an inhabitant of the Atlantic coasts of Europe, the Mediterranean, and the Australian seas. It is occasionally abundant on the coasts of Devon and Cornwall, and is also found, though more sparingly, throughout the British seas. It is exceedingly voracious, feeding on mollusks, shrimps, and the young of other fish; and Couch states that from the stomach of a single dory he has taken 25 flounders, some 2½ inches long, 3 fatherlashers half grown, and 5 stones from the beach, one an inch and a half in length. They are often taken in the fishermen's nets off the Cornwall and Devon coast, having entered these in pursuit of pilchards. They are seldom found in deep water, preferring sandy bays, among the weeds growing on the bottom of which they lie in wait for their prey, and in securing this they are greatly assisted by their great width of gape, by their power of protruding the mouth, and by the slender filaments of the first dorsal fins, which float like worms in the water, while the greater part of the body is buried in the sand, and thus they entice the smaller fishes to come within easy reach of the capacious jaws. The dory often attains a weight of 12 lb, although those usually brought into the market do not average more than 6 or 7 lb. It is highly valued as an article of food.

DOTIS. See TOTIS.

DOUAI, or **DOUAY**, an ancient and once strongly-fortified town of France, at the head of an arrondissement, in the department of Nord, situated on the Scarpe, at a railway junction 18 miles S. of Lille. Its triple line of fortifications, partly the work of Vauban and partly of more modern structure, includes a considerably larger space than is requisite for the area of its buildings; the streets are consequently spacious, and the number and size of the gardens unusually large. Besides a variety of administrative offices, the town possesses a court of appeal, which holds its sessions in the palace of the ancient parlement of Flandres; it contains also one of the principal cannon foundries of the kingdom, an arsenal, and large artillery establishments, and is further remarkable for the number of its literary and scientific institutions, among which may be mentioned the academy, with its faculties of letters and law, representing the university established in 1562, the college, founded by cardinal Allen, for the education of English Roman Catholic priests, the Government school of artillery, a school of drawing and music, a museum of natural history and antiquities, enriched with sculptured stones and inscriptions from Bevai, a botanical garden, a collection of paintings, and a public library of upwards of 40,000 volumes, and among the rest about 300 incunabula. The church of Notre Dame dates from the 12th and 14th centuries, and preserves a remarkable painting, containing 254 figures, which formerly belonged to the abbey of Anchin, and was apparently the work of Jean Bellegambe; the ancient Carthusian convent is still extant as an artillery magazine; and the town-house ranks as one of the historical monuments of France, and is architecturally interesting for its ogival windows and its belfry and spire. Railways and canals open up to Douai an extensive trade in corn, wine, brandy, cattle, wool, flax, and other agricultural products; and it manufactures lace, gauze, cottons, linens, thread, earthenware, soap, salt, and beer. The origin of the town is a matter of dispute; but it rose into importance in the Middle Ages under the Counts of Flanders, passed afterwards into the possession of the dukes of Burgundy, and thus became subject to the Spanish crown. In 1667 it was captured by the French under Louis XIV.; and though the allies under Marlborough and Eugene obtained possession in 1710, it was retaken by the French in 1711, and finally incorporated with France in 1714. Population in 1872, 21,703.

DOUARNENEZ, a town and watering-place of France, in the department of Finistère, to the S. of a bay of the same name. Its sardine fishery, which is carried on from the end of June to the beginning of December, gives occupation to about 800 boats, and between 3000 and 4000 men; the average number of sardines caught each year is 360,000,000, worth 9,000,000 francs. Population, 7180 in 1872.

DOUBLEDAY, THOMAS, an English author in political and general literature. He early adopted the views of his friend William Cobbett, and was active in promoting the agitation which resulted in the passing of the Reform Act of 1832. As secretary of the Northern Political Union of Whigs and Radicals, he took a prominent part in forwarding the interests of Lord Grey and the reforming party. In 1858–59 he was a member of the council of the Northern Reform Union; and to the last he was a keen observer of political events. He succeeded his father as partner in an eminent firm of soap manufacturers at Newcastle, but devoted his attention rather to literature than to mercantile affairs. On the failure of the firm he obtained the registrarship of St Andrew's parish, Newcastle, a post which he held until appointed secretary to the coal trade. He died at Burham, near Newcastle, December 18, 1870.

Besides poems, dramas, numerous pamphlets, contributions to *Blackwood's Magazine*, the *Eclectic Review*, and other periodicals, and leading articles in the *Manchester Guardian* and the *Newcastle Chronicle*, Doubleday wrote *A Financial, Monetary, and Statistical History of England*, 1847; *A Treatise on Mundane Moral Government*, 1852; *The True Law of Population*, 1858; a romance, *The Eve of St Mark*, 1857; *The Political Life of Sir Robert Peel*, 1859; and *Matter for Materialists*, 1870.

DOUBS, an eastern frontier department of France, so named from its chief river, is formed of the ancient German principality of Montbéliard (Mömpelgard), and of part of the province of Franche-Comté. It is bounded E.S.E. by Switzerland, N. by the territory of Belfort and by Haute-Saône, and N.W. and S.W. by Haute-Saône and Jura; and lies between 46° 33′ 10″ and 47° 33′ 45″ N. lat., and 5°42′ and 7° E. long. The surface is chiefly mountainous, four parallel chains of the Jura crossing it from S.W. to N.E. In the loftiest and most easterly chain the principal summit, Mont d'Or, has an altitude of 4800 feet; in the most westerly the highest points do not exceed 1000 feet. The river Doubs rises at the foot of the Noir Mont, in the arrondissement of Pontarlier, and, after twice traversing the department, passes through Jura, enters Saône-et-Loir, and joins the Saône at Verdun, after a course of 267 miles. It is navigable from Voujaucourt, near Montbéliard, to its mouth. Near Morteau it forms a cataract 88 feet in height. From Voujaucourt to Dôle it constitutes a part of the navigable canal between the Rhone and Rhine. Doubs is well watered by smaller rivers and rivulets. The climate, owing to the differences of elevation, is variable; but it is generally cold and rainy, and the winters are severe. The soil is stony and loamy, and at the higher levels there are numerous peat-bogs. The department may be divided into three regions. The highest, on which the snow usually lies from six to eight months in the year, is in part barren, but on its less exposed slopes is occupied by forests of fir trees, and affords good pasturage for cattle. In the second or lower region the oak, beech, walnut, and sycamore flourish; and the valleys are susceptible of cultivation. The region of the plains is the most fertile, and produces wheat, rye, maize, hemp, pulse, and grapes and other fruits. Agriculture is in a backward state, but cattle-rearing and dairy-farming receive much attention. Gruyère cheese to the value of seven millions of francs is produced yearly. The most important manufactures are watches, of which about 300,000 are annually made, cotton and woollen cloths, hardware, cutlery, paper, glass, and leather. There are several iron foundries, and distilleries for brandy and absinthe; and the trade in cattle, hides, and timber is considerable. Among the mineral products are iron, coal, lignite, marble, building stone, gypsum, glass-sand, and grindstones. Doubs is divided into the arrondissements of Besançon, Pontarlier, Baume-les-Dames, and Montbéliard, comprising 27 cantons and 639 communes. The capital is Besançon. Of the total area of 522,753 hectares (1,291,200 acres), about 462,353 acres are arable, 299,329 under wood, 19,848 vineyard, 215,684 meadows, and 225,294 heath. The population in 1872 was 291,251.

DOUCE, Francis (1762-1834), an English antiquarian, born in 1762, was the son of one of the six clerks of Chancery. After completing his education he entered his father's office, but quitted it after a short time, and devoted himself to the collection and study of antiquities. He became a prominent member of the Society of Antiquaries, and maintained an active correspondence with most of the leading antiquaries of his day. For a time he held the post of keeper of manuscripts in the British Museum, but he was compelled to resign it owing to a quarrel with one of the trustees. In 1807 he published his *Illustrations of Shakespeare and Ancient Manners* (2 vols. 8vo), which contained some curious information, along with a great deal of trifling criticism and mistaken interpretation. An unfavourable notice of the work in the *Edinburgh Review* greatly irritated the author, and made him unwilling to venture any further publications. He contributed, however, a considerable number of papers to the *Archæologia* and the *Gentleman's Magazine*. In 1833 he published a [illegible] on the various *Designs of the Dance of Death*, the substance of which had appeared forty years before. He died on the 30th March 1834. By his will he left his printed books, illuminated manuscripts, coins, &c., to the Bodleian Library, his own manuscript works to the British Museum, with directions that they should not be opened till 1900, and his paintings, carvings, and miscellaneous antiquities to Sir Samuel Meyrick, who published an account of them, entitled *The Doucean Museum*.

DOUGLAS, the commercial capital of the Isle of Man, and a favourite watering place, stands on a fine semicircular bay on the east coast of the island, at the junction of the [illegible] and Glass, in 54° 10′ N. lat. and 4° 26′ W. long. The [illegible], as is usual with seaport towns, are irregular and narrow, but the modern ones, on terraces rising [illegible] the old town, are handsome and spacious. Among [illegible] may be noticed Castle Mona [illegible] the "tower of refuge," on a [illegible] court house, the house of [illegible] [illegible] The [illegible] 1775 [illegible] [illegible] have [illegible] the climate, the peculiar characteristics of the surrounding scenery, and the cheapness of living render Douglas a favourite resort. There is communication daily in summer with Liverpool, Fleetwood, and Barrow, twice or thrice weekly with Ireland, and occasionally with Glasgow. The harbour is dry at low water; but vessels drawing not more than 10 feet may enter during neap tides, and those drawing not more than 14 feet during spring tides. A splendid new pier, at which passengers can land and embark at all heights of tide, was erected in 1872, and a spacious promenade, inclosing the greater part of the shore, in 1875. The principal industries are the coasting trade and fisheries. Population in 1871, 13,846.

DOUGLAS, Gawain or **Gavin** (c. 1474-1522), bishop of Dunkeld, and the ancient classical poet of Scotland, was the third son of Archibald, earl of Angus, known in Scottish history as "Bell-the-Cat." His mother was Elizabeth, daughter of Robert Lord Boyd, high chamberlain of Scotland. The year when he was born has not been recorded, but it is almost certain that it was 1474, or the beginning of 1475; and of his father's seats the one most likely to have been his birthplace was Douglas Castle, Lanarkshire.[1] Being intended for the church, Douglas studied at the university of St Andrews, where his name appears in the lists of alumni between 1489 and 1494. Having entered into holy orders, he was shortly afterwards appointed rector of Hauch, or Prestonkirk, and parson of Linton in East Lothian.[2] In 1501 he was elected dean or provost of the collegiate church of St Giles's, Edinburgh, an office of dignity and emolument.

In the battle of Flodden (1513), when James IV. and many of the Scottish nobility and ecclesiastics were killed, the earl of Angus lost his two eldest sons, which so affected him that he retired to St Mains, a religious house in Galloway, where he soon after died. He was succeeded by his grandson, Archibald, a handsome young nobleman, who attracted the attention of the widowed Queen Margaret, sister of Henry VIII. of England, and they were married within eleven months after the death of the king. While this precipitate connection incensed the nobility and caused much jealousy of the Douglas family, it seemed to open up a way for the preferment of Gavin Douglas. By the influence of the queen, Douglas was "postulated" by the Pope to the abbacy of Aberbrothock, or Arbroath. He met with such opposition, however, from a rival claimant, that his appointment was never completed, and he was unable to obtain his abbacy. Douglas was next recommended by the queen to the Pope for the archbishopric of St Andrews, then vacant; and, relying upon the validity of this appointment, he attempted by force to obtain possession of the castle of St Andrews. He was, however, unsuccessful, and ultimately was passed over in favour of Andrew Forman. At length, by the united influence of the queen and the Pope, he was nominated for the bishopric of Dunkeld, which shortly afterwards became vacant. The people were so indignant at the marriage of the queen with Angus that the Parliament deprived her of the regency of the kingdom and the charge of the young King James V., and appointed the duke of Albany to be regent in her room. One of the first acts of the duke, who came from France to assume the reins of government, was to bring Douglas to trial for intriguing for ecclesiastical benefices with the queen and the pope without the [illegible] f Parliament. He was found guilty, and put in prison at he calls the "wyndy and richt vnplesant castell oyk of Edinburgh," where he continued for about a

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[1] [illegible] stated as the birth-place of Douglas by Mr [illegible] [illegible] that town (2d ed. p. 257), but no authority is [illegible]

[2] [illegible] the former designation is Myln's MS. Vitæ [illegible] which Douglas is by Bishop Sage [illegible] 1710, and by Dr Irving and others, rector of [illegible] designation is found in the MS. of his Franciscan [illegible] in Trinity College, Cambridge.—Works, i. p. [illegible]

This harsh step of the duke of Albany seems to brought about a feeling of sympathy for Douglas. as at length set at liberty, and, to make some amends, duke permitted him to be consecrated bishop of eid.

e marriage of the queen with the earl of Angus d an unhappy one; and, in consequence of his ill-nent of her, the queen separated from her husband and l with the regent against the Douglases. Angus fled borders for a time; and in 1521 his uncle Gavin was ved of his bishopric. The bishop then took shelter at ourt of Henry VIII., but in 1522 he died of the e at London, in the forty-eighth year of his age. His ns were interred in the Hospital Church of the Savoy.

e works of Bishop Douglas, though not numerous, are rtant. They consist of—(1) *The Palice of Honour*, a written in 1501,—an allegorical description of many ous cavalcades of famous persons trooping to a magni-palace somewhat like Chaucer's Temple of Fame, e execution of which Douglas has displayed much ality of treatment; (2) Another allegorical poem *King Hart*, or the heart of man, descriptive of rogress of life from youth to age; (3) A short poem *Conscience;* and (4) A *Translation of the Æneid of l*, with the supplemental book of Maphæus Vegius. ch book a short prologue is prefixed, of which the efore the 12th,

> "Where splendid Douglas paints the blooming May,"

haps the finest effort of his muse.

is *Translation of Virgil*, by which Douglas is known, is a work of which Scotland will always be l, as it was the first metrical translation of a classical or made in Britain, and the precursor of many others. ough it is very diffuse, from the difficulty its author in adapting the Doric language of his country to the oses of translation, by the same reason it is a work of iderable philological value in tracing the history of the ary language of Scotland. Although Douglas was the native writer who applied the name "Scottis" to the uage he employed, he has Scotticized many Latin words, imported many expressions from the French; while dmiration of Chaucer has induced him to avail himself me of the grammatical forms used by that poet. Still, translation, written in the broad and widely spread ct common at an early period to the north of England Scotland, will always form one of the most important marks in Scottish philology. In concluding it Douglas rtunately took farewell of poetical composition, and red the areun of political strife, as the following extract rs:—

> "Thus vp my pen and instrumentis full yore
> On Virgillis post I fix for evirmore.
> Neuir from thens syk matteris to discryue,
> My muse sall now be clene contemplatiue
> And solitar as doith the byrd in cage.
> Sen fer byworn is all my chyldis age,
> And of my dayis nere passit the half date
> That nature suld me grantyn, wele I wate;
> Thus, sen I feill doun sweyand the ballance,
> Here I resigne vp younkeris obseruance,
> And wyil direk my labouris euermoir
> Vnto the commoun welth and Goddis gloir."[1]

eral early MSS. of Douglas's *Translation of Virgil* exist. s preserved in the library of Trinity College, Cambridge, l by his amanuensis, Matthew Geddes, from the bishop's own . Two are in the library of the university of Edinburgh, me in that of the marquis of Bath at Longleat. Of the printed editions one was issued by William Copland at London in 1553, one was printed by Ruddiman at Edinburgh in 1711, and one was presented to the members of the Bannatyne Club in 1839. The *Palice of Honour* was first printed at London by William Copland, without date, but probably in 1553; and an edition, printed by "Johne Ros for Henrie Charteris," appeared at Edinburgh in 1579, of which only two copies are known to exist. This rare edition was reprinted for the Bannatyne Club. The poems called *King Hart* and *Conscience* exist in the Maitland MS. in the Pepysian Library, Cambridge. The works of the bishop were first collected and published at Edinburgh in 1874, under the editorship of Mr John Small, with a life prefixed, and a glossary appended. (J. SM.)

DOUGLAS, STEPHEN ARNOLD (1813–1861), an American statesman, was born at Brandon, in the State of Vermont, on the 23d April 1813. His father, a physician, died when he was still an infant, and in his youth he had to struggle with poverty. He was apprenticed to a cabinet-maker, but his health failed, and he quitted the employment after a year and a half. He next studied for three years at the academy of Canandaigua, giving special attention in the latter part of his course to law. In 1833 he went west to seek his fortune, and settled in Jacksonville, Illinois. Here he supported himself for a few months by acting as an auctioneer's clerk and keeping a school. Called to the bar in March 1834, he quickly obtained a large and lucrative practice, and so early as the following year was elected attorney-general of the State. In December 1835 he was elected a member of the legislature, in 1837 he was appointed registrar of the land office at Springfield, and in December 1840 he became secretary of state of Illinois. He was a judge of the supreme court of Illinois from 1841 till November 1843, when he resigned the office in order to stand a candidate for Congress in the Democratic interest. In 1837 he had failed to secure his return by a minority of 5 in a total vote of 36,000; on this occasion he was successful, being elected by a majority of 400. He took an active share in the Oregon controversy, asserting his unalterable determination not to "yield up one inch" of the Territory to Great Britain, and advocating its occupation by a military force. He was also a leading promoter of the measures which resulted in the annexation of Texas and in the Mexican war. Being chairman of the Territorial committee at first in Congress and then in the Senate, to which he was elected in March 1847, it fell to him to introduce the bills for admitting Iowa, Wisconsin, Minnesota, California, and Oregon into the Union, and for organizing the Territories of Minnesota, Oregon, New Mexico, Utah, Washington, Kansas, and Nebraska. On the keenly disputed question of the permission of slavery in the Territories, Douglas advocated, if he was not the first to promulgate, what came to be known as the "popular sovereignty doctrine," by which each territory was to be left to decide the matter for itself in the same manner as a State. The bill for organizing the Territories of Kansas and Nebraska, which Douglas reported in January 1854, caused great popular excitement, as it repealed the Missouri compromise, and declared the people of "any State or Territory" "free to form and regulate their domestic institutions in their own way, subject only to the constitution of the United States." There was great indignation throughout the free states; and Douglas, as the chief promoter of the measure, was hanged or burned in effigy in many places. In 1852, and again in 1856, he was a candidate for the presidency in the National Democratic Convention, and though on both occasions he was unsuccessful, he received strong support. In 1857 he distinguished himself by his vigorous opposition to the admission of Kansas into the Union under the Lecompton constitution, which he maintained to be fraudulent. In the following year he was engaged in a close and very exciting contest for the senatorship with Abraham Lincoln, who was the Republican candidate. The

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Vorks, vol. iv. p. 233. The last two lines occur in the Bl. L. 1553.

popular vote was against him, but in the legislature vote he secured his return by 54 to 46. Douglas paid great attention to the local affairs of Illinois, and he was the chief promoter of the Illinois Central Railroad. In 1860 he was again one of the Democratic candidates for the presidency, and received a large popular vote, but he was very feebly supported in the electoral college. On the outbreak of the civil war he denounced secession as criminal, and was one of the strongest advocates of maintaining the integrity of the Union at all hazards. He delivered frequent addresses in this sense after the adjournment of Congress, and during his last illness he dictated a letter for publication urging all patriotic men to sustain the Union and the constitution. He died at Chicago on the 3d June 1861.

DOUR, a town of Belgium, in the province of Hainault, nine miles south-west of Mons, to the right of the railway from that city to Valenciennes. It owes its whole importance to its manufacturing industry, which includes iron-smelting, weaving, bleaching, and tanning, and is fostered by the existence in the vicinity of coal and iron mines. Population in 1866, 8501.

DOUSA, JANUS [JAN VAN DER DOES] (1545–1604), a distinguished Dutch statesman, historian, poet, and philologist, the heroic defender of Leyden, was born at Noordwyck, in the province of Holland, December 6, 1545. Left an orphan at the age of five, he was brought up by his grandfather, after whose death an uncle took charge of him. He began his studies at Lier in Brabant, became a pupil of Henry Junius at Delft in 1560, and thence passed successively to Louvain, Douai, and Paris. Here he studied Greek under Peter Dorat, professor at the Collége Royal, and became acquainted with the Chancellor L'Hôpital, Turnebus, Ronsard, and other eminent men. On his return to Holland in 1565 he married. His name stands in the list of nobles who in that year formed a league against Philip II.; but he does not appear to have taken any active part in public affairs till 1572, when he was sent as head of an embassy to England. Two years later he was intrusted with the government and defence of Leyden, then besieged by the Spaniards; and in this arduous post he displayed rare intelligence, fortitude, and practical wisdom. On the foundation of the university of Leyden by William I. of Orange, Dousa was appointed first curator, and this office he held for nearly thirty years. Through his friendships with foreign scholars he drew to Leyden many illustrious teachers and professors. After the assassination of William I. in 1584, Dousa came privately to England to seek the aid of Queen Elizabeth, and in the following year he was sent formally for the same purpose. About the same time he was appointed keeper of the Dutch archives, and the opportunities thus afforded him of literary and historical research he turned to good account. In 1591, being named a member of the States-General, he removed to the Hague. Heavy blows fell upon him in the deaths of his eldest son in 1597 and of his second son three years later. A bitterer trial still was the misconduct of another son. Dousa was author of several volumes of Latin verse and of philological notes on Horace, Catullus, Tibullus, Petronius Arbiter, and Plautus. But his principal work is the *Annals of Holland*, which first appeared in a metrical form in 1599, and was published in prose, under the title of *Bataviæ Hollandiæque Annales*, in 1601. This work had been begun by his eldest son. Dousa also took part, as editor or contributor, in various other publications. He died at Noordwyck, October 8, 1604, and was interred at the Hague; but no monument was erected to his memory until 1792, when one of his descendants placed a tomb in his honour in the church of Noordwyck.

DOUVILLE, JEAN BAPTISTE (1794–c. 1837), a French traveller born at Hambye, in the department of Manche, whose asserted discoveries in Africa have in large measure been relegated to the region of romance. At an early period his imagination seems to have been fired by narratives of travel and adventure; and accordingly, when he fell heir to a wealthy relation, he at once proceeded to gratify his desire for personal acquaintance with foreign lands. He certainly wandered far and wide; and, according to his own profession, he visited India, Kashmir, Khorassan, Persia, Asia Minor, and many parts of Europe. After spending some time in Paris, and being admitted a member of the Société de Géographie, he proceeded in 1826 to Brazil, with the intention apparently of carrying on scientific explorations: from this purpose, however, he was diverted by the political circumstances of the country; and to replenish his funds he started business at Montevideo in partnership with a M. Laboissière. Towards the close of the following year, probably in October, after a short residence at Rio Janeiro, he left Brazil for the Portuguese possessions on the west coast of Africa, where his presence in March 1828 is proved by the mention made of him in certain letters of Castillo Branco, the governor-general of Loanda. In May 1831 he reappeared in France, claiming to have pushed his explorations into the very heart of Africa, as far as the 27th degree of longitude E. of Greenwich, or, in other words, into what is now known as the great equatorial lake region. His story was readily accepted by the Société de Géographie at Paris, which hastened to recognise his services by assigning him the great gold medal, and appointing him their secretary for the year 1832. On the publication of his narrative—*Voyage au Congo et dans l'intérieur de l'Afrique équinoxiale*—which occupied four large volumes, and was accompanied by an elaborate atlas, the public enthusiasm might well run high. In company with his wife (a sister of his old Montevidean partner), and attended by about 400 native porters, the happy traveller had advanced from kingdom to kingdom rather like a monarch making a progress through his tributary states, distributing largesses and receiving homage, than like a humble adventurer [illegible]ing his expenses from his private purse. Everything went smooth for a time; the interior of Africa was described in text books and depicted in maps according to the discoveries of Douville; but in the August number of the *Foreign Quarterly Review* for 1832 the most sweeping charges of ignorance and fraud were launched against the author, and this attack was followed up in the *Revue des Deux Mondes* for November, by Thomas Lacordaire, who asserted that, during part of the time which he claimed to have spent in Africa, Douville had been a familiar object in the streets of Rio Janeiro. The tide of popular favour turned; and, in spite of the explanations furnished by Douville in *Ma defence*, 1832, and *Trente mois de ma vie, ou quinze mois avant et quinze mois après mon voyage au Congo*, 1833, the general decision was openly against him. Mlle. Audrun, a lady to whom he was about to be married, committed suicide from grief at the disgrace; and, after vainly attempting to obtain satisfaction from Lacordaire by duel, the poor adventurer himself withdrew in 1833 to Brazil, and proceeded to make explorations in the valley of the Amazon. According to Dr Gardner, in his *Travels in the Interior of Brazil*, he was murdered in 1837 on the banks of the São Francisco for charging too high for his medical assistance. His Brazilian manuscripts fell into the hands of M. S. Rang, by whom they were transmitted to M. Ferdinand Denis. While modern exploration has done nothing to support the wider pretensions of Douville, no less an authority than Captain Burton asserts that his descriptions of the country of the Congo are life-like and picturesque; that his observations on the anthropology, ceremonies, customs, and maladies of the people are remarkably accurate; and that even the native words inserted into the text of his narrative "are for the most part given with unusual correctness."

DOUW, or Dow, Gerhard (1613–1680), a celebrated Flemish painter, was born at Leyden on the 7th April 1613. His first instructor in drawing and design was Bartholomew Dolendo, an engraver; and he afterwards learned the art of glass-painting under Peter Kouwhoorn. At the age of fifteen he became a pupil of Rembrandt, with whom he continued for three years. From the great master of the Flemish school he acquired his skill in colouring, and in the more subtle effects of chiaroscuro; and the style of Rembrandt is reflected in several of his earlier pictures, notably in a portrait of himself at the age of twenty-two, in the Bridgewater Gallery, and in the Blind Tobit going to meet his Son, at Wardour Castle. At a comparatively early point in his career, however, he had formed a manner of his own distinct from, and indeed in some respects antagonistic to, that of his master. Gifted with unusual clearness of vision and precision of manipulation, he cultivated a minute and elaborate style of treatment; and probably few painters ever spent more time and pains on all the details of their pictures down to the most trivial. He is said to have spent five days in painting a hand; and his work was so fine that he found it necessary to manufacture his own brushes. Notwithstanding the minuteness of his touch, however, the general effect was harmonious and free from stiffness, and his colour was always admirably fresh and transparent. He was fond of representing subjects in lantern or candle light, the effects of which he reproduced with a fidelity and skill which no other master has equalled. He frequently painted by the aid of a concave mirror, and to obtain exactness looked at his subject through a frame crossed with squares of silk thread. His practice as a portrait painter, which was at first considerable, gradually declined, sitters being unwilling to give him the time that he deemed necessary. His pictures were always small in size, and represented chiefly subjects in still life. Upwards of two hundred are attributed to him, and specimens are to be found in most of the great public collections of Europe. His *chef d'œuvre* is generally considered to be the Woman sick of the Dropsy, in the Louvre. The Evening School, in the Amsterdam Gallery, is the best example of the candle-light scenes in which he excelled. In the National Gallery favourable specimens are to be seen in the Poulterer's Shop and a portrait of himself. Douw's pictures brought high prices, and it is said that President Van Spiring of the Hague paid him 1000 florins a year simply for the right of preemption. Douw died in 1680. His most celebrated pupil was Francis Mieris.

DOVE (Dutch, *Duyve*; Danish, *Due*; Icelandic, *Dufa*; German, *Taube*), a name which seems to be most commonly applied to the smaller members of the group of birds by ornithologists usually called Pigeons (*Columbæ*); but no sharp distinction can be drawn between Pigeons and Doves, and in general literature the two words are used almost indifferently, while no one species can be pointed out to which the word Dove, taken alone, seems to be absolutely proper. The largest of the group to which the name is applicable is perhaps the Ring-Dove, or Wood-Pigeon, also called in many parts of Britain Cushat and Queest (*Columba palumbus*, Linn.), a very common bird throughout these islands and most parts of Europe. It associates in winter in large flocks, the numbers of which (owing partly to the destruction of predacious animals, but still more to the modern system of agriculture, and the growth of plantations in many districts that were before treeless) have of late years increased enormously, so that their depredations are very serious. In former days, when the breadth of land in Britain under green crops was comparatively small, these birds found little food in the dead season, and this scarcity was a natural check on their superabundance. But since the extended cultivation of turnips and plants of similar use the case is altered, and perhaps at no time of the year has provender become more plentiful than in winter. The Ring-Dove may be easily distinguished from other European species by its larger size, and especially by the white spot on either side of its neck, forming a nearly continuous "ring," whence the bird takes its name, and the large white patches in its wings, which are very conspicuous in flight. It breeds several times in the year, making for its nest a slight platform of sticks on the horizontal bough of a tree, and laying therein two eggs—which, as in all the *Columbæ*, are white.

The Stock-Dove (*C. œnas* of most authors) is a smaller species, with many of the habits of the former, but breeding by preference in the stocks of hollow trees or in rabbit-holes. It is darker in colour than the Ring-Dove, without any white on its neck or wings, and is much less common and more locally distributed.

The Rock-Dove (*C. livia*, Temm.) much resembles the Stock-Dove, but is of a lighter colour, with two black bars on its wings, and a white rump. In its wild state it haunts most of the rocky parts of the coast of Europe, from the Færoes to the Cyclades, and, seldom going inland, is comparatively rare. Yet, as it is without contradiction the parent-stem of all our domestic Pigeons, its numbers must far exceed those of both the former put together. In Egypt and various parts of Asia it is represented by what Mr Darwin has called "Wild Races," which are commonly accounted good "species" (*C. schimperi*, *C. affinis*, *C. intermedia*, *C. leuconota*, and so forth), though they differ from one another far less than do nearly all the domestic forms, of which more than 150 kinds that "breed true," and have been separately named, are known to exist. Very many of these, if found wild, would have unquestionably been ranked by the best ornithologists as distinct "species," and several of them would as undoubtedly have been placed in different genera. These various breeds are classified by Mr Darwin[1] in *four* groups as follows:—

Group I. composed of a *single* Race, that of the "Pouters," having the gullet of great size, barely separated from the crop, and often inflated, the body and legs elongated, and a moderate bill. The most strongly marked subrace, the *Improved English Pouter*, is considered to be the most distinct of all domesticated pigeons.

Group II. includes *three* Races:—(1.) "Carriers," with a long pointed bill, the eyes surrounded by much bare skin, and the neck and body much elongated; (2.) "Runts," with a long, massive bill, and the body of great size; and (3.) "Barbs," with a short, broad bill, much bare skin round the eyes, and the skin over the nostrils swollen. Of the first four and of the second five subraces are distinguished.

Group III. is confessedly artificial, and to it are assigned *five* Races:—(1.) "Fan-tails," remarkable for the extraordinary development of their tails, which may consist of as many as forty-two rectrices in place of the ordinary twelve; (2.) "Turbits" and "Owls," with the feathers of the throat diverging, and a short thick bill; (3.) "Tumblers," possessing the marvellous habit of tumbling backwards during flight or, in some breeds, even on the ground, and having a short, conical bill; (4.) "Frill-backs," in which the feathers are reversed; and (5.) "Jacobins," with the feathers of the neck forming a hood, and the wings and tail long.

Group IV. greatly resembles the normal form, and comprises *two* Races:—(1.) Trumpeters," with a tuft of feathers at the base of the neck curling forward, the face much feathered, and a very peculiar voice, and (2.) Pigeons scarcely differing in structure from the wild stock.

Besides these some three or four other little-known breeds exist, and the whole number of breeds and sub-breeds almost defies computation. The difference between them is in many cases far from being superficial, for Mr Darwin has shown that there is scarcely any part of the skeleton which is constant, and the modifications that have been effected in the proportions of the head and sternal apparatus are very remarkable. Yet the proof that all these different birds have descended from one common stock is nearly certain. Here there is no need to point out its bearing upon the "Theory of Natural Selection" which that eminent naturalist and Mr Wallace have rendered so well known. The antiquity of some of these breeds is not the least interesting part of the subject, nor is the use to which one at least of them has long been applied. The Dove from the earliest period in history has been associated with the idea of a messenger (Genesis viii. 8–12), and its employment in that capacity, developed successively by Greeks, Romans, Mussulmans, and Christians, has never been more fully made available than in our own day, as witness the "Pigeon-post" established during the recent siege of Paris.

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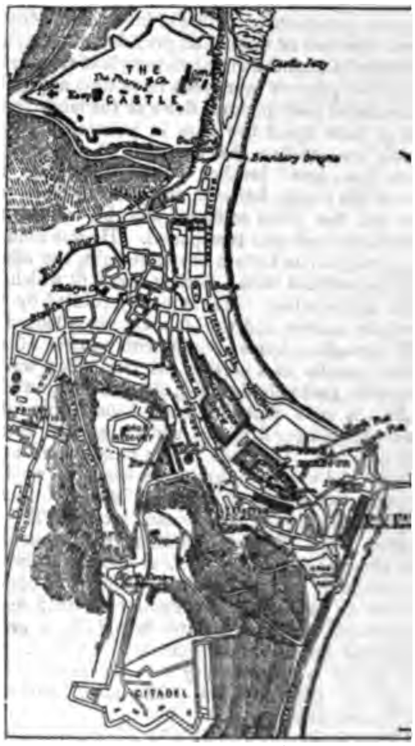
[1] *The Variation of Animals and Plants under Domestication.* London: 1868. Vol. i. pp. 131–224.

Leaving, then, this interesting subject, space does not permit our here dwelling on various foreign species, which, if not truly belonging to the genus *Columba*, are barely separable therefrom. Of these examples may be found in the Indian, Ethiopian, and Neotropical Regions. Still less can we here enter upon the innumerable other forms, though they may be entitled to the name of "Dove," which are to be found in almost every part of the world, and nowhere more abundantly than in the Australian Region. Mr Wallace (*Ibis*, 1865, pp. 365–400) considers that they attain their maximum development in the Papuan Subregion, where, though the land-area is less than one-sixth that of Europe, more than a quarter of all the species (some 300 in number) known to exist are found—owing, he suggests, to the absence of forest-haunting and fruit-eating Mammals.

It would, however, be impossible to conclude this article without noticing a small group of birds to which in some minds the name Dove will seem especially applicable. This is the group containing the Turtle-Doves—the time-honoured emblem of tenderness and conjugal love. The common Turtle-Dove of Europe (*Turtur auritus*) is one of those species which is gradually extending its area. In England, not much more than a century ago, it seems to have been chiefly, if not solely, known in the southern and western counties. Though in the character of a straggler only, it now reaches the extreme north of Scotland, and is perhaps nowhere more abundant than in many of the midland and eastern counties of England. On the continent the same thing has been observed, though indeed not so definitely; and this species has within the last twenty years or so appeared as a casual visitor within the Arctic Circle. The probable causes of its extension cannot here be discussed; and there is no need to dwell upon its graceful form and the delicate harmony of its modest colouring, for they are proverbial. The species is migratory, reaching Europe late in April and retiring in September. Another species, and one perhaps better known from being commonly kept in confinement, is that called by many the Collared or Barbary Dove (*T. risorius*)—the second English name probably indicating that it was by way of that country that it was brought to us, for it is not an African bird. This is distinguished by its cream-coloured plumage and black necklace. Some uncertainty seems to exist about its original home, but it is found from Constantinople to India, and is abundant in the Holy Land, though there a third species (*T. senegalensis*) also occurs, which Canon Tristram thinks is the Turtle-Dove of Scripture. (A. N.)

DOVER (the ancient Dubris), principal cinque port of England, is situated close to the South Foreland, 72 miles from London, in a main valley of the chalk h
ing with the opposite cliffs between Calais and
dominant object is the castle, on the east hei
its walls stands the Roman pharos; the I
fortress church, remaining not only *in situ*,
roof) integrally *in statu quo*, forming a prim
relic, unique in Christendom; some remain
fort; and the massive keep and subsidia
Norman building. These ancient works
garrison of 758; but they are now covered
site of Fort Burgoyne, a position of great st
men. The western heights, where is still
of a consort Roman pharos, form a circu
fortifications, with provision for 3010 tro
these, and stretching inland, lies the town,
following are the principal features. 1. The
at the eastern, is now at the western extrem
considerable basins being fit for mail steame
trading vessels. 2. The admiralty pier is a



Plan of Dover.

ture of solid concrete and masonry extendi
third of a mile into the sea, affording le
accommodation for vessels of almost any bur
ultimate connection by break-water with a h
castle, so inclosing the bay as a vast harl
visitors' quarter consists of ranges of good ho
length of the seaboard and elsewhere,
elevation newly built on a western spur of t
4. Of old Dover, within its walls and g
remains, except a remnant of the Saxon co
of the canons of St Martin, and the parish
Mary the Virgin—rebuilt and enlarged in
preserving the three bays of the Anglo-Saxo
its western narthex, on which had been su
Norman tower, still presenting its rich front t
A later Norman church stands under the Cas
has been partially restored, but its parochial

ferred to the new parish church of St James. There are two other modern churches—Holy Trinity and Christchurch, and, further up the valley, the parish church of Charlton (originally Norman) and Buckland (Early English), which, including the Castle Church, completes the former number of seven for the town. There are also 13 chapels of nonconformist worship, representing most denominations, and placed in various parts of the borough. 6. The remains of the once (12th century) splendid foundation of St Martin's priory include the great gate, the house refectory with campanile, and the spacious strangers' refectory, lately converted into the college school-room. 7. Just across the High Street stand the tower and truncated fabric of the noble hall of the hospital Maison Dieu, founded (13th century) for the reception of pilgrims of all nations, long used as a Crown victualling office, but latterly purchased by the corporation and adapted for a town hall, with prison cells as basements, and other prison buildings annexed, the former chapel of the society serving now as a court of sessions. 8. The ground work of a round (Holy Sepulchre) church of the Templars is on the opposite heights, approaching the citadel. 9. Among the centres of educational work are a proprietary college, occupying the site and remaining buildings of St Martin's Priory, for a cheap but sound education of town boys, and for boarders in the masters' houses, and also a strong array of national schools, worked up to a high mark, according to H. M. Inspectors' reports, and providing means for a good practical education of about 3400 children. In physical conditions the place is exceptionally healthy, the registrar-general's returns showing them in some years to be little below those of the Malvern Hills. The steep shore and open downs make it agreeable for bathing and summer resort; and it has constant sea-going interest from the Continental mail service, and the course of vessels up and down channel lying within two miles of the shore. Objects of interest within easy reach are—the S. Foreland electric light-houses; the (florid Norman) church of St Margaret's; the Templars' Manor, Ewell; St Radigund's Abbey; the Preceptory of Knights of St John, Swingfield; rich Norman votive chapel, Barfreystone. There are two lines of railway to London—one traversing the Weald of Kent, the other following the old Roman road, *via* Canterbury and Rochester. Dover returns 2 members to Parliament, and is governed by a mayor, 6 aldermen, and 18 councillors. The area of the borough is 1262 acres. Population (1871), 28,590.

Corporation Seal.

DOVER, a city of the United States, capital of Strafford county, New Hampshire, situated on the Cocheco, a tributary of the Piscataqua, at a railway junction twelve miles north-west of Portsmouth. It has eight churches, a high school, a city hall, and a public library; and the water-power furnished by the falls of the Cocheco encourages its industrial activity, the principal results of which are prints and other cotton goods to the value of upwards of £200,000 annually, woollens, leather, boots and shoes, hats, oil-cloth, sand-paper, iron and brass wares, and carriages. The town was founded in 1623, and received its city charter in 1855. Population in 1870, 9294.

DOVER, a town of the United States, the capital of Delaware, on St Jones river, 9 miles inland from Delaware Bay, and 48 miles south of Wilmington. It is a regular brick-built place, with broad, well-shaded streets, has a State house, a court-house, six churches, an academy, and several other public buildings, and carries on a brisk trade in preserved fruits. Population in 1870, 1905, of whom 501 were people of colour.

DOVER, George James Welbore Agar Ellis, Baron (1797–1833), born on the 14th January 1797, was the eldest son of the second Viscount Clifden. He was educated at Christ Church, Oxford, and in 1818 he was returned to Parliament as member for Heytesbury. He afterwards represented Seaford (1820), Ludgershall (1826), and Oakhampton (1830). In party politics he took little interest; but he was a zealous and enlightened advocate in Parliament and elsewhere of state encouragement being given to the cause of literature and the fine arts. In 1824 he was the leading promoter of the grant of £57,000 for the purchase of Mr Angerstein's collection of pictures, which formed the foundation of the National Gallery. On the formation of Lord Grey's administration, in November 1830, he was appointed chief commissioner of woods and forests. The post was one for which his tastes well fitted him, but he was compelled by delicate health to resign it after two months' occupancy. In June 1831, during the lifetime of his father, he was raised to the House of Lords under the title of Baron Dover. His services to the cause of learning and the fine arts, as well as his own distinction as an author, led in 1832 to his election to the presidency of the Royal Society of Literature. He died on the 10th July 1833. Lord Dover's literary works were chiefly historical, and included *The True History of the Iron Mask, extracted from Documents in the French Archives* (1826), *Historical Inquiries respecting the Character of Clarendon* (1827), and a *Life of Frederick the Great* (1831). He also edited the *Ellis Correspondence* and *Walpole's Letters to Sir Horace Mann*. He left in manuscript a volume written for the instruction of his son, which was published posthumously under the title *Lives of the Most Eminent Sovereigns of Modern Europe*. A fourth edition of this work appeared in 1853.

DOW, Lorenzo (1777–1834), an American preacher, noted for his eccentricities of dress and manner, was born at Coventry, Connecticut, U.S., October 16, 1777. He received but a limited education, and was much troubled in his youth by religious perplexities; but he ultimately joined the Methodists, and was appointed a preacher (1799). The same year, however, his official connection with that body ceased, and he came over to preach to the Catholics of Ireland. He attracted great crowds to hear and see him, and was often persecuted as well as admired. He also visited England, introduced the system of camp meetings, and thus led the way to the formation of the Primitive Methodist Society. These visits were repeated in 1805. Dow's enthusiasm sustained him through the incessant labours of more than thirty years, during which he preached in almost all parts of the United States. His later efforts were chiefly directed against the Jesuits. His *Polemical Works* were published in 1814. Among his other writings are *The Stranger in Charleston, or the Trial and Confession of Lorenzo Dow* (1822), *A Short Account of a Long Travel* (1823), and the *History of a Cosmopolite*. He died February 2, 1834.

DOWLETABAD, a city and fortress of India, in the north-western corner of the Nizam's Dominions, near one of the right-hand tributaries of the Godavery. Though still the centre of an administrative district, the city has sunk into comparative insignificance since the rise of Aurungabad, about ten miles to the east; but the fortress remains, from its natural position, one of the most remarkable in the country. It occupies the conical top of a great granite rock, which rises abruptly from the plain to a height of at least 300 feet, and is encompassed at the foot by a ditch upwards of 30 feet wide. The only means of access to the summit is afforded by a narrow bridge, with passage for not more than two men abreast, and a long gallery, excavated in the rock, which has for the most part a very gradual upward slope, but about midway is intercepted by a steep stair, the top of which is covered by a grating destined in time of war to form the hearth of a huge fire kept burning by the garrison above. In spite, however, of its natural strength and its various artificial defences, the fortress has frequently been taken. When about the year 1203 the Mahometans invaded this part of the Deccan, Deogurh, as the city was then called, was the wealthy residence of a powerful rajah. In 1306 it was occupied by Mallek Naib, the emperor of Delhi's general; and in the early part of the same century Mahomet III., in his anxiety to make it the capital of his kingdom and worthy of its new name of Dowletabad, or Abode of Prosperity, endeavoured, but in vain, to cause a wholesale transmigration of the inhabitants of Delhi. About the year 1595 it surrendered to Ahmed Nizam, shah of Ahmadnagar; and on the fall of his dynasty it was taken possession of by Mallek Amber, an Abyssinian slave. His successors reigned till 1634, when it was taken by the Moguls, who transferred the seat of government to Aurungabad. In the 18th century it passed into the possession of Nizam el Mulk.

DOWN, a maritime county of Ireland, in the province of Ulster, occupying the most easterly part of the island, is bounded N. by the county Antrim and Belfast Lough, E. and S. by the Irish Sea, and W. by the county Armagh. Its area, including Ballymacarret, a suburb of Belfast (1670 acres), covers 967 square miles, or 612,409 acres. The coast-line is very irregular, and is indented by several loughs and bays. The largest of these is Strangford Lough, a fine sheet of water studded with 260 islets, 54 of which have names, and all of which are finely wooded or rich in pasturage. The lough runs for ten miles northwards, and the ancient castles and ruined abbeys on the islets render the scene one of singular interest and beauty. Further south Dundrum Bay forms a wider expanse of water. In the south-west Carlingford Lough separates the county from Louth. On its north-east shore lies the village of Rosstrevor, now the resort of invalids from all parts of the United Kingdom.

Mountains.—Between Strangford and Carlingford loughs the county is occupied by a range of hills known in its south-western portion as the Mourne Mountains, which give rise to the four principal rivers—the Bann, the Lagan, the Annacloy, and the Newry. The highest peak in the Mourne range is named Slieve Donard. It is 2796 feet above the level of the sea, and is exceeded only by one peak, Lugduff, in the Wicklow range, and the higher reeks in Killarney.

Springs.—Down is celebrated for its holy wells and mineral springs. The chalybeate are more numerous than the sulphurous, but both abound. There are springs at Ardmillan, Granshaw, Dundonnell, Magheralin, Dromore, Newry, Banbridge, and Tierkelly. The Struel springs, a mile south-east of the town of Downpatrick, are celebrated for their healing properties. Fifty years ago they were regarded as possessing not only chemical wealth in rare abundance, but miraculous powers; and the decline of public credulity in the latter was coincident with the failure of the former. To this day, however, the wells, which are four in number, are visited, and certain religious observances maintained, sometimes for a week. Circuits on the knees are made round the wells; and amongst the ignorant the reputation of the sacred waters remains unimpaired.

The scenery of the county is pleasantly diversified, the people are intelligent and comparatively well educated, the landed proprietors are resident, and there is a thriving independence which may be looked for in vain outside the province of Ulster.

Minerals.—There are several quarries of fine sandstone. The best is that on Scrabb Hill, near Newtownards, where a very close-grained, clear-coloured, and hard and durable stone is raised. Limestone is not very general. Near Comber, on the shores of Strangford Lough, is a very hard and sparkling kind of reddish granular limestone. But the greatest magazine of this rock is in the vicinity of Moira, where the stone lies very near the surface. Granite occurs in many places in detached masses, but the great body of it is confined to the southern and western regions, chiefly in the Mourne Mountains. Crystals of topaz and beryl are found in the granite of Slieve Donard. Indications of lead have been discovered near Castlewellan, Killough, Newtownards, and Warrenpoint; and traces of copper in the Mourne Mountains near Rosstrevor.

Soil.—The predominating soil is a loam of little depth, in most places intermixed with considerable quantities of stones of various sizes, but differing materially in character according to the nature of the subsoil. Clay is mostly confined to the eastern coast, and to the northern parts of Castlereagh. Of sandy soil the quantity is small; it occurs chiefly near Dundrum. Moor grounds are mostly confined to the skirts of the mountains. Bogs, though frequent, are scarcely sufficient to furnish a supply of fuel to the population.

According to Owners of Land Return (1876), there were, in 1875, 3605 separate proprietors, holding a total area of 608,214 acres, valued at £776,518. The number of owners of less than 1 acre numbered 1460, or 40½ per cent., that of all Ulster being 48 per cent. The average size of the holdings was 168½ acres, and the average value per acre was £1, 5s. 6½d., as against 239½ acres and 15s. 8½d. respectively for Ulster. As in the neighbouring counties of Antrim and Armagh, the value of the land in Down is considerably higher than that of the rest of the province. Eighteen proprietors hold upwards of 6000 acres each, and among them an aggregate extent equal to 48½ per cent. of the total area,—the principle holders being:—Marquis of Downshire (Hillsborough), 64,356 acres; the Kilmorley Trustees, 37,454; Earl of Annesley (Castlewellan), 23,567; Marquis of Londonderry (Newtownards), 23,554; Colonel W. B. Forde (Seaforde), 19,882; Earl Dufferin (Clandeboy), 18,238; Hon. R. Meade's trustees (Dromore), 13,493; R. N. Batt (Belfast), 12,010; and Lord A. E. Hill-Trevor, 10,940.

Agriculture.—Of the total area of the county, which is 610,740 acres (exclusive of Ballymacarret), there are 339,541 acres under tillage, 187,604 in pasture, and 12,037 under wood. Although comparisons as to yields of crops between different periods is now fallacious, inasmuch as the increased and increasing importation of wheat into Ireland has altered the system of agriculture, it may be mentioned that, while in five years the cultivation of wheat has fallen from 244,451 acres to 119,597 in Ireland, during the same period in Down the decrease was from 32,734 acres to 21,272. There are many landed proprietors who hold large tracts in their own hands. The great bulk of the labouring population is orderly and industrious. Their dwellings are better constructed and furnished than those for a similar class in other parts of Ireland. The processes of agriculture. owing in a great degree to the example set by the resident gentry, are skilfully carried on. The land is well cultivated. The farms are in some districts small, but the effect of emigration has been to consolidate the holdings.

The breed of horses is an object of much attention, and some of the best racers in Ireland have been bred in this county. The native breed of sheep, a small hardy race, is confined to the mountains. The various other kinds of sheep have been much improved by judicious crosses from the best breeds. Hogs are reared in great numbers, chiefly for the Belfast market, where the large exportation occasions a constant demand for them, hams of very superior quality being prepared in that town.

The following figures give the acreage of the principal crops and the numbers of live stock raised in the years 1873 and 1876 respectively :—

	Wheat.	Oats.	Potatoes.	Turnips.	Flax.
1873	24,783	118,342	53,266	21,117	27,093
1876	21,272	119,857	52,278	20,978	23,612

	Horses and mules.	Cattle.	Sheep.	Pigs.	Goats.
1873	32,183	146,971	75,406	32,827	11,484
1876	31,875	143,832	68,968	51,327	11,227

Along with Tyrone, the county grows the largest extent of flax in Ireland, and the largest extent of the other cereals of any county in Ulster. In live stock Down possesses a greater number of horses than any other Irish county with the exception of Cork.

Fisheries.—These are not developed as they might be. The Kilkeel herring fishery realized £4203 in 1871, £6200 in 1872, £13,349 in 1873, £6000 in 1874, and £1360 in 1875. There are fishing stations at Donaghadee, Strangford, Newcastle, and Carlingford ; the total number of vessels in 1875 was 678, and of men and boys 2537. In 1850 there were 1468 vessels and 4640 hands.

Administration.—The county is divided into 14 baronies, 70 parishes, and 1258 town-lands. It forms part of the united dioceses of Down, Connor, and Dromore; and it belongs to the military district of Belfast. The assizes are held at Downpatrick ; quarter sessions at Banbridge, Downpatrick, Hillsborough, Newry, and Newtownards ; and there are 26 petty sessions districts. The poor-law unions of Downpatrick, Kilkeel, and Newtownards are wholly within the county, and those of Banbridge and Newry partly in Down and partly in Armagh. The total sum expended in poor-law administration in 1875 was £21,076, and the average daily number of paupers 1280. The county prison and infirmary are in Downpatrick, but the county lunatic asylum is in Belfast. Down returns 4 members to Parliament—2 for the county at large, 1 for Downpatrick, and 1 for Newry. Portions of the boroughs of Belfast and Lisburn are in Down county, but they are regarded more properly as parts of Antrim and Armagh respectively. Previous to the Act of Union Down returned 14 members to the Irish Parliament—2 for the county at large, and 2 each for the boroughs of Bangor, Downpatrick, Hillsborough, Newry, Newtownards, and Killyleagh.

Population.—The general decrease of population in the province of Ulster between the census of 1851 and that of 1871 indicates a percentage of 8¾, while that of this county amounts to 13½. This decrease may be ascribed in some part to the migration of the people to Belfast and the neighbouring manufacturing towns, as well as to the emigration to foreign countries. In 1851, the inhabitants of Down (exclusive of the part of Belfast) numbered 320,817 ; in 1861, 299,302 ; and in 1871, 277,294, of whom 130,457 were males and 146,837 females.

At the last census it appeared that 31¾ per cent. belonged to the Roman Catholic persuasion, the numbers being—Catholics, 88,003 ; Episcopalians, 60,868 ; Presbyterians, 116,017 ; and others, 12,406. There were at the same time 140,886 persons of five years and upwards who could read and write, 57,140 who could read but could not write, and 45,792 who were illiterate. There were 20 superior schools in the county, and 527 primary schools.

The following are the principal towns :—Newtownards, population 9562 ; Banbridge, 5600 ; Downpatrick, 4155 ; Holywood, 3573 ; Gilford, 2720 ; Bangor, 2560 ; Dromore, 2408 ; Donaghadee, 2226 ; Comber, 2006 ; Portaferry 1938 ; Rathfriland, 1827 ; Warrenpoint, 1806 ; Killyleagh, 1772 ; Kilkeel, 1338 ; and Ballynahinch, 1225. Newry, partly in Down and partly in Armagh county, has a population of 14,213.

History and Antiquities.—From the period of the English settlement to the Irish revolt in 1333, Down formed two counties, Newtownards in the north and Down in the south. The English settlers at that time were driven into the maritime baronies of Ards, Lecale, and Mourne, of which they in part retained possession. The remainder of the district fell into the hands of Irish families, the O'Neals of Clandeboy, the MacArtans, MacRorys, and MacGinnises, whose possessions, however, reverted to the crown on the attainder of Shane O'Neal, in the latter half of the 16th century ; but having afterwards submitted to the Government, they received back their former estates. In 1602 the O'Neal estates were again forfeited, and granted to Sir Hugh Montgomery and Mr Hamilton, who planted Scottish colonies on the land. The estates of the remaining old Irish and Anglo-Norman families were mostly forfeited in the rebellion of 1641, or subsequently at the Revolution.

The county is not wanting in interesting remains. At Slidderyford, near Dundrum, there is a group of ten or twelve pillar stones in a circle, about 10 ten feet in height. A very curious cairn on the summit of Slieve Croob is 80 yards in circumference at the base and 50 at the top, where is a platform on which cairns of various heights are found standing. The village of Anadorn is famed for a cairn covering a cave which contains ashes and human bones. Cromlechs, or altars, are numerous, the most remarkable being the Giant's Ring, which stands on the summit of a hill near the borders of Antrim. This altar is formed of an unwrought stone 7 feet long by 6½ broad, resting in an inclined position on rude pillars about 3 feet high. This solitary landmark is in the centre of an inclosure about a third of a mile in circumference, formed of a rampart about 20 feet high, and broad enough atop to permit two persons to ride abreast. Near Downpatrick is a rath, or mound of earth, three-quarters of a mile in circumference, its exterior consisting of three artificial ramparts, the largest of which is 30 feet broad. In its vicinity are the ruins of Saul Abbey, said to have been founded by St Patrick, and Inch Abbey, founded by Sir John de Courcy in 1180. The number of monastic ruins is also considerable. The most ancient and celebrated is the abbey or cathedral of Downpatrick, supposed to have been founded by St Patrick soon after his arrival here in 432, and said to contain his remains, together with those of St Columba and St Bridget. It was restored in 1790, when the adjoining round tower was taken down. (E. T. L.)

DOWNPATRICK, a municipal and parliamentary borough and market-town of Ireland, capital of the county of Down, 18 miles S.E. of Belfast, and 74 N.N.E. of Dublin. Downpatrick lies in a valley formed by hills of some elevation, near the south-west extremity of Strangford Lough, and is divided into the English, Irish, and Scotch quarters. It consists of four main streets meeting near the centre, the principal of which are the Irish and English streets. In the former all business is carried on: the latter is well built, and contains neat private residences.

The principal buildings are the cathedral church of the diocese, the parish church, Roman Catholic chapel, two Presbyterian and two Methodist meeting-houses, diocesan school, county court-house, prison, alms-houses, two branch banks, barracks, infirmary, and fever hospital. A small trade is carried on at Strangford Lough by means of vessels of 100 tons, which discharge at Quoil quay, about a mile from the town; but vessels of larger tonnage can discharge at a steamboat quay built lower down the Quoil. The imports are principally iron, coal, salt, and timber; the exports—barley, oats, cattle, pigs, and potatoes. The linen manufacture is also carried on. The County Down Railway connects the town with the other trading centres, and a line specially constructed in 1862 connects it with the port of Donaghadee. Brewing, tanning, and soap-making give considerable employment. The Down corporation races are very popular, and are regarded as a meeting for the province. The parliamentary borough, which returns one member to Parliament, had in 1871 a population of 4155, with an area of 1486 acres; the area of this town is 278 acres, population 3621.

DOXOLOGY, a hymn in praise of the Almighty. The name is often applied to the Trisagion, or "Holy, Holy, Holy," the scriptural basis of which is found in Isaiah vi. 3; to the Hallelujah of several of the Psalms and of Rev. xix.; and to the last clause of the Lord's Prayer according to Saint Matthew, which critics are generally agreed in regarding as an interpolation. It is used, however, more definitely as the designation of two hymns distinguished by liturgical writers as the Greater and Lesser Doxologies. The origin and history of these it is impossible to trace fully. The germ of both is to be found in the Gospels; the first words of the Greater Doxology, or *Gloria in Excelsis*, being taken from Luke ii. 14, and the form of the Lesser Doxology, or *Gloria Patri*, having been in all probability first suggested by Matt. xxviii. 19. The Greater Doxology, in a form approximating to that of the English prayer-book, is given in the *Apostolical Constitutions* (vii. 47). This is the earliest record of it, unless, indeed, the *Apostolical Constitutions* be taken to be of a later date than the Alexandrine Codex, where the hymn also occurs. Alcuin attributes the authorship of the Latin form—the *Gloria in Excelsis*—to St Hilary of Poitiers (died 368), but this is at best only a plausible conjecture. The quotations from the hymn in the *De Virginitate* of Athanasius, and in Chrysostom (*Hom.* 69 *in Matth.*), include only the opening words (those from St Luke's gospel), though the passage in Athanasius shows by an *et cætera* that only the commencement of the hymn is given. These references indicate that the hymn was used in private devotions; as it does not appear in any of the earliest liturgies, whether Eastern or Western, its introduction into the public services of the church was probably of a later date than has often been supposed. Its first introduction into the Roman liturgy is due to Pope Symmachus (498–514), who ordered it to be sung on Sundays and festival days. The Mozarabic liturgy provides for its eucharistic use on Sundays and festivals. In these and other early liturgies the Greater Doxology occurs immediately after the commencement of the service; in the English prayer-book it is introduced at the close of the communion office, but it does not occur in either the morning or evening service. The Lesser Doxology, or *Gloria Patri*, combines the character of a creed with that of a hymn. In its earliest form it ran simply—"Glory be to the Father, and to the Son, and to the Holy Ghost, world without end, Amen," or "Glory be to the Father, in or by the Son, and by the Holy Ghost." Until the rise of the Arian heresy these forms were probably regarded as indifferent, both being equally capable of an orthodox interpretation. When the Arians, however, finding the second form more consistent with their views, adopted it persistently and exclusively, its use was naturally discountenanced by the Catholics, and the other form became the symbol of orthodoxy. To the influence of the Arian heresy is also obviously due the addition of the clause—"as it was in the beginning, is now, and ever shall be," the use of which was, according to some authorities, expressly enjoined by the Council of Nicæa. There is no sufficient evidence of this, but there exists a decree of the second Council of Vaison (529), asserting its use as already established in the East *propter hæreticorum astutiam*, and ordering its adoption throughout the churches of the West. In the Western Church the *Gloria Patri* is repeated at the close of every psalm, in the Eastern church at the close of the last psalm.

DOYEN, GABRIEL FRANCOIS (1726–1806), an eminent French painter, was born at Paris in 1726. His passion for art prevailed over his father's wish, and he became in his twelfth year a pupil of Vanloo. Making rapid progress, he obtained at twenty the grand prize, and in 1748 set out for Rome. He studied the works of Annibale Caracci, Cortona, Giulio Romano, and Michelangelo, then visited Naples, Venice, Bologna, and other Italian cities, and in 1755 returned to Paris. At first unappreciated and disparaged, he resolved by one grand effort to conquer a reputation, and in 1758 he exhibited his Death of Virginia. It was completely successful, and procured him admission to the Academy. Among his greatest works are reckoned,—the Miracle des Ardents, painted for the church of St Geneviève at St Roch (1773); the Triumph of Thetis, for the chapel of the Invalides; and the Death of St Louis, for the chapel of the Military School. In 1776 he was appointed professor at the Academy of Painting. Soon after the beginning of the Revolution he accepted the invitation of Catherine II. and settled at St Petersburg, where he was loaded with honours and rewards. He died there June 5, 1806.

DRACO, a celebrated Athenian legislator who flourished in the 7th century B.C. By a strange irony of fate his name has passed into a proverb for an inexorable lawgiver, whose laws were written with blood and not with ink. Modern Greek historians, such as Thirlwall, Grote, and Curtius, have clearly shown that such a character is an utter perversion of fact. Of Draco's famous code not a single line remains, and all we know of it is derived from a few scattered notices occurring mostly in late Greek authors. Of these the most important is a passage in Plutarch's life of Solon. After stating that Solon abolished the whole of Draco's legislation, except in cases of murder, on account of its harshness and severity, Plutarch adds by way of commentary—"For for nearly all crimes there was the same penalty of death. The man who was convicted of idleness, or who stole a cabbage or an apple, was liable to death no less than the robber of temples or the murderer." To the same effect is a traditional saying of Draco by which he justified the rigour of his laws. The least offence, he said, seemed to him deserving of death, and he could devise no greater for the worst crime. It is obvious that the statement of Plutarch is not meant to be accepted as a literal statement of fact, and it is probable that to the most bloodthirsty of Draco's laws parallels might be quoted from English statutes against vagrancy and theft. All that Draco did was to put in writing the customary laws of his time and nation. It was natural that these laws, the growth of a rude and primitive age, should strike writers of the Augustan age as indiscriminative and inhuman. That he made no change in the constitution of Athens we have the express testimony of Aristotle. The judicial changes which he effected, so far from aggravating, all nded to mitigate the severity of early Athenian law. Before his time all cases of homicide were tried by the Areopagus, and we are justified in inferring that death was the universal penalty. To Draco is generally attributed the establishment of the ἐφέται, a body of fifty-one elders, who sat in four different courts,—one for cases of accidental homicide, a second for justifiable homicide, a third for cases where another homicide had been committed abroad by a prisoner who had been banished by one of the above-named courts, and a fourth for cases of deodand. Such an institution is of itself enough to explode the traditional conception of Draco, and we may now proceed to discuss the true character of his legislation. At Athens, as at Rome, the kings were the depositaries and administrators of law. With the extinction of the regal power this prerogative passed into the hands of the aristocracy as represented by the archons. It was in the nature of things that such a monopoly should be abused. The remedy for this abuse which the commons sought was a published code of laws. It was attained at Rome by the law of the Twelve Tables, and at Athens by the code of Draco, 621 B.C. In both cases the promulgated law was merely an enunciation of existing customs. Such was the work of Draco. Of his life we know absolutely nothing with the exception of a most improbable story related by Suidas. In Suidas's *Lexicon*, under the word "Draco," we are told that he composed his code in his old age, and was smothered to death in the theatre at Ægina with the caps, chitons, and cloaks which were thrown at him by an enthusiastic audience. The only value of the story is that it may show the feelings with which he was regarded by the commons of his own day.

DRAGON (δράκων, sharp-sighted), the name given by the ancients to a fabulous monster represented by them as a huge winged lizard or serpent. They regarded it as the enemy of mankind, and its overthrow is made to figure among the greatest exploits of the gods and heroes of heathen mythology. A dragon watched the garden of the Hesperides, and its destruction formed one of the seven labours of Hercules. Its existence does not seem to have been called in question by the older naturalists, figures of the dragon appearing in the works of Gesner and Aldrovandi, and even specimens of the monster—evidently formed artificially of portions of various animals—having been exhibited. The only creatures ever known to have existed, at all comparable to this imaginary monster, are the Pterodactyls, remains of which are found in the Liassic and Oolitic formations. These were huge reptiles, provided with true wings somewhat resembling those of bats. The name "dragon" is now applied to a highly interesting, but very harmless, group of small flying lizards forming the genus *Draco*, belonging to the *Agamidæ*, a family of Saurian Reptiles. They inhabit India and the islands of the Malay Archipelago, and 18 species of them are known. They are small creatures, measuring about 10 inches long, including the tail, which in some cases is more than half of the entire length. The head is small, and the throat is provided with three pouches which are spread out when they lie on the trunks of trees. They are, however, chiefly remarkable for the wing-like cutaneous processes with which their sides are provided, and which are extended and supported by greatly elongated ribs. These form a sort of parachute by which the animals are enabled to glide from branch to branch of the trees on which they reside, but, being altogether independent of the fore limbs, they cannot be regarded as true wings, nor do they enable the lizard to fly, but merely to make extensive leaps. When not in use they are folded by the side after the manner of a fan, and the dragon can then walk or run with considerable agility. They also use their wing-like expansions in clasping the branches of trees, where they are fond of lying basking in the sun, and feeding on whatever insect may come in their way. When threatened with danger they are said to feign death.

DRAGON-FLY (German, *Wasserjungfer;* Swedish, *Trollslända;* Danish, *Guldsmed;* Dutch, *Scherpstekendevlieg;* French, *Demoiselle*), the popular English name applied to the members of a remarkable group of insects which formed the genus *Libellula* of Linnæus and the ancient authors. In some parts of the United States they appear to be known as "Devil's Darning Needles," and in many parts of England are termed "Horse-stingers." It is almost needless to say that (excepting to other insects upon which they prey) they are perfectly innocuous, though some of the larger species can inflict a momentarily painful bite with their powerful jaws. Their systematic position is at present contested and somewhat uncertain. By most of the older systematists they were placed as forming part of the heterogeneous order *Neuroptera*. Fabricius, however, elevated them to the rank of a distinct order, which he termed *Odonata;* and whatever may be the difference of opinion amongst authors at the present day, that term is almost universally employed for the group. Erichson transferred all the groups of so-called *Neuroptera* with incomplete metamorphoses, hence including the dragon-flies, as a division of *Orthcptera*, which he termed *Pseudo-Neuroptera*. Gerstäcker more recently also retains them in the *Orthoptera*, terming those groups in which the earlier states are sub-aquatic *Orthoptera amphibiotica*. It is not necessary to enter into an examination here of the merits or demerits of those various systems, and it will suffice to say that all are agreed in maintaining the insects as forming a group marked by characters at once extraordinary and isolated in their nature.

The group *Odonata* (using the term as a matter of convenience) is divided into three families, and each of these again into two sub-families. The families are the *Agrionidæ*, *Æschnidæ*, and *Libellulidæ*,—the first including the sub-families *Calopterygina* and *Agrionina*, the second *Gomphina* and *Æschnina*, and the third *Cordulina* and *Libellulina*.

The structure of a dragon-fly being so very remarkable, it is necessary to enter somewhat extensively into details. The head is comparatively small, and excavated posteriorly, connected very slightly with the prothorax, on which it turns almost as on a pivot. The eyes are, as a rule, enormous, often contiguous, and occupying nearly the whole of the upper surface of the head, but sometimes (*Agrionidæ* and *Gomphina*) widely distant; occupied by innumerable facets, which are often larger on the upper portion. In front of them is a portion termed the vertex, which sometimes (*Libellulidæ*) forms a swollen vesicle, before which are placed the three very small ocelli, and on either side of which are inserted the antennæ, which are smaller in proportion than in almost any other insects, consisting only of two short swollen basal joints and a 5 or 6-jointed bristle-like thread. The front of the head is vertical, and consists of a large, often dilated upper portion, which is commonly termed the *nasus*, followed by a tranverse portion termed the *rhinarium*, and this again by the large labrum, which conceals the jaws and inner mouth parts. The lower lip, or labium, is attached to a very small chin piece (or mentum), and is generally very large, often (*Agrionidæ*) divided almost to its base into two portions, or more frequently entire or nearly so; on each side of it are two usually enormous hypertrophied pieces, which form the "palpi," and which are often furnished at the tips with an articulated spine (or terminal joint), the whole structure serving to retain the prey. Considerable diversity of opinion exists with respect to the composition of the mouth parts, and by some authors the "palpi" have been termed the side pieces of the lower lip. In a dead dragon-fly the parts are closed on each other, and, for a just appreciation of their structure and power, it is necessary to take a living example in the fingers by the thorax, slight lateral pressure on which causes the insect to display the formidable arrangement. The prothorax is extremely small, consisting of only a narrow ring, the upper portion of which is often elevated into lobes. The rest of the thorax is very large, and consolidated into a single piece, with oblique sutures on the sides beneath the wings; the portion in front of the wings is extremely robust, and offers a median carina or suture above, and a broad transverse sinus posteriorly. The interalar portion is somewhat excavated, and on each side of it above are nodosities forming the attachments of the powerful muscles that work the wings; on each side is a large and distinct spiracle. The abdomen varies excessively in form, the two extremes being the filiform structure observable in most *Agrionidæ*, and the very broad and depressed formation seen in our familiar *Libellula depressa*. It consists of ten distinct segments, whereof the basal two and those at the apex are short, the others elongate, the first being excessively short. In a slit on the under side of the second in the male, accompanied by external protuberances, are concealed the genital organs: on the under side of the eighth in the female is a scale-like formation, indicating the entrance to the oviduct. The tenth is always provided in both sexes with prominent appendages, differing greatly in form, and often furnishing the best specific (and even generic) characters; by some authors these appendages are considered as representing a modified eleventh segment. The basal segments often have additional transverse sutures, and in the common triquetrous abdomen there is a fine longitudinal dorsal carina, and prominent lateral angles; invariably the ventral surface has a longitudinal membranous space connecting the here divided chitinous portion of the external skeleton. The legs vary in length and stoutness, but may, as a rule, be termed long and slender, and in a measure that appears disproportionate to the necessities of the insect; for a dragon-fly can scarcely be said to walk after the short promenade it takes on emerging from its puparium. The anterior pair probably assist in capturing and holding its insect prey, but the greatest service all the legs render is possibly in enabling the creature to rest lightly, so that it can quit a position of repose in chase of passing prey in the quickest possible manner, in which the majority of the species are aided also by the horizontally extended wings. The coxa is short and stout, followed by a still shorter trochanter; the femora and tibiæ long and slender, almost invariably furnished on their under surface with two series of strong spines, as also are the tarsi, which consist of three slender joints, the last having two long and slender claws, usually (but not invariably) with a small tooth internally below the tips; the pulmi are absent or nearly so, and naturally are not necessary in a non-ambulatory insect. The wings are always elongate, and furnished with strong longitudinal neuration and dense transverse nervules strengthening the already strong (although typically transparent) membrane. In the *Agrionidæ* both pairs are nearly equal, and are carried vertically and longitudinally in repose, and the neuration and membrane are less strong; hence the species of this family are not so powerful on the wing as are those of the other groups in which the wings are horizontally extended in a position ready for instant service. The neuration is peculiar, and in many respects without precise analogy in other groups of insects, but it is not necessary here to enter into more than some special points. On the costal margin (excepting in some *Calopterygina*) there is a small dark space limited by nervules, termed the pterostigma; and between this and the base of the wing is a point termed the "nodus," at which the sub-costal nervure is suddenly arrested. The arrangement of the nervures at the base of the wing is very singular, and slight differences in its form useful aids to classification. In the *Æschnidæ* and *Libellulidæ* this arrangement results in the formation of a triangular space (known as the "triangle"), which is either open or traversed by nervules; but in many *Agrionidæ* this space, instead of being triangular, is oblong or elongately quadrate, or with its upper edge partly straight and partly oblique. This fixitude of type in neuration is not one of the least important of the many peculiarities exhibited in these insects.

The internal structure is comparatively simple. The salivary glands appear to be absent, and the whole digestive apparatus consists of an elongate canal extending from mouth to anus, comprising the œsophagus, stomach, and intestine, with certain dilatations and constrictions; the characteristic Malpighian vessels are stated to number about forty, placed round the posterior extremity of the stomach. Dragon-flies eat their prey completely, and do not content themselves by merely sucking its juices; the harder portions are rejected as elongate, nearly dry, pellets of excrement.

But the most extraordinary feature in the economy, —one which has attracted the attention of naturalists from remote times,—is the position of the genital organs, and the corresponding anomalous manner in which the pairing of the sexes and impregnation is effected. In the male the intromittent organ is (as stated above) situated in a slit on the under surface of the second abdominal segment; it is usually very crooked or sinuous in form, and is accompanied by sheaths, and by external hooks or secondary appendages, and also by seminal vesicles. But the ducts of the vessels connected with the testes unite and open on the under surface of the ninth segment; hence, before copulation can take place, it is necessary that the vessels in the second segment be charged from this opening, and in the majority of cases this is done by the male previously to seeking the female. In the latter sex the entrance to the oviduct and genital organs is on the under surface of the eighth abdominal segment. The act of pairing may be briefly stated as follows. The male, when flying, seizes the prothorax of the female with the strong appendages at the extremity of the abdomen, and the abdomen of this latter sex is then curved upward so as to bring the under side of the eighth segment into contact with the organs of the second segment of the male. This act must have been observed by all, though but few non-entomologists are acquainted with the reasons for this most extraordinary position. In the more powerful *Libellulidæ*, &c., the act is of short duration, and it is probable that polygamy and polyandry exist, for it possibly requires more than one almost momentary act to fertilise all the eggs in the ovaries of a female. But in many *Agrionidæ*, and in some others, the male keeps his hold of the prothorax of the female for a lengthened period, retaining himself in flight in an almost perpendicular manner, and it may be that the deposition of eggs and pairing go on alternately. There is, however, much yet to be learned on these points. The gravid female usually lays her eggs in masses (but perhaps sometimes singly), and the operation may be witnessed by any one in localities frequented by these insects. She hovers for a considerable time over nearly the same spot, rapidly dipping the apex of her abdomen into the water, or at any rate touching it, and often in places where there are no water-weeds, so that in all probability the eggs fall at once to the bottom. But in some of the *Agrionidæ* the female has been often noticed by trustworthy observers to creep down the stems of aquatic plants several inches below the surface, emerging after the act of oviposition has been effected; and in the case of *Lestes sponsa*, Von Siebold saw the male descend with the female. The same exact observer noticed also in this species that the female makes slight incisions in the stems or leaves of water plants with the double serrated apparatus (vulva) forming a prolongation of the ninth segment beneath, depositing an egg in each excision. He has seen two pairs thus occupied beneath the surface on one and the same stem.

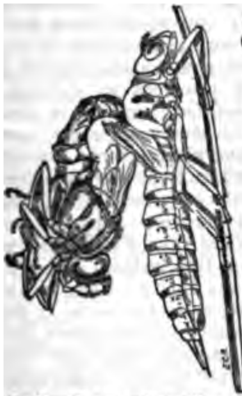


FIG. 1.—The anterior portion of the body of *Æschna cyanea* freed from the puparium.

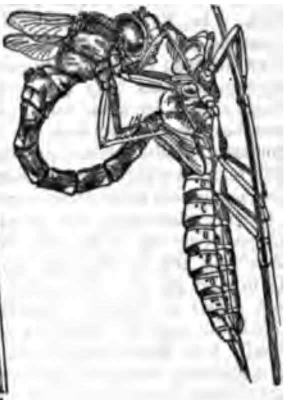


FIG. 2.—The tail being extricated.

The duration of the sub-aquatic life of a dragon-fly is no doubt variable, according to the species. In the smaller forms it is probably less than a year, but precise evidence is wanting as to the occurrence of two broods in one year. On the other hand, it is certain that often a longer period is requisite to enable the creature to attain its full growth, and three years have been stated to be necessary for this in the large and powerful *Anax formosus*. Like all insects with incomplete metamorphoses, there is no quiescent pupal condition, no sharp line of demarcation between the larval and so-called "nymph" or penultimate stage. The creature goes on eating and increasing in size from the moment it emerges from the egg to the time when it leaves the water to be transformed into the aerial perfect insect. The number of moults is uncertain, but they are without doubt numerous. At probably about the antepenultimate of these operations, the rudimentary wings begin to appear as thoracic buddings, and in the full-grown nymph these wings overlap about one-half of the dorsal surface of the abdomen. In structure there is a certain amount of resemblance to the perfect insect, but the body is always much stouter and shorter, in some cases most disproportionately so, and the eyes are always separated; even in those genera (*e.g.*, *Æschna*) in which the eyes of the imago are absolutely contiguous, the most that can be seen in the larva is a prolongation towards each other, and there are no ocelli. The legs are shorter and more fitted for crawling about water plants and on the bottom. In the mouth parts the mandibles and maxillæ are similar in form to those of the adult, but there is an extraordinary and unique modification of the lower lip. This is attached to an elongate and slender mentum articulated to the posterior portion of the lower surface of the head, slightly widened at its extremity, to which is again articulated the labium proper, which is very large, flattened, and gradually dilated to its extremity; but its form differs according to group as in the perfect insect. Thus in the *Agrionidæ* it is deeply cleft, and with comparatively slender side-pieces (or palpi), and strongly developed articulated spines; in the *Æschnidæ* it is at the most notched, with narrow side-pieces and very strong spines; in the *Libellulidæ* it is entire, often triangular at its apex, and with enormously developed palpi without spines, but having the opposing inner edges furnished with interlocking serrations. The whole of this apparatus is commonly termed the mask. In a state of repose it is applied closely against the face, the elongated mentum directed backward and lying between the anterior pair of legs; but when an approaching victim is seen the whole apparatus is suddenly projected, and the prey caught by the raptorial palpi; in some large species it is capable of being projected fully half an inch in front of the head. The prey, once caught and held by this apparatus, is devoured in the usual manner. There are two pairs of thoracic spiracles, but respiration is mostly affected by a peculiar apparatus at the tail end, and

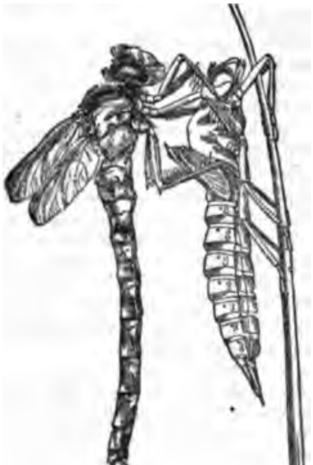


FIG. 3.—The whole body extricated.

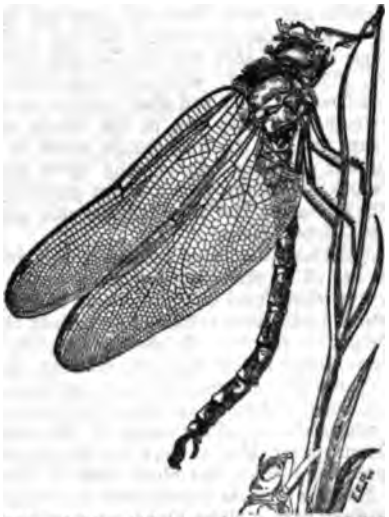


FIG. 4.—The perfect insect (the wings having acquired their full dimensions) resting to dry itself, preparatory to the wings being horizontally extended.

there are two different methods. In the *Agrionidæ* there are three elongate flattened plates, or false gills, full of tracheal ramifications, which extract the air from the water, and convey it to the internal tracheæ (in *Calopteryx* these plates are excessively long, nearly equalling the abdomen), the plates also serving as means of locomotion. But in the other groups these external false gills are absent, and in their place are five valves, which by their sudden opening and closing force in the water to the rectum, the walls of which are furnished with branchial lamellæ. The alternate opening and closing of these valves enables the creature to make quick jerks or rushes (incorrectly termed "leaps") through the water,[1] and, in conjunction with its mouth parts, to make sudden attacks upon prey from a considerable distance. The lateral angles of the terminal abdominal segments are sometimes produced into long curved spines. In colour these larvæ are generally muddy, and they frequently have a coating of muddy particles, and hence are less likely to be observed by their victims. If among insects the perfect dragon-fly may be termed the tyrant of the air, so may its larva be styled that of the water. Aquatic insects and larvæ form the principal food, but there can be no doubt that worms, the fry of fish, and even younger larvæ of their own species, form part of the bill of fare. The "nymph" when arrived at its full growth sallies forth from the water, and often crawls a considerable distance (frequently many feet up the trunks of trees) before it fixes itself for the final change, which is effected by the thorax splitting longitudinally down the back, through which fissure the perfect insect gradually drags itself. The figures on last page indicate this process as observed in *Æschna cyanea*.

For a considerable time after its emergence a dragon-fly is without any of its characteristic colours, and is flaccid and weak, the wings (even in those groups in which they are afterwards horizontally extended) being held vertically in a line with the abdomen. By degrees the parts harden, and the insect essays its first flight, but even then the wings have little power and are semi-opaque in appearance, as if dipped in mucilage. In most species of *Calopterygina*, and in some others, the prevailing colour of the body is a brilliant bronzy green, blue, or black, but the colours in the other groups vary much, and often differ in the sexes. Thus in *Libellula depressa* the abdomen of the fully adult male is covered with a bluish bloom, whereas that of the female is yellow; but several days elapse before this pulverulent appearance is attained, and a comparatively young male is yellow like the female. The wings are typically hyaline and colourless, but in many species (especially *Calopterygina* and *Libellulina*) they may be wholly or in part opaque and often black, due apparently to gradual oxydization of a pigment between the two membranes of which the wings are composed; the brilliant iridescence, or metallic lustre, so frequently found is no doubt due to interference—the effect of minute irregularities of the surface—and not produced by a pigment. A beautiful little genus (*Chalcopteryx*) of *Calopterygina* from the Amazon is a gem in the world of insects, the posterior wings being of the most brilliant fiery metallic colour, whereas the anterior remain hyaline.

These insects are pre-eminently lovers of the hottest sunshine (a few are somewhat crepuscular), and the most powerful and daring on the wing in fine weather become inert and comparatively lifeless when at rest in dull weather, allowing themselves to be captured by the fingers without making any effort to escape. Many of the larger species (*Æschna*, &c.) have a habit of affecting a particular twig or other resting place like a fly-catcher among bird darting off after prey and making long excursions, b returning to the chosen spot. Mr Wallace, in his *Mal* *Archipelago*, states that the inhabitants of Lombock u the large species for food, and catch them by means limed twigs.

They are distributed over the whole world excepting t polar regions, but are especially insects of the tropics. A the present day about 1700 species are known, disperse unequally among the several sub-families as follow *Agrionina*, 490 species; *Calopterygina*, 170; *Gomphin* 210; *Æschnina*, 150; *Corduliina*, 100; *Libellulin* 580. In Europe proper only 100 species have bee observed, and about 46 of those occur in the British island New Zealand is excessively poor, and can only number species, whereas they are very numerous in Australi Some species are often seen at sea, far from land, in cal weather, in troops which are no doubt migratory; o common *Libellula quadrimaculata*, which inhabits the co and temperate regions of the northern hemisphere, has bee frequently seen in immense migratory swarms. One speci (*Pantala flavescens*) has about the widest range of an insect, occurring in the Old World from Kamtschatka t Australia, and in the New from the Southern States t Chili, also all over Africa and the Pacific islands, but i not found in Europe. The largest species occur in th *Æschnina* and *Agrionina*; a member of the former su family from Borneo expands to nearly 6½ inches, and wit a moderately strong body and powerful form; in the latte the Central American and Brazilian *Megaloprepus cœrulat* and species of *Mecistogaster* are very large, the forme expanding to nearly 7 inches, and the latter to nearly a much, but the abdomen is not thicker than an ordinar grass-stem and of extreme length (fully 5 inches i *Mecistogaster*). Among living entomologists the drago flies have received, and are receiving, great attentio especially from the Baron de Selys-Longchamps of Liég and from Dr H. A. Hagen, formerly of Königsberg, now Cambridge, Massachusetts.

It is impossible to prepare dragon-flies for the cabinet s as to retain all the brilliant colours the bodies have in lif They are excessively brittle when dry, and in the small species it is advisable to run a bristle into the under sid of the thorax, pushing it down till it reach the extremit of the abdomen, when the other end can be cut off close t the thorax. But the larger species should be disembowell through a slit along the under surface of the abdomen, an then filled (but not too tightly) with clean white cotto wool. The colours stand a much better chance of n greatly altering if the insects be not killed until some hou after they are captured, so as to allow the contents of th intestinal canal to be naturally passed away, for it is th decomposition of the food that assists materially to alter obliterate the colour and markings.

Among fossil insects dragon-flies hold a conspicuo position. Not only do they belong to what appears to hav been a very ancient type, but in addition, the large wing and strong dense reticulation are extremely favourable fo preservation in a fossil condition, and in many cases all th intricate details can be as readily followed as in a recent example. In this country they have been found more especially in the Purbeck beds of Swanage, and the vales of Wardour and Aylesbury, in the Stonesfield Slate series, and in the Lias and Rhætic series of the west of England. But the richest strata appear to be those of the Upper Miocene at Œningen, in the Rhine valley; the Middle Miocene at Radaboj, in Croatia; the Eocene of Aix, in Provence; and more especially the celebrated Secondary rocks furnishing the lithographic stone of Solenhofen, in Bavaria. This latter deposit would appear to have been of marine origin, and it is significant that, although the remains of gigantic dragon-flies discovered in it are very numerous and perfect, no traces of their sub-aquatic conditions have been found, although these as a rule are numerous in most of the other strata, hence the insects may be regarded as having been drowned in the sea and washed on shore. Many of these Solenhofen species differ considerably in form from those now existing, so that Dr Hagen, who has especially studied them, says that for nearly all it is necessary to make new genera. A notice of fossil forms should not be concluded without the remark that indications of at least two species have been found in amber, a number disproportionately small if compared with other insects entombed therein; but it must be remembered that a dragon-fly is, as a rule, an insect of great power, and in all probability those then existing were able to extricate themselves if accidentally entangled in the resin.

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[1] A similar contrivance was suggested and (if the writer mistakes not) actually tried as a means of propelling steam-ships.

See De Selys-Longchamps, *Monographie des Libellulidées d'Europe*, Brussels, 1840; *Synopses des Agrioninées, Caloptérygines, Gomphines, et Cordulines*, with Supplements, Brussels, from 1853 to 1877; De Selys-Longchamps and Hagen, *Revue des Odonates d'Europe*, Brussels, 1850; *Monographie des Caloptérygines et des Gomphines*, Brussels, 1854 and 1858; Charpentier, *Libellulinæ europeæ*, Leipsic, 1840. (R. M'L.)

DRAGON'S BLOOD, a name applied to the resins obtained from several species of plants. *Calamus Draco* (Willd.), one of the Rotang or Rattan Palms, which produces much of the dragon's blood of commerce, is a native of Further India and the Eastern Archipelago. When young it grows erect, but with age it becomes climbing. The leaves are pointed, about a foot long, of a finger's breadth, and, like the stems, armed with spines. The flower has a three-cleft corolla, and the ovary is egg-shaped. The fruit is round, pointed, scaly, and the size of a large cherry, and when ripe is coated with the resinous exudation known as dragon's blood. The finest dragon's blood, called *jernang* or *djernang* in the East Indies, is obtained by beating or shaking the gathered fruits, sifting out impurities, and melting by exposure to the heat of the sun or by placing in boiling water; the resin thus purified is then usually moulded into sticks or quills (the *sanguis draconis in baculis* of pharmacy), and wrapped in reeds or palm-leaves, and is then ready for market. An impurer and inferior kind, sold in lumps of considerable size (*sanguis draconis in massis*), is extracted from the fruits by boiling. Dragon's blood is dark red-brown, nearly opaque, and brittle, contains small shell-like flakes, and gives when ground a fine red powder; it is soluble in alcohol, ether, and fixed and volatile oils, and in the pure condition has, according to F. W. Johnston (*Phil. Trans.*, 1839, p. 134), the composition $C_{20}H_{21}O_4$. If heated it gives off fumes of benzoic acid. In Europe it was once valued as a medicine on account of its astringent properties, and is now used for colouring plasters, dentrifice, and varnishes; in China, where it is mostly consumed, it is employed to give a red facing to writing paper. The drop dragon's blood of commerce, called *cinnabar* by Pliny (*N. H.* xxxiii. 39), and *sangre de dragon* by Barbosa, was formerly and is still one of the products of Socotra, the *Dioscoridis insula* of ancient geographers; it was known to the Arabs by the term *kâtir*, from which the name of the island may have been derived (see A. Sprengel, *Alte Geographie Arabiens*, 1875). It is the spontaneous exudation of a leguminous tree, *Pterocarpus Draco*, which grows at elevations between 800 and 2000 feet above sea-level (see Wellsted, *Journ. R. Geog. Soc.*, 1835, p. 198). Jacquin states (*Select. Stirpium Amer. Hist.*, p. 283, 1763) that the tree grows in the woods of Tierra Bomba, off Cartagena, in Colombia, and that dragon's blood, obtained from it by incision, was at one time imported into Spain for medicinal purposes. The dragon's blood of the Canary Islands is a tonic and astringent resin procured from the surface of the leaves and from cracks in the trunk of *Dracæna Draco*, a tree of the natural order *Liliaceæ*. The hardened juice of a euphorbiaceous tree, *Croton Draco*, a resin resembling kino, is the *sangre del drago* or dragon's blood of the Mexicans, used by them as a vulnerary and astringent.

Rumphius, *Herbarium Amboinense*, p. v. 114-119, tab. lviii., 1747; Flückiger and Hanbury, *Pharmacographia*, 1874.

DRAGUIGNAN, the chief town of the department of Var, in France, and of an arrondissement of the same name, on the River Pis, a branch of the Nartuby, lies at the foot of the wooded height of Malmont, in 43° 32′ 18″ N. lat. and 6° 27′ 56″ E. long. The préfecture, palace of justice, theatre, hospital, and prison are the most important public buildings. The town possesses a communal college, a training school for teachers, a botanical garden, a fine promenade, a library of about 18,000 volumes, collections of coins, pictures, and natural history objects, and an archæological society. The inhabitants, who in 1872 numbered 8177, are engaged in agriculture and the manufacture of wine, coarse cloth, earthenware, silk, soap, candles, oil, brandy, copper wares, and leather.

DRAINAGE. See AGRICULTURE, ARCHITECTURE, BUILDING, and SEWAGE.

DRAKE, SIR FRANCIS (*c.* 1545–1595), a celebrated English admiral, was born near Tavistock, Devonshire, about 1545 according to most authorities, but Barrow, in his life, says the date may have been as early as 1539. His father, a yeoman and a zealous Protestant, was obliged to take refuge in Kent during the persecutions in the reign of Queen Mary. He obtained a naval chaplaincy from Queen Elizabeth, and is said to have been afterwards vicar of Upnor Church, on the Medway. This, however, must be a mistake, as there is no evidence of any church ever having existed at Upnor. Young Drake was educated at the expense and under the care of Sir John Hawkins, who was his kinsman; and, after passing an apprenticeship on a coasting vessel, at the age of eighteen he had risen to be purser of a ship trading to Biscay. At twenty he made a voyage to Guinea; and at twenty-two he was made captain of the "Judith." In that capacity he was in the harbour of San Juan de Ulloa, in the Gulf of Mexico, where he behaved most gallantly in the actions under Sir John Hawkins, and returned with him to England, having acquired great reputation, though with the loss of all the money which he had embarked in the expedition. In 1570 he obtained a regular privateering commission from Queen Elizabeth, the powers of which he immediately exercised in a cruise in the Spanish Main. Having next projected an attack against the Spaniards in the West Indies to indemnify himself for his former losses, he set sail in 1572, with two small ships named the "Pasha" and the "Swan." He was afterwards joined by another vessel; and with this small squadron he took and plundered the Spanish town of Nombre de Dios. With his men he penetrated across the isthmus of Panama, and committed great havoc among the Spanish shipping. From the top of a tree which he climbed while on the isthmus he obtained his first view of the Pacific, and resolved "to sail an English ship in these seas." In these expeditions he was much assisted by a tribe of Indians, who were then engaged in a desultory warfare with the Spaniards. Having embarked his men and filled his ships with plunder, he bore away for England, and arrived at Plymouth on the 9th August 1573.

His success and honourable demeanour in this expedition gained him high reputation; and the use which he made of his riches served to raise him still higher in popular esteem. Having fitted out three frigates at his own expense, he sailed with them to Ireland, and rendered effective service as a volunteer, under Walter earl of Essex, the father of the famous but unfortunate earl. After the death of his patron he returned to England, where Sir Christopher Hatton introduced him to Queen Elizabeth, and procured him a favourable reception at court. In this way he acquired the means of undertaking that grand expedition which has immortalized his name. The first proposal he made was to undertake a voyage into the South Seas through the Straits of Magellan, which no Englishman had hitherto ever attempted. This project having been well received at court, the queen furnished him with means; and his own fame quickly drew together a sufficient force. The fleet with which he sailed on this enterprise consisted of only five small vessels, and their united crews mustered only 166 men. Having sailed on the 13th December 1577, he on the 25th made the coast of Barbary, and on the 29th Cape Verd. He reached the coast of Brazil on the 5th of April, and entered the Rio de la Plata, where he parted company with two of his ships; but having met them again, and taken out their provisions, he turned them adrift. On the 29th May he entered the port of St Julian's, where he continued two months for the sake of laying in a stock of provisions. On the 20th August he entered the Straits of Magellan, and on the 25th September passed them, having then only his own ship. On the 25th November he arrived at Macao, which he had appointed as the place of rendezvous in the event of his ships being separated; but Captain Winter, his vice-admiral, had repassed the straits and returned to England. He thence continued his voyage along the coast of Chili and Peru, taking all opportunities of seizing Spanish ships, and attacking them on shore, till his men were satiated with plunder; and then coasted along the shores of America, as far as 48° N. lat., in an unsuccessful endeavour to discover a passage into the Atlantic. Having landed, however, he named the country New Albion, and took possession of it in the name of Queen Elizabeth. Having careened his ship, he sailed thence on the 29th September 1579 for the Moluccas. On the 4th November he got sight of those islands, and, arriving at Ternate, was extremely well received by the king. On the 10th December he made the Celebes, where his ship unfortunately struck upon a rock, but was taken off without much damage. On the 16th March he arrived at Java, whence he intended to have directed his course to Malacca; but he found himself obliged to alter his purpose, and to think of returning home. On the 25th March 1580 he again set sail; and on the 15th June he doubled the Cape of Good Hope, having then on board only fifty-seven men and three casks of water. He passed the line on the 12th July, and on the 16th reached the coast of Guinea, where he watered. On the 11th September he made the Island of Terceira, and on the 3d November he entered the harbour of Plymouth. This voyage round the world, the first accomplished by an Englishman, was thus performed in two years and about ten months. The queen hesitated for some time whether to recognize his achievements or not, on the ground that such recognition might lead to complications with Spain, but she finally decided in his favour. Accordingly, soon after his arrival she paid a visit to Deptford, went on board his ship, and there, after partaking of a banquet, conferred upon him the honour of knighthood, at the same time declaring her entire approbation of all that he had done. She likewise gave directions for the preservation of his ship, the "Golden Hind," that it might remain a monument of his own and his country's glory. After the lapse of a century it decayed and had to be broken up. Of the sound timber a chair was made, which was presented by Charles II. to the university of Oxford. In 1585, open hostilities having commenced with Spain, Drake sailed with a fleet to the West Indies, and took the cities of St Jago, St Domingo, Cartagena, and St Augustine. In 1587 he went to Lisbon with a fleet of thirty sail; and having received intelligence of a great fleet being assembled in the bay of Cadiz, and destined to form part of the Armada, he with great courage entered the port on the 19th April, and there burnt upwards of 10,000 tons of shipping,—a feat which he afterwards jocosely called "singeing the king of Spain's beard." In 1588, when the Spanish Armada was approaching England, Sir Francis Drake was appointed vice-admiral under Lord Howard, and made prize of a very large galleon, commanded by Don Pedro de Valdez, who was reputed the projector of the invasion, and who struck at once on learning his adversary's name.

It deserves to be noticed that Drake's name is mentioned in the singular diplomatic communication from the king of Spain which preceded the Armada:—

Te veto ne pergas bello defendere Belgas;
Quæ Dracus eripuit nunc restituantur oportet;
Quas pater evertit jubeo te condere cellas:
Religio Papæ fac restituatur ad unguem.

To these lines the queen made this extempore response:—

Ad Græcas, bone rex, fiant mandata kalendas.

In 1589 Drake commanded the fleet sent to restore Dom Antonio, king of Portugal, the land forces being under the orders of Sir John Norris; but they had hardly put to sea when the commanders differed, and thus the attempt proved abortive. But as the war with Spain continued, a more formidable expedition was fitted out, under Sir John Hawkins and Sir Francis Drake, against their settlements in the West Indies, than had hitherto been undertaken during the whole course of it. Here, however, the commanders again disagreed about the plan; and the result in like manner disappointed public expectation. These disasters were keenly felt by Drake, and were the principal cause of his death, which took place on board his own ship, near the town of Nombre de Dios, in the West Indies, January 28, 1595.

See Lives of Drake by Samuel Clarke (1671) and John Barrow, junr. (1848).

DRAKENBORCH, Arnold (1684–1748), a celebrated scholar and editor, was born at Utrecht on the 1st January 1684. Having studied belles-lettres under Grævius and Burmann, and law under Cornelius Van Eck, he succeeded Professor Burmann in 1716, and continued to hold his professorship till his death in 1748, in the sixty-fourth year of his age. His earliest work was a dissertation entitled *Disputatio philologico-historico de Præfectis urbis*, in 4to (1704), and its merit caused it to be reprinted at Frankfort, in 1752, by Professor Uhl, accompanied with a life of its learned author. His next work, entitled *Disputatio de officio præfectorum prætorio*, was published in 1707; and ten years afterwards he issued his edition of Silius Italicus (1717), undertaken at the suggestion of Burmann. In order to render this edition as perfect as possible, nothing was omitted; and many historical subjects were engraved for the purpose of elucidating the text, to which his own copious and learned annotations greatly contributed. But his splendid edition of Livy (Lugd. Batav. 1738 and 1746, 7 vols.), with a life of that historian, is that on which his fame as a scholar chiefly rests. The preface to this work is replete with erudition, and gives a particular account of all the literary men who have at different periods commented on the works of Livy. His edition is based on that of Gronovius; but he made many important alterations on the authority of manuscripts which it is probable Gronovius either had never seen, or had not taken the pains to consult. The edition is peculiarly rich in various readings, but the text is, of course, inferior to that which has been furnished by the skill of later editors. Upon the whole, this edition of Livy was, at the time of its publication, one of the most elaborate, interesting, and instructive that had ever been given to the world.

DRAMA

n δράω) signifies action. The term is
compositions which imitate action by re-
rsonages introduced in them as real and as
action itself. The varieties of the drama
s widely, both as to the objects imitated
ans used in the imitation. But they all
ethod or *manner* which is essential to the
, *imitation in the way of action.*

ive expression to feelings and conceptions
om human nature. Man expresses his
otions by gesture and by speech, or by a
oth; and these expressions he soon learns
other men—and more especially on joyous
ns—to vary or regulate in dance and song.
xpression, often combined with the other,
imitate, says Aristotle, is instinctive in
infancy; and from imitation all men
pleasure. Gesture and voice are means
non to all human beings; and the aid of
s and decoration is generally within the
, and of the childhood of nations. The
aracter, whether real or fictitious, is there-
tep towards the drama. But it is only a
; nor is the drama itself reached till the
to action.

man is not wont to attribute (except
y but members of his own species and to
g or beings in whose existence and power
es an operation of the will and an execu-
ion, whether or not amounting to a fulfil-
se. It implies a procedure from cause to
ust therefore present itself to the human
s source in a human or superhuman will.
of action by action is in germ a drama.
not all nations have advanced.

has been taken, it only remains for the
a form regulated by literature, of which
mes a branch. We may then speak of a
re; but this only a limited number of
e to possess. A nation may, however,
thout a dramatic literature; it may even
ssion of the former after having ceased to
er. On the other hand, both before and
f a nation has assumed a literary form, it
more of its adventitious elements—music,
on—predominantly to assert themselves,
lly to bring about the formation of new, or
used, dramatic species. But as a branch
drama necessarily includes speech among
itation; and its beginnings as such are
he history of all literatures known to us,
eginnings at least of other forms of poetic
lyric and the epic, or by those of one of
events. It is in the combination of both
n its literary form takes its origin in the
nal civilizations in which it has found
h which we are more than superficially

ting is the indispensable adjunct of the
ile the aid of all other arts is merely an
ough really inseparable from one another,
e dramatic and the histrionic arts do not
parallel. The actor is only the temporary
e dramatist, though he may occasionally
some of the proper functions of his text-
ide, the dramatist may in practice, though he cannot in theory, dispense with the actor's interpretation; but though the term literary drama is sometimes used of works kept apart from the stage, it is in truth a misnomer, since, properly speaking, no drama is such till it is acted.

Laws and rules of the drama.

The whole body of the laws and rules of the drama, could it be written down with completeness, would indicate, together with the ends proper to the art, the means by which it is able to accomplish them. But neither the great authorities of dramatic theory—an Aristotle or a Lessing—nor the resolute apologists of more or less transitory fashions—a Corneille or a Dryden—have exhausted the exposition of the means which the drama has proved or may prove capable of employing. The multitude of technical terms and formulæ which has gathered round the practice of the art has at no time seriously interfered with the operation of creative power, whose inventive activity the existence of accepted systems has frequently—in the Greek drama, for instance, and in the Spanish—served to stimulate. On the other hand, it is self-evident that no dramaturgic theory has ever given rise to a single dramatic work of enduring value, unless the creative force was there to animate the form.

Subject, idea, and action.

The task of this creative force begins with the beginnings of the dramatist's labours. For it is in the dramatic *idea* that the germ of the action of a play lies—not in the *subject*, which is merely its dead material. The story of the Scottish thane as it stood written in the chronicle, is the subject, not the action, of *Macbeth*. To convert a subject—whatever its kind or source—into the action or fable of a play is the primary task, which in its progressive development becomes the entire task, of the dramatist; and though the conception may expand or modify itself with the execution, yet upon the former the latter depends. The range of subjects open to a dramatist may be wide as the world itself, or it may be limited by usage, by imperious fashion, by the tastes and tendencies of a nation or an age, by the author's own range of sympathies, by a thousand restrictions of an historical, moral, or æsthetical origin; it may be virtually confined (as with the earlier Greek tragedians) to a body of legend, or (as with the English comedians of the Restoration) to the social experiences of a particular epoch. But in all cases the transformation of the subject into the action is equally indispensable; and an imperfect transformation is (as in the old Chronicle Histories) the work of a rude, or (as in ninety-nine out of a hundred modern plays "founded upon fact") that of a careless method of dramatic production.

Unity of action.

What, then, are the laws which determine the nature of all actions properly such, however they may vary either in subjects or in form? In the first place, a dramatic action must possess *unity*—and this requirement at once distinguishes it from the subject which has suggested its idea. The events of real life, the facts of history, the incidents of narrative fiction, are like the waves of a ceaseless flood; that which binds a group or body of them into a single action is the bond of the dramatic idea, and this it is which the dramatist has to supply. Within the limits of a dramatic action all its parts claim to be connected together as contributions to a single stream; and upon the degree in which they are true to this purpose their primary dramatic significance depends. The unity of action which a drama should possess, therefore, means that everything in it should form a link in a single chain of cause and effect. This law is incumbent upon every kind of drama—alike upon the tragedy which solves the problems of a life, and upon the farce which sums up the follies of an afternoon.

Such is not, however, the case with certain rules which have at different times been set up for this or that kind of drama, but which have no absolute validity for any kind. The supposed necessity that an action should consist of *one event* is an erroneous interpretation of the law that it should be, as an action, *one*. For an event is but an element in an action, though it may be an element of decisive moment. The assassination of Cæsar is not the action of a *Cæsar* tragedy; the loss of his treasure is not the action of *The Miser*. Again, unity of action does not exclude the introduction of one or even more subsidiary actions as contributing to the progress of the main action. The sole indispensable law is that these should always be treated as what they are—subsidiary only; and herein lies the difficulty, which Shakespeare so successfully overcame, of solving a combination of subjects into the idea of a single action; herein also lies the danger in the use of that favourite device of the modern drama—*bye-* or *under-plots*. On the other hand, a really double or multiple action, logically carried out as such, is inconceivable in a single drama, though there is many a play which is palpably only two plays knotted into one. Every one is familiar with the dramatist who towards the drop of the curtain seems to be counting on his fingers whom he has killed or what couples he has to marry. Thirdly, unity of action need not imply unity of hero—for hero (or heroine) is merely a term signifying the principal personage of the action. And inasmuch as an action may consist in the joint contention of more than one will against the same obstacle—as in the instance of *The Seven against Thebes*, or *Romeo and Juliet*—it is only when the change in the degree of interest excited by different characters in a play results from a change in the conception of the action itself, that the consequent *duality* (or multiplicity) of heroes recalls a faulty uncertainty in the conception of the action they carry on. Such is the objection applying to the crucial case of Schiller's *Don Carlos*. Lastly, the entirely arbitrary exactions of *unity of time* and *of place* are not, like that of unity of action, absolute dramatic laws. Their object is by representing an action as visibly continuous to render its unity more distinctly or easily perceptible; but the effect of their observance cannot be to render it more really *one*. Thus they may in one sense be regarded as devices to avoid the difficulty experienced by the human mind in regarding an action as *one* when the eye beholds its different parts occurring in what are supposed to be different places, or when the process of its advance from cause to effect extends over what is supposed to be a considerable period of time. But the imagination is capable of constructing for itself the bridges necessary to preserve to an action, conceived of as such, its character of continuousness. In another sense these rules were convenient usages conducing to a concise and clear treatment as actions of subjects in themselves of a limited nature: for they were a Greek invention, and the repeated resort to the same group of myths made it expedient for a Greek poet to seek the subject of a single tragedy in a part only of one of the myths open to him. The observance of unity of place, moreover, was suggested to the Greeks by certain outward conditions of their stage—as assuredly as it was adopted by the French in accordance with the construction and usages of theirs, and as the neglect of it by the Elizabethans was in their case encouraged by the established form of the English scene. The palpable artificiality of these laws needs no demonstration, so long as the true meaning of the term action be kept in view. Of the *action* of *Othello* part takes place at Venice and part at Cyprus, and yet the whole is one in itself, while the limits of time
over which an action extends cannot be restri
revolution of the earth round the sun, or of the m
the earth.

In a drama which presents its action as *one*, t
must be *complete in itself*. This law, like the fi
guishes the dramatic action from its subject. T
may be said to have a real artistic, while the
only an imaginary real, completeness. The his
instance, aims indeed at a complete exposition of
events and transactions, and may even design to
working to a definite end; but he is aware that
can never be more than partially accomplished
may present only what he knows, and all hum
ledge is partial. But art is limited by no such u
The dramatist, in treating an action as *one*, co
the whole of it in the form of his work, since t
has *conceived* it, all its parts from cause to effect, a
clear. Accordingly, every drama should rep
organic sequence the several stages of which a
action consists, and which are essential to it. T
completeness therefore lies at the foundation of a
of dramatic *construction*.

Every action, if conceived of as complete, has
growth, height, consequences, and close. The
binding law to prescribe the relative length at w
several stages in the action should be treated in
or to enforce a more or less exact correspondence
the successive presentment of each, and technical
such as acts or scenes, which dramatic practice
convenient to adopt. Neither is there any law
any obligatory regulation of the treatment of such
actions as may be introduced in aid of the main
such more or less directly connected *episodes* whi
the same time advance and relieve its progress.
rience, as the parent of usage, has necessarily fro
time established certain rules of practice, from
dramatist, working under customary forms, w
neither easy, nor in most cases advantageous, to
widely; and from the adoption of particular
division for particular species of the drama—su
into five acts for a regular tragedy or comedy, whi
example has caused to be so largely followed—ha
resulted a certain uniformity of relation be
conduct of an action and the outward sections
Essentially, however, there is no difference be
laws regulating the construction of a Soph
Shakespearean tragedy, a comedy of Molière or
and a well-built modern farce. And this, b
exhibit an action complete in itself.

The *introduction* or *exposition* forms an integ
the action, and is therefore to be distinguished fr
logue in the more ordinary sense of the term, whi
epilogue (or the Greek *parabasis*), stands outside
and is a mere address to the public from auth
occasioned by the play. Prologue and epilogue,
they may have at times contributed to the s
drama, are mere external adjuncts, and have as
with the construction of a play as the bill which
it, or the musical prelude which disposes the m
reception. The introduction or exposition belo
action itself; it is, as the Hindu critics called i
or circumstance from which the business arises.
being its primary requisite, many expedients h
various times adopted to secure this feature.
Euripidean prologue, though spoken by one of
ters of the play, takes a narrative form, and p
half without, half within the action of which it
part. The same purpose is served by the sepa
tions in many of our old English plays, and th
or prologues, or by whatever name they

themselves, in numberless modern dramas of all kinds—from *Faust* down to the favourites of the Ambigu and the Adelphi. Another such expedient is that of the inductive dumb-shows, which sought to secure rapidity together with impressiveness of exposition by the process of pantomimic summary. Such, again, are the opening scenes in French tragedy between hero and *confidant*, and those in French comedy and its derivatives between observant valet and knowing lady's-maid. But it is clear how all such expedients may be rendered unnecessary by the art of the dramatist, who is able outwardly also to present the introduction of his action as what it is—an organic part of that action itself; who seems to take the spectators *in medias res* while he is really building the foundations of his plot; who can dramatically account for an Iliad of woes without going back to Leda's egg; who touches in the opening of his action the chord which is to vibrate throughout its course—"Down with the Capulets! down with the Montagues!"—"With the Moor, sayest thou?"

The introduction ends with the opening of the movement of the action, a passage which it may prove highly effective to mark with the utmost distinctness (as in *Hamlet*, where it is clearly to be sought in the actual meeting between the hero and the ghost), but which in other instances is advantageously marked by the insertion of subsidiary action or episode (as in *King Lear*, where the opening of the movement of the main action would follow too sharply upon its exposition, were not the beginning of the subsidiary action of Gloster and his sons opportunely introduced between them). From this point the second stage of the action—its growth—progresses to that third stage which is called its height or *climax*. All that has preceded the reaching of this constitutes that half of the drama—usually its much larger half—which Aristotle terms the δέσις, or tying of the knot. The varieties in the treatment of the growth or second stage of the action are infinite, and it is here that the masters of the tragic and the comic drama—notably those unequalled weavers of intrigues, the Spaniards—are able most fully to exercise their *inventive* faculties. If the growth is too rapid, the climax will fail of its effect—and it is, therefore, at this stage that subsidiary actions and episodes are most largely used; if it is too slow, the interest will be exhausted before the greatest demand upon it has been made—a fault to which comedy is specially liable; if it is involved or inverted, a vague uncertainty will take the place of an eager or agreeable suspense, the action will seem to halt, or a fall will begin prematurely. In the contrivance of the *climax* itself lies one of the chief tests of the dramatist's art; for while in the transactions of real life their climax is often only a matter of assumption, in the action of a drama its climax should present itself as self-evident. In the middle of everything, says the Greek poet, lies the strength; and this strongest or highest point it is the task of the dramatist to make manifest. Much here depends upon the niceties of constructive instinct; much (as in all parts of the action) upon a thorough dramatic transformation of the subject. The historical drama here presents peculiar difficulties, and perhaps the example of *Henry VIII.*, as compared with Shakespeare's other historical plays, may be held to furnish an instructive example of defective (because hasty) workmanship.

From the climax, or height, the action proceeds through its *fall* to its *close*, which in a drama with an unhappy ending we still call its *catastrophe*, while to terminations in general we apply the term *dénouement*. This latter name would, however, more properly be used in the sense in which Aristotle employs its Greek equivalent λύσις—the untying of the knot—of the whole of the second part of the action, from the climax downwards. If, in the management of the climax, everything depended upon making the effect, in the fall everything depends upon not marring it. This may be ensured by a rapid progress to the close; but neither does every action admit of such treatment, nor is it in accordance with the character of those actions which are of a complicated kind. With the latter, therefore, the *fall* is often a *return*—*i.e.*, in Aristotle's phrase, a change into the reverse of what is expected from the circumstances of the action (περιπέτεια),—as in *Coriolanus*, where the Roman story lends itself so admirably to dramatic demands. In any case the art of the dramatist is in this part of his work called upon for the surest exercise of its tact and skill. The effect of the climax has been to concentrate the interest; the fall must therefore, above all, avoid dissipating it. The use of episodes is not even now excluded; but they must be of a more directly significant kind than is necessary in the earlier stages of the drama; even where serving the purpose of relief they must help to keep alive the interest previously raised to its highest pitch. This may be effected by a return or revolution; or again, by the raising of obstacles between the height of the action and its expected consequences, by the suggestion in tragedy of a seemingly possible recovery or escape from them (as in the wonderfully powerful construction of the latter part of *Macbeth*), by the gradual removal in comedy, or wherever the interest of the action is less intense, of such difficulties as the growth and climax have occasioned. In all kinds of the drama *discovery* will remain, as it was in the judgment of Aristotle, a most effective expedient; but it should be a discovery which has been foreshadowed by that method of treatment which in its consummate master, Sophocles, has been termed his *irony*. Nowhere should the close or catastrophe be other than a consequence of the action itself. Sudden revulsions from the conditions of the action—such as the *deus ex machina*, or the revising officer of the emperor of China, or the nabob returned from India bring about—condemn themselves as unsatisfactory makeshifts. However sudden, and even, in manner of accomplishment, surprising, may be the catastrophe, it should not be unprepared, but like every other part of the action should preserve its organic connection with the whole. The sudden suicides which terminate so many tragedies, and the paternal blessings which close an equal number of comedies, should be something more than a signal for the fall of the curtain.

Return.

Close or catastrophe

The action of a drama, besides being one and complete in itself, ought likewise to be *probable*. The probability required of a drama is not that of actual or historical experience—it is a conditional probability, or in other words the consistency of the course of the action with the conditions under which, and with the characters by which, the dramatist has chosen to carry it on. As to the former, he is fettered by no restrictions save those which he imposes upon himself, whether or not in deference to the usages of certain accepted species of dramatic composition. Ghosts appear neither in real life nor in dramas of real life; but the introduction of supernatural agency is neither enjoined nor prohibited by any general dramatic law. The use of such expedients is as open to the dramatic as to any other poet; the judiciousness of his use of them depends upon the effect which, consistently with the general conduct of his action, they will exercise upon the spectator, whom other circumstances may or may not predispose to their acceptance. The ghost in *Hamlet* belongs to the action of the play; the ghost in the *Persæ* is not intrinsically less probable, but the apparition seems to spring, so to speak, less naturally out of the atmosphere around it. Dramatic probability has, however, a far deeper meaning than this. The *Eumenides* is probable with all its primitive mysteriousness, and *Macbeth* with all its barbarous witchcraft. The proceedings of the feathered builders of Cloudcuckootown

Probability of action.

are as true to dramatic probability as are the pranks of Oberon's fairies. In other words, it is in the consistency of the action with the characters, and of the characters with themselves, that this dramatic probability lies. The dramatist has to represent characters affected by the progress of an action in a particular way, and contributing to it in a particular way, because, if consistent with themselves, they *must* be so affected, and *must* so act.

aracter-
tion.

Upon the invention and conduct of his characters the dramatist must therefore expend a great proportion of his labour. His treatment of them will, in at least as high a degree as his choice of subject, conception of action, and method of construction, determine the effect which his work produces. And while there are aspects of the dramatic art under which its earlier history already exhibits an unsurpassed degree of perfection, there is none under which its advance is more perceptible than this. Many causes have contributed to this result; the chief is to be sought in the multiplication of the opportunities for mankind's study of man. The theories of the Indian critics on the subject of dramatic character are a scaffolding more elaborate than the edifice it surrounds. Aristotle's remarks on the subject are scanty; and it may be unhesitatingly asserted that the strength of the dramatic literature from whose examples he abstracted his maxims is not to be sought in the fulness or variety of its characterization. This relative deficiency the outward conditions of the Greek theatre—the remoteness of actor from spectator, and the consequent necessity for the use of masks, and for the raising and therefore conventionalizing of the tones of the voice—undoubtedly helped to occasion. Later Greek and Roman comedy, with a persistency furnishing a remarkable illustration of the force of habit, limited their range of characters to an accepted gallery of types. Nor is it easy to ignore the fact that these examples, and the influence of national tendencies of mind and temperament, have inclined the dramatists of the Romance nations to attach less importance to characterization of a closer and more varied kind than to interest of action and effectiveness of construction. The Italian and the Spanish drama more especially, and the French during a great part of its history, have in general shown a disposition to present their characters, as it were, ready made—whether in the case of tragic heroes and heroines, or in that of comic types, often moulded according to a long-lived system of local or national selection. It is in the Germanic drama, and in its master Shakespeare above all, that the individualization of characters has been carried to its furthest point, and that their significance has been allowed to work itself out in closest connection with the progress of the dramatic action to which they belong.

vance of
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ter.

But, however the method and scope of characterization may vary under the influence of different historical epochs and different tendencies or tastes of races or nations, the laws of this branch of the dramatic art are everywhere based on the same essential requirements. What interests us in a man or woman in real life, or in the impressions we form of historical personages, is that which seems to us to individualize them. A dramatic character must therefore, whatever its part in the action, be sufficiently marked in its distinctive features to interest the imagination; with these its subsequent conduct must be consistent, and to these its participation in the action must correspond. In order that such should be the result, the dramatist must first have distinctly conceived the character, whatever may have suggested it to him. If, for instance, he has taken it, as the phrase is, from history or from contemporary life, he must transform it, just as he must transform the subject of the action into the action itself. His task is not to paint a copy of any particular man, but to conceive a kind of man—of which a particular individual may have occurred to him as a suggestive illustration—under the op particular circumstances. His conception, gro modifying itself with the progress of that of th will determine the totality of the character he The likeness which the result bears to an actual cal personage may very probably, from secondary view, concern the success of his creation; upon its effect this likeness can have no influence whatev different sense from that in which Shakespeare words, it should be possible to say of every dram acter which it is sought to identify with a personage, "This is not the man." The mirr drama is not a photographic apparatus.

Distinctiveness, as the primary requisite in characterization, is to be demanded in the case o sonages introduced into a dramatic action, but cases in an equal degree. Schiller, in addin *dramatis personæ* of his *Fiesco* superscriptions of characteristics, labels Sacco as "an ordinary per this suffices for Sacco. Between Bassanio's two ful rivals in the trial of the caskets there is enough for the dramatic purpose of their existen with the great masters of characterization a few of which the true actor's art knows how to av distinguish even their lesser characters from one and every man is in his humour down to the thir Elaboration is necessarily reserved for characters the more important contributors to the action, fulness of elaboration for its heroes. Many expedi lend their aid to the higher degrees of distinctive characters designed to influence the whole of the must be marked early, in others in due relation to tribution towards the course of the plot. Much is a significant introduction of hero or heroine,—so is dragged in by the watchman, Gloucester ent upon the scene, Volpone is discovered in adorati golden saint. Nothing marks character more cle the use of contrast—as of Othello with Iago, of with Max Piccolomini, of Joseph with Charles Nor is direct antithesis the only effective kind of Cassius is a foil to Brutus, and Leonora to her the Princess. But besides impressing the imagi a conception distinct in itself, each character must a consistency between its conduct in the actio features it has established as its own. This c does not imply uniformity; for, as Aristotle obse are characters which, to be represented with must be presented as uniformly un-uniform. consistently complex characters the great criti instances, nor indeed are they of frequent occu Greek tragedy; in the modern drama Hamlet unrivalled exemplar; and Weislingen in Goet and Alceste in the *Misanthrope*, may be as other illustrations in dramas widely different another. It should be added that those dra natures which freely admit of a mixture of th with the comic element thereby enormously inc opportunities of varied characterization. The di the task at the same time enhances the effect from its satisfactory solution; and if the conce character is found to bear a variety of tests that which experience shows life to have at hand man, its naturalness, as we term it, becomes mor to the imagination. Naturalness is only another what Aristotle terms propriety; the artificial rules usage has at times sought to define particular spec racter are in their origin only a convenience of th though they have largely helped to conventionalise characterisation. Lastly, a character should be effective with regard to the dramatic action in part,—that is to say, the influence it exerts upon the of the action should correspond to its distinctive the conduct of the play should seem to spring the nature of its characters. Hence even the minor acters should not idly intervene, and, before they significantly, we should be prepared by some notion of them. The chief characters, on the hand, should predominate over or determine the of the action; its entire conception should harmonize their distinctive features; it is only a Prometheus the gods bind fast to a rock, only a Juliet who will into a living death for her Romeo. Thus in a chance is excluded from dramatic action, or rather, every other element in it, bends to the dramatic idea. In view of this predominance of character over action, appropriately use such expressions as a tragedy of jealousy or ambition, or a comedy of character—by is merely meant one whose preponderating interest the effectiveness with which its conduct impresses the mind the conception of its chief character or cters.

term *manners* (as employed in a narrower sense the Aristotelian) applies to that which colours action and characters, but does not determine ssence of either. As exhibiting human agents certain conditions of time and place, and of the relations of community existing or conceivable men, the action of a drama, together with the char- engaged in it and the incidents and circumstances ging to it, must be more or less suited to the external tions assumed. From the assumption of some such tions not even those dramatic species which indulge most sovereign licence, such as Old Attic comedy or que in general, can wholly emancipate themselves; ven supernatural characters and actions must adapt lves to some antecedents. But it depends altogether measure in which the nature of an action and the pment of its characters are affected by considerations e and place, or of temporary social systems and the tory distinctions they produce, whether the imitation particular kind of manners becomes a significant ele- in a particular play. What is of vanishing import- in one may be an adjunct of inestimable value in r. The Hindu caste-system is an antecedent of Hindu drama, and the peculiar organization of society of nearly every Chinese with which we are ted. Greek tragedy itself, though treating subjects from no historic age, had established a standard of from which in its decline it did not depart with ty. The imitation of manners of a particular age try may or may not be of moment in a play. The ture of the Crusades is merely a felicitous choice for of action of *Nathan the Wise*; but the dramatic of *Minna von Barnhelm* derives half its life from ground of the Seven Years' War. In some dramas, some species of drama, time and place are so purely ary and so much a matter of indifference that the adop- a purely conventional standard of manners, or at e exclusion of any definitely fixed one, is here desir- The ducal reign of Theseus at Athens (when ascer- does not date *A Midsummer Night's Dream*; nor coasts of Bohemia localize the manners of the of Autolycus. Where, on the other hand, as pecially in the historic drama, or in that kind of which directs its shafts against the ridiculous vices rticular age or country, the likeness of the manners ated to what is more or less known possesses ance, there the dramatist will use care in his colour- How admirably is the French court specialized in V., how completely are we transplanted among the burghers of Brussels in the opening scenes of *Egmont!* What a picture of a clique we have in the *Précieuses ridicules* of Molière; what a reproduction of a class in the pot-house politicians of Holberg! Yet even in such instances the dramatist will only use what suits his dramatic purpose; he will select, not transfer in mass, historic features, and discriminate in his use of modern instances. The details of historic fidelity, and the lesser shades distinguishing the varieties of social usage, he will introduce at his choice, or leave to be supplied by the actor. Where the reproduction of manners becomes the primary purpose of a play, its effect can only be of an inferior kind; and a drama purely of manners is a contradiction in terms.

Species of the drama.

No complete system of dramatic species can be abstracted from any one dramatic literature. They are often the result of particular antecedents, and their growth is often affected by peculiar conditions. Different nations or ages use the same name, and may preserve some of the same rules, for species which in other respects their usage may have materially modified from that of their neighbours or predecessors. Who would undertake to define, except in their successive applications, such terms as *tragi-comedy* or *melodrama?* Yet this does not imply that all is confusion in the terminology as to the species of the drama. In so far as they are distinguishable according to the effects which their actions, or those which the preponderating parts of their actions, produce, they may primarily be ranged in accordance with the broad difference established by Aristotle between tragedy and comedy. *Tragic* and *comic* effects differ in regard to the emotions of the mind which they excite; and a drama is tragic or comic according as such effects are produced by it. The strong or serious emotions are alone capable of exercising upon us that influence which, employing a bold but marvellously happy figure, Aristotle termed *purification*, and which a Greek comedian, after a more matter-of-fact fashion, thus expressed:

Tragic and comic.

> "For whensoe'er a man observes his fellow
> Bear wrongs more grievous than himself has known,
> More easily he bears his own misfortunes;"

i.e., the petty troubles of self which disturb without elevating the mind are driven out by the sympathetic participation in greater griefs, which raises while it excites the mind employed upon contemplating them. It is to these emotions—which are and can be no others than pity and terror—that actions and characters which we call tragic appeal. Those which we term comic address themselves to the sense of the ridiculous, and their subjects are those vices and moral infirmities, the representation of which is capable of touching the springs of laughter. Where, accordingly, a drama excludes all effects except those of the former class, it may be called a pure *tragedy*; when all except those of the latter, a pure *comedy*. In those dramas where the effects are mixed, it is the nature of the main action and of the main characters (as determined by their distinctive features) which alone enables us to classify such plays as serious or humorous dramas—or as tragic or comic, if we choose to preserve the terms. But the classification admits of a variety of transitions, from pure tragedy to mixed, from mixed tragedy to mixed comedy, and thence to pure comedy and her slighter sister *farce*. This method of distinction has no concern with the mere question of the termination of a play, according to which Philostratus and other authorities have sought to distinguish between tragic and comic dramas. The serious drama which ends happily (the German *Schauspiel*) is not a species co-ordinate with tragedy and comedy, but only one subordinate to the former, if, indeed, it be necessary to distinguish it as a species at all. Oth distinctions may be almost infinitely varied according to the point of view adopted for the classification.

The historical sketch of the drama attempted in the following pages will best serve to indicate the successive growth of national dramatic species, many of which by asserting their influence in other countries and ages than those which gave birth to them, have acquired a more than national significance.

The art of acting.

The art of acting, whose history forms an organic though a distinct part of that of the drama, necessarily possesses a theory and a technical system of its own. But into these it is impossible here to enter. One claim, however, should be vindicated for the art of acting, viz., that though it is a dependent art, and most signally so in its highest forms, yet its true exercise implies a creative process. The conception of a character is determined by antecedents not of the actor's own making; and the term originality can be applied to it only in a relative sense. Study and reflection enable him, with the aid of experience and of the intuition which genius bestows, but which experience may in a high degree supply, to interpret, to combine, and to supplement given materials. But in the transformation of the conception into the represented character the actor's functions are really creative; for here he *becomes* the character by means which belong to his art alone. The distinctiveness he gives to the character by making the principal features recognized by him in it its groundwork;—the consistency which he maintains in it between groundwork and details;—the appropriateness which he preserves in it to the course of the action and the part borne in it by the character:—all these are produced by himself, though suggested by the conception he has derived from his materials. As to the means at his disposal, they are essentially of two kinds only; but not all forms of the drama have admitted of the use of both, or of both in the same completeness. All acting includes the use of gesture, or, as it has been more comprehensively termed, of bodily eloquence. From various points of view its laws regulate the actor's bearing, walk, and movements of face and limbs. They teach what is æsthetically permitted and what is æsthetically pleasing. They deduce from observation what is appropriate to the expression of particular affections of the mind and of their combinations, of emotions and passions, of physical and mental conditions—joy and grief, health and sickness, waking, sleeping, and dreaming, madness, collapse, and death—of particular ages of life and temperaments, as well as of the distinctive characteristics of race, nationality, or class. While under certain conditions—as in the masked drama—the use of bodily movement as one of the means of expression has at times been partially restricted, there have been, or are, forms of the drama which have altogether excluded the use of speech (such as pantomime), or have restricted the manner of its employment (such as opera). In the spoken drama the laws of rhetoric regulate the actor's use of speech, but under conditions of a special nature. Like the orator, he has to follow the laws of pronunciation, modulation, accent, and rhythm (the last in certain kinds of prose as well as in such forms of verse as he may be called upon to reproduce). But he has also to give his attention to the special laws of dramatic delivery, which vary in soliloquy and dialogue, and in such narrative or lyrical passages as may occur in his part.

It means gesture.

speech.

costume

The totality of the effect produced by the actor will in some degree depend upon other aids, among which those of a purely external kind will not be lost sight of. But the significance of costume in the actor, like that of decoration and scenery in an [illegible] is a wholly relative one, and is to a large measure determined by the claims which custom enables the theatre to make, or forbids its making, upon the imagination of the spectators. The actor's real achievement lies in the transformation which the artist himself effects; nor is there any art more sovereign in the use it can make of its means, or so happy in the directness of the results it can accomplish by them.

The origin of the INDIAN drama may unhesitatingly be described as purely native. The Mahometans when they overran India brought no drama with them; the Persians, the Arabs, and the Egyptians were without a national theatre. It would be absurd to suppose the Indian drama to have owed anything to the Chinese or its offshoots. On the other hand, there is no real evidence for assuming any influence of Greek examples upon the Indian drama at any stage of its progress. Finally, it had passed into its decline before the dramatic literature of modern Europe had sprung into being.

The Hindu writers ascribe the invention of dramatic entertainments to an inspired sage Bharata, or to the communications made to him by the god Brahma himself concerning an art gathered from the Vedas. As the word *Bharata* signifies an actor, we have clearly here a mere personification of the invention of the drama. Three kinds of entertainments, of which the *nátya* (defined as a dance combined with gesticulation and speech) comes nearest to the drama, were said to have been exhibited before the gods by the spirits and nymphs of Indra's heaven, and to these the god Siva added two new styles of dancing.

The origin of the Indian drama was thus doubtless religious; it sprang from the union of song and dance in the festivals of the gods, to which were afterwards added narrative recitation, and first sung, then spoken, dialogue. Such scenes and stories from the mythology of Vishńu are still occasionally enacted by pantomime or spoken dialogue in India (*játras* of the Bengalis; *rásas* of the Western Provinces); and the most ancient Indian play was said to have treated an episode from the history of that deity,—the choice of him as a consort by Laxmi,—a favourite kind of subject in the Indian drama. The tradition connecting its earliest themes with the native mythology of Vishńu agrees with that ascribing the origin of a particular kind of dramatic performance—the *sangíta*—to Krishńa and the shepherdesses. The author's later poem, the *Gítagovinda*, has been conjectured to be suggestive of the earliest species of Hindu dramas. But while the epic poetry of the Hindus gradually approached the dramatic in the way of dialogue, their drama developed itself independently out of the union of the lyric and the epic forms. Their dramatic poetry arose later than their epos, whose great works, the *Mahábhárata* and the *Rámáyańa*, had again been long preceded by the hymnody of the *Vedas*—just as the Greek drama followed upon the Homeric poems, and these had been preceded by the early hymns. The beginnings of the Indian drama may accordingly belong to the 1st century B.C., or to a rather earlier date. But by the time it produced the first specimens with which we are acquainted, it had already reached its zenith; and it was therefore looked upon as having sprung into being as a perfect art. We know it only in its glory, in its decline, and in its decay.

The history of Indian dramatic literature may be roughly divided into the following periods:—

I. *From the* 1*st century* B.C. *to the* 10*th century* A.D.—This period belongs to the pre-Mahometan age of Indian history, but to that second division of it in which Buddhism had already become a powerful factor in the social, as well as in the moral and intellectual, life of the land. It is the classical period of the Hindu drama, and includes the works of its two indisputably greatest masters. Of these Kalidasa was by far the earlier, who lived at the rt of King Vikramáditya of Avanti (died 56 B.C.), ng accounted the brightest of its "nine gems" of genius.

s the authorvof *Sákuntalá*,—the work Sir William es's translation of which first revealed to the Western ld of letters the existence of an Indian drama. It is a matic love-idyll of surpassing beauty, and, in the opinion he highest authorities, one of the master-pieces of the tic literature of the world. Kálidása's other drama, *rama and Urvaśi* (*The Hero and the Nymph*), though qual as a whole to *Sákuntalá*, contains one act of mparable loveliness; and its enduring effect upon ian dramatic literature is shown by the imitations of it ater plays. To Kálidása has likewise been attributed a d play—the *Málavikágnimitra*; but it is doubtful ether this comedy, though held to be of ancient date, s not composed by a different poet of the same name.

Another work of high merit, the pathetic *Mrichchhakati* he *Toy-Cart*), a domestic drama with a public underplot, y possibly belong to the close of the 2d century A.D., l seems certainly of an earlier date than the 10th. It ttributed (as is not uncommon with Indian plays) to a al author named Śúdraka.

The palm of pre-eminence is disputed with Kálidása by great dramatic poet Babhavúti (called Çrikańtha, or he whose throat is fortune), who flourished in the earlier t of the 8th century. While he is considered more ficial in language than his rival, and in general more nd by rules, he can hardly be deemed his inferior in matic genius. Of his three extant plays, *Mahávíra-harita* and *Uttara-Ráma-Charitra* are heroic dramas erned with the adventures of Ráma (the seventh rnation of Vishńu); the third, the powerful *Málati d Mádhava*, has love for its theme, and has been called th more aptitude than such comparisons usually possess) *Romeo and Juliet* of the Hindus. It is considered by r critical authorities the best example of the *prakarańa*, drama of domestic life.

Among the remaining chief works of Indian dramatic ature, the *Veńi-Samhara* is thought probably to date about the 8th or 9th century. Its author's name s doubtful; the play is described as one in which both s and horror are exaggerated, and which in the ce of its action recalls the manner of Shakespeare's ccessors. The next series of plays forms a transition ween the first period of Indian dramatic literature and

II. The period of decline, which may be reckoned *from the 11th to about the 14th century of our era*, and of h the beginning roughly coincides with that of a con-ous series of Mahometan invasions of India. *Hanúman-aka*, or "the great *Nataka*" (for this play, the work of al hands, surpasses all other Indian dramas in length, ding over not less than fourteen acts), dates from the h or 11th century. Its story is taken from the Ráma-, and a prominent character in it is the mythical key-chief Hanúmat, to whom, indeed, tradition ascribed original authorship of the play. Kŕishńamicra's osophic mystery," as it has been called, of *Prabodha-ndrodaya* (*The Rise of the Moon of Insight*, *i.e.*, the ory of true doctrine over error), is ascribed by one ority to the middle of the 11th century, by another bout the end of the 12th. The dates of the famous *navali* (*The Necklace*), a court-comedy of love and igue, with a half-Terentian plot, and of the interesting dhist drama *Nágánanda*, which begins as an erotic play passes into a most impressive exemplification of the me virtue of self-sacrifice, depend on the disputed tion of their respective authorship. One of them ngs to the first quarter of the 12th century, the other n earlier time. Finally, Viśákhadatta's interesting a of political intrigue, *Mudrá-Rakshasa* (*The Signet of the Minister*), in which prince Chandragupta, presumably identifiable with Sandrocottus, makes his appearance, was probably composed later than the end of the 12th century. This is the only Indian play known to us with an essentially historical fable—a noteworthy circumstance, if (as is most likely) it was produced at a time when the Mahometan invasions had already begun.

The remaining plays of which it has been possible to conjecture the dates range in the time of their composition from the end of the 11th to the 14th century, and belong to the period of decline. Of this period, as compared with the first, the general characteristics seem to be an undue preponderance of narrative and description, and an affected and over-elaborated style. As a striking instance of this class is mentioned a play on the adventures of Ráma, the *Anargha-Rághava*, which in spite, or by reason, of the commonplace character of its sentiments, the extravagance of its diction, and the obscurity of its mythology, is stated to enjoy a higher reputation with the pandits of the present age than the master-pieces of Kálidása and Babhávuti. To the close of this period, the 14th century, has likewise (but without any pretension to certainty) been ascribed the only Tamil drama of which we possess an English version. *Arichandra* (*The Martyr of Truth*) exemplifies—with a strange likeness in the contrivance of its plot to the *Book of Job* and *Faust*—in the trials of a heroically enduring king the maxim "Better die than lie."

Third period (decay).

III. Isolated plays remain from *centuries later than the 14th*; but these, which chiefly turn on the legends of Kŕishńa (the last incarnation of Vishńu), may be regarded as a mere aftergrowth, and exhibit the Indian drama in its decay. Indeed, the latest of them, *Chitra-Yajna*, which was composed about the beginning of the present century, and still serves as a model for Bengali dramatic performances, is imperfect in its dialogue, which (after the fashion of Italian improvised comedy) it is left to the actors to supplement. Besides these there are farces or farcical entertainments, more or less indelicate, of uncertain dates.

Number of plays.

The number of the plays which have descended to us from so vast an expanse of time is both relatively and absolutely small. Wilson doubts whether all the plays to be found, and those mentioned by Hindu writers on the drama, amount to many more than 60; and it has been seen that not more than three are ascribed to either of the two great masters. To these should be, however, added the plays in Tamil, stated to be about 100 in number, and to have been composed by poets who enjoyed the patronage of the Pandian kings of Madura. On the other hand, there is among the Hindus no dearth of dramatic theory. The sage Bharata, the reputed inventor of dramatic entertainments, was likewise revered as the father of dramatic criticism—a combination of functions to which the latter days of the English theatre might perhaps furnish an occasional parallel. The commentators (possibly under the influence of inspiration rather than as a strict matter of memory) constantly cite his *sútras*, or aphorisms. (From *sútra*, thread, was named the *sútra-dhára*, thread-holder, carpenter, a term applied to the architect and general manager of sacrificial solemnities, then to the director of theatrical performances). By the 11th century, when the drama was already approaching its decline, dramatic criticism had reached an advanced point; and the *Dasa-Rupaka* (of which the text belongs to that age) distinctly defines the ten several kinds of dramatic composition. Other critical works followed at later dates, exhibiting a rage for subdivision unsurpassed by the efforts of Western theorists, ancient or modern; the misfortune is that there should not be examples remaining (if they ever existed) to illustrate all the branches of so elaborate a dramatic system.

Critics' literature.

Exclusiveness of the Indian drama.

"What," inquires the manager of an actor in the induction to one of the most famous of Indian plays, "are those qualities which the virtuous, the wise, the venerable, the learned, and the Brahmans require in a drama?" "Profound exposition of the various passions," is the reply, "pleasing interchange of mutual affection, loftiness of character, delicate expression of desire, a surprising story, and elegant language." "Then," says the manager (for the Indian dramatists, though not, like Ben Jonson, wont to "rail" the public "into approbation," are unaffected by *mauvaise honte*) "I recollect one." And he proceeds to state that "Babhavúti has given us a drama composed by him, replete with all qualities, to which indeed this sentence is applicable: 'How little do they know who speak of us with censure! This entertainment is not for them. Possibly some one exists, or will exist, of similar tastes with myself; for time is boundless, and the world is wide.'" This self-possessed disregard of popularity, springing from an imperturbable consciousness of lofty aims, accounts for much that is characteristic of the higher class of Indian plays. It explains both their paucity and their length, renders intelligible the chief peculiarity in their diction, and furnishes the key to their most striking ethical as well as literary qualities. Connected in their origin with religious worship, they were only performed on solemn occasions, chiefly of a public nature, and more especially at seasons sacred to some divinity. Thus, though they might in some instances be reproduced, they were always written with a view to one particular solemn representation. Again, the greater part of every one of the plays of Northern India is written in Sanskrit, which ceased to be a popular language by 300 B.C., but continued the classical, and at the same time the sacred, form of speech of the Brahmans. Sanskrit is spoken by the heroes and principal personages of the plays, while the female and inferior characters use varieties, more or less refined, of the Prakrit languages (as a rule not more than three, that which is employed in the songs of the women being the poetic dialect of the most common Prakrit language, the Çauraseni). Hence, part at least of each play cannot have been understood by the large majority of the audience, except in so far as their general acquaintance with the legends or stories treated enabled them to follow the course of the action. Every audience thus contained an *inner* audience, which could alone feel the full effect of the drama. It is, then, easy to see why the Hindu critics should make demands upon the art, into which only highly-trained and refined intellects were capable of entering, or called upon to enter. The general public could not be expected to appreciate the sentiments expressed in a drama, and thus (according to the purpose prescribed by Hindu theory) to receive instruction by means of amusement. These sentiments are termed *rasas* (flavours), and said to spring from the *bhávas* (conditions of mind and body). A variety of subdivisions is added; but the *sańta rasa* is logically enough excluded from dramatic composition, inasmuch as it implies absolute quiescence.

[illegible]

The Hindu critics know of no distinction directly corresponding to that between tragedy and comedy, still less of any determined by the nature of the close of a play. For, in accordance with the child-like element of the [illegible] character, they dislike an unhappy ending to any story, and a [illegible] rule accordingly prohibits a fatal conclusion in their dramas. The general term for all dramatic compositions is *rúpaka* (from *rúpa*, form), those of an inferior class being distinguished as *uparúpakas*. Of the various subdivisions of the *rúpaka*, in a more limited sense, the *nátaka*, or play proper, represents the most perfect kind. Its subject should always be celebrated and important—it is virtually either heroism or love, and most frequently the latter—and the hero should be a demigod or divinity as *Ráma* in Babhavúti's heroic plays) or a king (s the hero of *Sákuntalá*). But although the earlier d[illegible] tists took their plots from the sacred writings or P[illegible] they held themselves at liberty to vary the incide[illegible] licence from which the later poets abstained. Th[illegible] accordance, perhaps, with the respective developme[illegible] the religious life of the two peoples, the Hindu dra[illegible] this respect reversed the progressive practice of the G[illegible] The *prakarańas* agree in all essentials with the na[illegible] except that they are less elevated; their stories are [illegible] fictions, taken from actual life in a respectable cla[illegible] society.[1] Among the species of the *uparúpaka* ma[illegible] mentioned the *trolaka*, in which the personages are p[illegible] human, partly divine, and of which a famous exa[illegible] remains.[2] Of the *bhańa*, a monologue in one act, [illegible] literary example is extant—a curious picture of manne[illegible] which the speaker describes the different persons he m[illegible] at a spring festival in the streets of Kolahalapur.[3] [illegible] satire of the farcical *prahasanas* is usually directed agai[illegible] the hypocrisy of ascetics and Brahmans, and the sensual[illegible] of the wealthy and powerful. These trifles represent [illegible] lower extreme of the dramatic scale, to which, of co[illegible] the principles that follow only partially apply.

Unity of action is strictly enjoined by Hindu [illegible] though not invariably observed in practice. Episod[illegible] prolix interruptions are forbidden; but, in order to [illegible] the connection, the story of the play is sometim[illegible] on by narratives spoken by actors or "interpret[illegible] thing after the fashion of the Chorus in *He*[illegible] Gower in *Pericles*. "Unity of time" is libera[illegible] arbitrarily, understood by the later critic[illegible] as limiting the duration of the action of [illegible] but even this is exceeded in more than one [illegible] The single acts are to confine the events o[illegible] to "one course of the sun," and usually do [illegible] place" is unknown to the Hindu drama, [illegible] absence of scenery; for the plays were [illegible] open courts of palaces, perhaps at times [illegible] apart for public entertainments, or in the [illegible] change of scene is usually indicated in [illegible] find[5] the characters making long jou[illegible] under the eyes of spectators not train[illegible] mileage.

With the solemn character of [illegible] dramatic performances accord the [illegible] defining what may be called the p[illegible] drama. Not only should death [illegible] *populo*, but the various operatio[illegible] kissing, eating, sleeping, the [illegible] ceremony should never take pla[illegible] rules are made to be occasionall[illegible] the mild humour of the *vidu*[illegible] "gesticulating eating" inst[illegible] of noxious act.[6] The charmin[illegible] at least in the earlier recensi[illegible] as the hero is about to act th[illegible] of the heroine's lips.[7] But la[illegible] or less refined. In two dra[illegible] the stage by her braid of h[illegible] one than that imputed to [illegible] motive of the action. In a [illegible] ceremony occur in the co[illegible]

The dramatic construct[illegible] to very striking peculiari[illegible] enfold and to overshadow the moral life of the Indian drama. The affections and passions forming part of self it delineates with a fidelity to nature which no art can neglect; but the freedom of the picture is restricted by conditions which to us are unfamiliar and at times seem intolerable, but which it was impossible for the Indian poet's imagination to neglect. The sheer self-absorption of ambition or love appears inconceivable by the minds of any of these poets; and their social philosophy is always based on the system of caste. On the other hand, they are masters of many of the truest forms of pathos, above all of that which blends with resignation. In humour of a delicate kind they are by no means deficient; to its lower forms they are generally strangers, even in productions of a professedly comic intention. Of wit, Indian dramatic literature—though a play on words is as the breath of its nostrils—furnishes hardly any examples intelligible to Western notions.

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[1] e.g., *Mrichchhakati*; Mal[illegible]

[2] *Vikrama and Urvasi*.

[4] *Sákuntalá*; *Uttara-Rá*[illegible]

[6] *Nágánanda*, act I.

[8] *Veni-Samhára*; *Prach*[illegible]

etry of c dian ana. The distinctive excellence of the Indian drama is to be sought in the poetic robe which envelops it as flowers overspread the bosom of the earth in the season of spring. In its nobler productions, at least, it is never untrue to its half religious, half rural origin; it weaves the wreaths of idyllic fancies in an unbroken chain, adding to its favourite and familiar blossoms ever fresh beauties from an inexhaustible garden. Nor is it unequal to depicting the grander aspects of nature in her mighty forests and on the shores of the ocean. A profound familiarity with its native literature can here alone follow its diction through a ceaseless flow of phrase and figure, listen with understanding to the hum of the bee as it hangs over the lotus, and contemplate with Sákuntalá's pious sympathy the creeper as it winds round the mango tree. But the poetic beauty of the Indian drama reveals itself in the mysterious charm of its outline, if not in its full glow, even to the untrained; nor should the study of it—for which the materials may yet increase—be left aside by any lover of literature.

hinese rama. Like the Indian drama, the CHINESE arose from the union of the arts of dance and song. To the ballets and pantomimes out of which it developed itself, and which have continued to flourish by the side of its more advanced forms, the Chinese ascribe a primitive antiquity of origin; many of them originally had a symbolical reference to such subjects as the harvest, and war and peace. A very ancient pantomime is said to have symbolized the conquest of China by Wou-Wang; others were of a humbler, and often of a very obscure, character. To their music the Chinese likewise attribute a great antiquity of origin.

Though some traditions declare the emperor Wan-Te (fl. about 580 A.D.) to have invented the drama, this honour is more usually given to the emperor Heun-Tsung (720 A.D.), who is likewise remembered as a radical musical reformer. Pantomimes henceforth fell into disrepute; and the history of the Chinese drama from this date is divided, with an accuracy we cannot profess to control, into four distinct periods, of each of which the plays composed in it are stated to bear the manifest impress. These are

Chronology. I. That of the dramas composed *under the Tang dynasty, from* 720 *to* 907 A.D. These pieces, called *Tchhouen-Khi*, were limited to the representation of extraordinary events, and were therefore, in design at least, a species of heroic drama. The ensuing times of civil war interrupted the "pleasures of peace and prosperity" (a Chinese phrase for dramatic performances)—which, however, revived

II. *Under the Song Dynasty, from* 960 *to* 1119.—The plays of this period are called *Hi-Khio*, and presented what became a standing peculiarity of the Chinese drama, viz., that in them figures a principal personage *who sings*.

III. The best known age of the Chinese drama was *under the Kin and Yuen dynasties, from* 1123 *to* 1367. The plays of this period are called *Yuen-Pen* and *Tsa-Ki*, the latter seem to have resembled the *Hi-Khio*, and to have treated very various subjects. The *Yuen-Pen* are the plays from which our literary knowledge of the Chinese drama is mainly derived; the short pieces called *Yen-Kia* were in the same style, but briefer. The list of dramatic authors under the Yuen dynasty is tolerably extensive, comprising 85, among whom four are designated as courtesans; the number of plays composed by these and by anonymous authors is reckoned at not less than 564. In 1735 the Jesuit missionary Prémare first revealed to Europe the existence of the tragedy *Tchao-Chi-Cu-Eul* (*The Little Orphan of the House of Tchao*), which was founded upon an earlier piece treating of the fortunes of an heir to the imperial throne, who was preserved in a mysterious box like another Cypselus or Moses. Voltaire seized the theme of the earlier play for a rhetorical tragedy, in which he coolly professes it was his intention "to paint the manners of the Chinese and the Tartars." The later play, which is something less elevated in the rank of its characters, and very decidedly less refined in treatment, was afterwards re-translated by Stanislas Julien; and to the labours of this scholar, of Sir J. F. Davis, and of Bazin the elder, we owe a series of translated Chinese dramas, among which there can be no hesitation whatever in designating the master-piece. The justly famous *Pi-Pa-Ki* (*The Story of the Lute*) belongs to a period rather later than that of the Yuen plays, having been composed towards the close of the 14th century by Kao-Tong-Kia, and reproduced in 1404, under the Ming dynasty, with the alterations of Mao-Tseu, a commentator of learning and taste. *Pi-Pa-Ki*, which as a domestic drama of sentiment possesses very high merit, long enjoyed a quite exceptional popularity in China; it was repeatedly republished with laudatory prefaces, and so late as the 18th century was regarded as a monument of morality, and as the master-piece of the Chinese theatre. It would seem to have remained without any worthy competitors, for although it had been originally designed to produce a reaction against the immorality of the drama then in fashion, especially of Wang-Chi-Fou's celebrated *Si-Siang-Ki* (*The Story of the Western Pavilion*), yet

IV. The period of the Chinese drama *under the Ming dynasty, from* 1368 *to* 1644, exhibited no improvement. "What" (says the preface to the 1704 edition of *Pi-Pa-Ki*) "do you find there? Farcical dialogue, a mass of scenes in which one fancies one hears the hubbub of the streets or the ignoble language of the highways, the extravagances of demons and spirits, in addition to love intrigues repugnant to delicacy of manners." Nor would it appear that the Chinese theatre has ever recovered from its decay.

In theory, no drama could be more consistently elevated in purpose and in tone than the Chinese. Every play, we learn, should have both a moral and a meaning. A virtuous aim is imposed upon Chinese dramatists by an article of the penal code of the empire; and those who write immoral plays are to expect after death a purgatory which will last so long as these plays continue to be performed. In practice, however, the Chinese drama falls far short of its ideal; indeed, according to the native critic already cited, among ten thousand playwrights not one is to be found intent upon perfecting the education of mankind by means of precepts and examples.

The Chinese are, like the Hindus, unacquainted with the distinction between tragedy and comedy; they classify their plays according to subjects in twelve categories. It may be doubted whether what seems the highest of these is actually such; for the religious element in the Chinese drama is often sheer buffoonery. Moreover, Chinese tion (*nándí*), followed by "some account" of the author, and by an introductory scene between the manager and one of the actors, which is more or less skilfully connected with the opening of the play itself. This is divided into acts (*ankas*) and scenes; of the former a *nataka* should have not fewer than 5, or more than 10; 7 appears a common number; "the great *nataka*" reaches 14. Thus the length of the higher class of Indian plays is considerable—about that of an Æschylean trilogy; but not more than a single play was ever performed on the same occasion. Comic plays are restricted to two acts (here called *sandhis*). In theory the scheme of an Indian drama corresponds very closely to the general outline of dramatic construction given above; it is a characteristic merit that the business is rarely concluded before the last act. The piece closes, as it began, with a benediction or prayer. Within this framework room is found for situations as ingeniously devised and highly wrought as those in any modern Western play. What could be more pitiful than the scene in *Sákuntalá*, where the true wife appears before her husband, whose remembrance of her is fatally overclouded by a charm; what more terrific than that in *Málatí and Mádhava*, where the lover rescues his beloved from the horrors of the charnel-field? Recognition—especially between parents and children—frequently gives rise to scenes of a pathos which Euripides has not surpassed.[1] The ingenious device of a "play within the play" (so familiar to the English drama) is employed with the utmost success by Babhavúti.[2] On the other hand, miraculous metamorphosis[3] and, in a later play,[4] vulgar magic lend their aid to the progress of the action. With scenes of strong effectiveness contrast others of the most delicate poetic grace—such as the indescribably lovely little episode of the two damsels of the god of love helping one another to pluck the red and green bud from the mango tree; or of gentle domestic pathos—such as that of the courtesan listening to the prattle of her lover's child, one of the prettiest scenes of a kind rarely kept free from affectation in the modern drama. For the *dénouement* in the narrower sense of the term the Indian dramatists largely resort to the expedient of the *deus ex machina*, often in a sufficiently literal sense.[5]

Every species of drama having its appropriate kind of hero or heroine, theory here again amuses itself with an infinitude of subdivisions. Among the heroines are to be noticed the courtesans, whose social position to some extent resembles that of the Greek *hetæræ*, and association with whom does not seem in practice, however it may be in theory, to be regarded as a disgrace even to Brahmans.[6] In general, the Indian drama indicates relations between the sexes subject to peculiar restraints of usage, but freer than those which Mahometan example seems to have introduced into higher Indian society. The male characters are frequently drawn with skill, and sometimes with genuine force. Prince Samsthanaka[7] is a type of selfishness born in the purple worthy to rank beside figures of the modern drama, of which this has at times naturally been a favourite class of character; elsewhere[8] the intrigues of ministers are not more fully exposed than their characters and principles of action are judiciously discriminated. Among the lesser personages common in the Indian drama, two are worth noticing, as corresponding though by no means precisely to familiar types of other dramatic literatures. These are the *vitá*, the accomplished but dependent companion (both of men and women), and the *vidúshaka*, the humble associate (not servant) of the prince, and the buffoon of the action.[9] Strangely enough, he is always a Brahman, or the pupil of a Brahman. His humour is to be ever intent on the pleasures of a quiet life, and on that of eating in particular; his jokes are always devoid of both harm and point.

Diction.

Thus, clothing itself in a diction always ornate and tropical, in which (as Rückert has happily expressed it) the prose is the warp and the verse the weft; in which (as Goethe says) words become allusions, allusions similes, and similes metaphors, the Indian drama essentially depended upon its literary qualities, and upon the familiar sanctity of its favourite themes, for such effect as it was able to produce. Of scenic apparatus it knew but little; the simple devices by which exits and entrances were facilitated it is unnecessary to describe, and on the contrivances it resorted to for such "properties" as were required (above all, the cars of the gods and of their emissaries)[10] it is useless to speculate. Propriety of costume, on the other hand, seems always to have been observed, agreeably both to the peculiarities of the Indian drama and to the habits of the Indian people.

Scenery and costume.

Actors.

The ministers of an art practised under such conditions could not but be regarded with respect, and spared the contempt or worse, which, except among one other great civilized people, the Greeks, has everywhere at one time or another been the actor's lot. Companies of actors seem to have been common in India at an early date, and the inductions show the players to have been regarded as respectable members of society. In later if not in earlier times individual actors enjoyed a widespread reputation,—"all the world" is acquainted with the talents of Kalaha Kandala.[11] The directors, as already stated, were usually Brahmans. Female parts were in general, though not invariably, represented by females. One would like to know whether such was the case in a piece[12] where—after the fashion of more than one Western play—a crafty minister passes off his daughter as a boy, on which assumption she is all but married to a person of her own sex.

Summar

The Indian drama would, if only for purposes of comparison, be invaluable to the student of this branch of literature. But from the point of view of purely literary excellence it holds its own against all except the very foremost dramas of the world. It is, indeed, a mere phrase to call Kálidása the Indian Shakespeare—a title which, moreover, if intended as anything more than a synonym for poetic pre-eminence, might fairly be disputed in favour of Babhavúti; while it would be absolutely misleading to place a dramatic literature, which, like the Indian, is the mere quintessence of the culture of a caste, by the side of one which represents the fullest development of the artistic consciousness of a people such as the Hellenes. The Indian drama cannot be described as national in the broadest and highest sense of the word; it is, in short, the drama of a literary class, though as such it exhibits many of the noblest and most refined, as well as of the most characteristic, features of Hindu religion and civilization. The ethics of the Indian drama are of a lofty character, but they are those of a scholastic system of religious philosophy, self-conscious of its completeness. To the power of Fate is occasionally ascribed a supremacy, to which gods as well as mortals must bow;[13] but if man's present life is merely a phase in the cycle of his destinies, the highest of moral efforts at the same time points to the summit of possibilities, and self-sacrifice is the supreme condition both of individual perfection and of the progress of the world. Such conceptions as these seem at once to ciation of the lyric passages, which do not appear to be altogether restricted to the singing of the principal personage, for other characters frequently "recite verses." In these lyrical or didactic passages are to be sought those flowers of diction which, as Julien has shown, consist partly in the use of a metaphorical phraseology of infinite nicety in its variations—such as a long series of phrases compounded with the word signifying *jet* and expressing severally the ideas of rarity, distinction, beauty, &c., or as others derived from the names of colours, birds, beasts, precious metals, elements, constellations, &c., or alluding to favourite legends or anecdotes. These features constitute the literary element *par excellence* of Chinese dramatic composition. At the same time, though it is impossible for the untrained reader to be alive to the charms of so unfamiliar a phraseology, it may be questioned whether even in its diction the Chinese drama can claim to be regarded as really poetic. It may abound in poetic *ornament;* it is not, like the Indian, bathed in poetry.

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[1] *Sákuntalá; Uttara-Ráma-Charitra.*
[2] *Ib.*, act vii.
[3] *Vikrama and Urvási*, act iv.
[4] *Ratnávalí.*
[5] *Vikrama and Urvási: Arichandra; Nágánanda.*
[6] *Mrichchhakatí.*
[7] *Ib.*
[8] *Mudrá-Rakshasa.*
[9] *Sákuntalá; Nágánanda.*
[10] *Sákuntalá*, acts vi. and vii.; *Málatí and Mádhava*, act v.
[11] Induction to *Anargha-Rághava*.
[12] *Viddha-Salabhanjíka.*
[13] *Vikrama and Urvasí.*

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On the other hand, the merits of this dramatic literature are by no means restricted to ingenuity of construction and variety of character—merits, in themselves important, which no candid criticism will deny to it. Its master-piece is not only truly pathetic in the conception and the main situations of its action, but includes scenes of singular grace and delicacy of treatment—such as that where the re-married husband of the deserted heroine in vain essays in the presence of his second wife to sing to his new lute, now that he has cast aside the old.[1] In the last act of a tragedy appealing at once to patriotism and to pity, there is true imaginative power in the picture of the emperor, when aware of the departure but not of the death of his beloved, sitting in solitude broken only by the ominous shriek of the wild fowl.[2] Nor is the Chinese drama devoid of humour. The lively abigail who has to persuade her mistress into confessing herself in love by arguing (almost like Beatrice) that "humanity bids us love men;"[3] the corrupt judge (a standing type of the Chinese plays) who falls on his knees before the prosecuting parties to a suit as before "the father and mother who give him sustenance,"[4] may serve as examples; and in *Pi-Pa-Ki* there is a scene of admirable burlesque on the still more characteristic theme of the humours of a competitive examination.[5] If such illustrations could not easily be multiplied, they are at least worth citing in order to deprecate a perfunctory criticism on the qualities of a dramatic literature as to which our materials for judgment are still scanty.

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While in the north of China houses are temporarily set apart for dramatic performances, in the south these are usually confined to theatres erected in the streets (*Hi-Thaï*). Thus scenic decorations of any importance must always have been out of question in the Chinese theatre. The costumes, on the other hand, are described as magnificent; they are traditionally those worn before the 17th century, in accordance with the historical colouring of most of the plays. The actor's profession is not a respectable one in China, the managers being in the habit of buying children of slaves and bringing them up as slaves of their own. Women may not appear on the stage, since the emperor Khian-Lung admitted an actress among his concubines; female parts are therefore played by lads, occasionally by eunuchs.

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Japanese
ama

The Japanese drama, as all evidence seems to agree in showing, still remains what in substance it has always been—an amusement passionately loved by the lower orders, but dignified by no literature deserving the name. Apart from its native elements of music, dance, and song, and legendary or historical narrative and pantomime, it is clearly to be regarded as a Chinese importation; nor has it in its more advanced forms apparently even attempted to emancipate itself from the reproduction of the conventional Chinese types. As early as the close of the 6th century Hada Kawatsu, a man of Chinese extraction, but born in Japan, is said to have been ordered to arrange entertainments for the benefit of the country, and to have written as many as thirty-three plays. The Japanese, however, ascribe the origin of their drama to the introduction of the dance called *Sambâso* as a charm against a volcanic depression of the earth which occurred in 805; and this dance appears still to be used as a prelude to theatrical exhibitions. In 1108 lived a woman called Iso no Zenji, who is looked upon as "the mother of the Japanese drama." But her performances seem to have been confined to dancing or posturing in male attire (*otoko-mai*); and the introduction of the drama proper is universally attributed to Saruwaka Kanzaburô, who in 1624 opened the first theatre (*sibaïa*) at Yeddo. Not long afterwards (1651) the play-houses were removed to their present site in the capital; and both here and in the provincial towns, especially of the north, the drama has since continued to flourish. Persons of rank are never seen at these theatres; but actors are occasionally engaged to play in private at the houses of the nobles, who appear formerly themselves to have taken part in performances of a species of opera affected by them, always treating patriotic legends and called *nô*. The Mikado only has a court theatre.

The subjects of the popular plays are to a large extent historical, though the names of the characters are changed. An example is to be found in the *jôruri*, or musical romance, in which the universally popular tale of *Chiushingura* (*The Loyal League*) has been amplified and adapted for theatrical representation. This famous narrative of the feudal fidelity of the forty-seven *ronins*, who about the year 1699 revenged their chief's judicial suicide upon the arrogant official to whom it was due, is stirring rather than touching in its incidents, and contains much bloodshed, together with a tea-house scene which suffices as a specimen of the Japanese comedy of manners. One of the books of this dramatic romance consists of a metrical description, mainly in dialogue, of a journey which (after the fashion of Indian plays) has to be performed on the stage. Other popular plays are mentioned dealing with similar themes, besides which there are domestic dramas of a very realistic kind, and often highly improper, though all intrigues against married women are excluded. Fairy- and demon—operas and ballets, and farces and intermezzos form an easy transition to the interludes of tumblers and jugglers. As a specimen of nearly every class is required to make up a Japanese theatrical entertainment—which lasts from sunrise to sunset—and as the lower houses appropriate and mutilate the plays of the higher, it is clear that the condition of the Japanese theatre cannot be regarded as promising. In respect, however, of its movable scenery and properties, it is stated to be in advance of its Chinese prototype. The performers are, except in the ballet, males only. Though the leading actors enjoy great popularity and very respectable salaries, the class is held in contempt, and the companies were formerly recruited from the lowest sources. The disabilities under which they lay have, however, been removed; nor is it impossible that the reign of progress in Japan may revolutionise an agency of civilization which it seems for the present to have regarded as beneath its notice.

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[1] *Pi-Pa-Ki*, sc. 14.

[2] *Sorrows of Han.*

[3] *Tchao-Mei-Kiang*, act ii.

[4] *Tou-Ngo-Yuen*, act ii.; *cf. Hoei-Lan-Ki.*

[5] *Pi-Pa-Ki*, sc. 5.

s of a drama exist in any of the other civilized
sia—for that in Siam may probably be regarded
of the Indian. Among the Hebrews and other
ples, as well as in at least one originally Aryan
sia which has cultivated letters with assiduity
s—the Persians—the dramatic art is either
only appears as an occasional and exotic growth.
cessary to dwell on the dramatic *element*
two of the books of the Hebrew Scripture—the
uth and the *Book of Job*. Of the dramatic
the religious rites of the Egyptians a word will
nediately; meanwhile it may be convenient at
e that traces of dramatic entertainments have
in various parts of the New World, which it
art of the present sketch to pursue. Among
e performances, accompanied by dancing and
with recitation and singing, of the South-Sea
rst described by Captain Cook, and lately re-
to the notice of students of comparative
by Mr W. Wyatt Gill. Of the so-called Inca
he Peruvians, the unique relic, *Apu Ollantay*,
been written down in the Quichua tongue from
ion by Spanish priests shortly after the conquest
as been partly translated by Mr Clements
nd recently twice rendered into German verse.
o be an historic play of the heroic type, combin-
incidents with a pathos finding expression in
lyric of some sweetness—the lament for the
With it may be contrasted the ferocious Aztek
llet, *Rabinal-Achi* (translated by the Abbé
rg), of which the text seems rather a succession
arangues than an attempt at dramatic treat-
racter. But these are mere isolated curiosities.

zation and religious ideas of the EGYPTIANS so
nced the people of whose drama we are about
at a reference to them cannot be altogether
he influence of Egyptian upon Greek civiliza-
bably been over-estimated by Herodotus; but
never be clearly known how much the Greeks
Egyptians in divers branches of knowledge, it
at the former confessed themselves the scholars
the cardinal doctrine of its natural theology.
of the immortality of the soul there found its
expression in mysterious recitations connected
es of sepulture, and treating of the migration
from its earthly to its eternal abode. These
whose transition into the Hellenic mysteries
been attributed to the agency of the Thracian
Dionysus, undoubtedly contained a dramatic
n, the extent of which it is, however, useless to
The ideas to which they sought to give
ntred in that of Osiris, the vivifying power or
l of nature, whom Herodotus simply identifies
onysus of the Greeks. The same deity was
oured by processions among the rural Egyptian
which, according to the same authority, in
pects except the absence of choruses resembled
hallic processions in honour of the wine-god.
Egyptians looked upon music as an important
s fully established; it was diligently studied
sts, though not, as among the Greeks, forming
eral education, and in the sacred rites of their
a rule permitted the use of flute and harp, as
cal music. Dancing was as an art confined to
persons; but though the higher orders
om its practice, the lower indulged in it on
ions, when a tendency to pantomime naturally
lf, and licence and wanton buffoonery prevailed,
rly rustic festivals of the Greek and Italian
peoples. Of a dance of armed men, on the other hand, there seems no satisfactory trace in the representations of the Egyptian monuments.

Greek drama its religious origin.

But whatever elements the GREEK drama may, in the sources from which it sprang, have owed to Egyptian, or Phrygian, or other Asiatic influences, its development was independent and self-sustained. Not only in its beginnings, but so long as the stage existed in Greece, the drama was in intimate connection with the national religion. This is the most signal feature of its history, and one which cannot in the same degree and to the same extent be ascribed to the drama of any other people, ancient or modern. Not only did both the great branches of the Greek drama alike originate in the usages of religious worship, but they never lost their formal union with it, though one of them (comedy) in its later growth abandoned all direct reference to its origin. Hellenic polytheism was at once so active and so fluid or flexible in its anthropomorphic formations, that no other religious system has ever so victoriously assimilated to itself foreign elements, or so vivaciously and variously developed its own. Thus, the worship of Dionysus, introduced into Greece by the Phœnicians as that of the tauriform sun-god whom his worshippers adored with loud cries (whence *Bacchus* or *Iacchus*), and the god of generation (whence his *phallic* emblem) and production, was brought into connection with the Dorian religion of the sun-god Apollo. Apollo and his sister, again, corresponded to the Pelasgian and Achæan divinities of sun and moon, whom the Phœnician Dionysus and Demeter superseded, or with whose worship theirs was blended. Dionysus, whose rites were specifically conducted with reference to his attributes as the wine-god, was attended by deified representations of his original worshippers, who wore the skin of the goat sacrificed to him. These were the *satyrs*. Out of the connected worships of Dionysus, Bacchus, Apollo, and Demeter sprang the beginnings of the Greek drama.

"Both tragedy and comedy," says Aristotle, "originated in a rude and unpremeditated manner,—the first from the leaders of the dithyramb, and the second from those who led off the phallic songs." This diversity of origin, and the distinction jealously maintained down to the latest times between the two branches of the dramatic art, even where they might seem to come into actual contact with one another, necessitate a separate statement as to the origin and history of either.

Origin of tragedy.

The custom of offering thanks to the gods by hymns and dances in the places of public resort was first practised by the Greeks in the Dorian states, whose whole system of life was organized on a military basis. Hence the dances of the Dorians originally taught or imitated the movements of soldiers, and their hymns were warlike chants. Such were the beginnings of the *chorus*, and of its songs (called *pæans*, from an epithet of Apollo), accompanied first by the phorminx and then by the flute. A step in advance was taken when the poet with his trained singers and dancers, like the Indian *sûtra-dhâra*, performed these religious functions as the representative of the population. From the Doric *pæan* at a very early period several styles of choral dancing formed themselves, to which the three styles of dance in scenic productions—the tragic, the comic, and the satyric—are stated afterwards to have corresponded. But none of these could have led to a literary growth. This was due to the introduction among the Dorians of the *dithyramb*,—originally a song of revellers, probably led by a flute-player and accompanied by the music of other Eastern instruments, in which it was customary in Crete to celebrate the birth of Bacchus (the doubly-born) and possibly also his later adventures. The leader of the band

Lyrical tragedy.

(*coryphæus*) may be supposed to have at times assumed the character of the wine-god, whose worshippers bore aloft the vine-clad *thyrsus*. The dithyramb was reduced to a definite form by the Lesbian Arion (fl. 610), who composed regular poems, turned the moving band of worshippers into a standing or *cyclic* chorus, invented a style of music adapted to the character of the chorus—the *tragic* or goat style—and called these songs goat-songs, or *tragedies*. Arion thus became the inventor of *lyrical tragedy*—a transition stage between the dithyramb and the regular drama. His invention, or the chorus with which it dealt, was *established* according to fixed rules by his contemporary Stesichorus. About the same time that Arion introduced these improvements into the Dorian city of Corinth, the (likewise Dorian) Families at Sicyon honoured the hero-king Adrastus by tragic choruses. Hence the invention of tragedy was ascribed by the Sicyonians to their poet Epigenes; but this step, significant for the future history of the Greek drama, of employing the Bacchic chorus for the celebration of other than Bacchic themes, was soon annulled by the tyrant Clisthenes.

The element which transformed lyrical tragedy into the tragic drama was added by the Ionians. The custom of the recitation of poetry by wandering minstrels called *rhapsodes* (from ῥάβδος, staff, or from ῥάπτω, to piece together) first sprang up in the Ionia beyond the sea; to such minstrels was due the spread of the Homeric poems and of subsequent epic cycles. These recitations, with or without musical accompaniment, soon included gnomic or didactic, as well as epic, verse; if Homer was a rhapsode, so was the sententious or "moral" Hesiod. The popular effect of these recitations was enormously increased by the metrical innovations of Archilochus (from 708), who invented the trochee and the *iambus*, the latter the arrowy metre which is the native form of satirical invective—the species of composition in which Archilochus excelled—though it was soon used for other purposes also. The recitation of these iambics may already have nearly approached to theatrical declamation. The rhapsodes were welcome guests at popular festivals, where they exercised their art in mutual emulation, or ultimately recited parts, perhaps the whole, of longer poems. The recitation of a long epic may thus have resembled theatrical dialogue; that of alternating iambic poems, the form being frequently an address in the second person, even more so. The rhapsode was in some sense an actor; and when these recitations reached Attica, they thus brought with them the germs of theatrical dialogue.

Invention of the tragic drama

The rhapsodes were actually introduced into Attica at a very early period; the *Iliad*, we know, was chanted at the Brauronia, a rural festival of Bacchus, whose worship had early entered Attica, and was cherished among its rustic population. Meanwhile the cyclic chorus of the Dorians had found its way into Attica and Athens, ever since the Athenians had recognized the authority of the great centre of the Apolline religion at Delphi. It therefore only remained for the rhapsodic and the cyclic—in other words, for the epic and the choral—elements to coalesce; and this must have been brought about by a union of the two accompaniments of religious worship in the festive rites of Bacchus, and by the domestication of these rites in the ruling city. This occurred in the time of Pisistratus, perhaps after his restoration in 554. To Thespis (535), said to have been a contemporary of the tyrant and a native of a Diacrian deme (Icaria), the invention of tragedy is accordingly ascribed. Whether his name be that of an actual person or not, his claim to be regarded as the inventor of tragedy is founded on the statement that he introduced an actor for the sake of relieving the Dionysian chorus. This actor, the representative of the rhapsodes,
and doubtless, at first, generally the poet himsel
of merely alternating his recitations with the son
chorus, addressed his speech to its leader—the *cor*
with whom he thus carried on a species of *dialog*
chorus stood round its leader upon the steps of th
altar (*thymele*), the actor was placed upon a tab
table is the predecessor of the stage, for the w
Thespis is a fiction, probably due to a confusion
his table and the waggon of Susarion. It is a s
minor invention ascribed to Thespis, that he disg
actor's face first by means of a pigment, afterw
mask. In the dialogue was treated a myth re
Bacchus or some other deity or hero. Whethe
Thespis actually wrote tragedies (and there seems
to doubt it), and although both the cyclic ch
rhapsodic recitation continued in separate use, tra
now in existence. The essential additions afterw
to its simple framework were remarkably few.
added a second actor, and by reducing the functio
chorus further established the dialogue as the prin
of the action. Sophocles added a third actor, l
change the preponderance of the dialogue w
complete.

If the origin of Greek comedy is simpler in i
than that of Greek tragedy, the beginnings of its
are involved in more obscurity. It is said to h
invented by Susarion, a native of Megaris, whos
tants were famed for their coarse humour, wh
communicated to their colonies in Sicily. In thi
to this day the home of spontaneous mimicry, co
said to have arisen. In the rural Bacchic vintag
bands of jolly companions (κῶμος, properly a r
tinued after supper) went about in carts or afoot,
the phallic emblem, and indulging in the ribald l
wanton mirth. From the song sung in these proc
at the Bacchic feasts, which combined the praise o
with gross personal ridicule, and was called *co*
secondary sense; the Bacchic reveller taking part
called a *comus*-singer or *comœdus*. These phalli
sions, which were afterwards held at Athens as in
cities, imparted their character to Old Attic come
essence was personal vilification.

Thus independent of one another in their origi
tragedy and comedy never actually coalesced. T
drama, though in some sense it partook of the
both, was in its origin as in its history conne
tragedy alone. Pratinas of Phlius, a contem
Æschylus in his earlier days, is said to have re
tragic chorus to the satyrs, *i.e.*, he first produce
the same in form and theme as the tragedies, but
the dances were different and entirely carried on l
The tragic poets, while never writing comedies, h
also composed satyr-dramas; but neither tragedies
dramas were ever written by the comic poets, and
conjunction with tragedies only that the satyr-dr
performed. The theory of the Platonic Socrates,
same man ought to be the best tragic and the b
poet, was never exemplified in practice. The
hilaro-tragedy or *tragi-comedy* of later writers, t
some of its features to have been anticipated by E
in form nowise differed from tragedy; it merely
a comic element in its characters, and invariab
happy ending. The serious and sentimental elem
comedy of Menander and his contemporaries did
to destroy the essential difference between the
branches of the Greek dramatic art.

The history of Greek—which virtually alway
Attic—tragedy divides itself into three periods.

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[1] *Alcestis; Orestes.*

riod before Æschylus (535–499).—From this
t a few names of authors and plays—those of
being (besides Thespis) Chœrilus, Phrynichus,
s, all of whom lived to contend with Æschylus
ic prize. To each of them certain innovations
l—among the rest the introduction of female
o Phrynichus.

classical period of Attic tragedy—that of
Sophocles, and Euripides, and their con-
(499–405).—To this belong all the really im-
ses in the progress of Greek tragedy, which
nnect themselves with the names of its three
rs. They may be regarded as the representa-
ferent generations of Attic history and life,
ourse in these, as in the progress of their art
e is an unbroken continuity. Æschylus
had not only fought both at Marathon and at
inst those Persians whose rout he celebrated
ic pride,[1] but he had been trained in the
nysteries, and was a passionate upholder of the
most intimately associated with the primitive
litions of the past—the Areopagus.[2] He had
 the generation after Solon, to whose maxims
lung; he must have belonged to that anti-
l party which favoured the Spartan alliance,
he Dorian development of Hellenic life and the
l system based upon it with which his religious
onvictions were imbued. Thus even upon the
which succeeded him the chivalrous spirit and
is poetry, and the unapproached sublimity of
 imagination, fell, as it falls upon later posterity,
 of a mightier age. Sophocles (495–405) was
 of Pericles, and an upholder of his authority
a consistent pupil of his political ideas; but his
d perhaps the maturity of his genius coincided
eat days when he could stand, like his mighty
he community they both so gloriously repre-
the sunny heights of achievement. Serenely
t treats the myths of the national religion in the
onscious artist, contrasting with lofty irony the
 humanity with the irresistible march of its
His art (which he described as having passed
ee successive stages) may in its perfection be
y the watchful and creative calm of his city's im-
. Euripides (480–406), as is the fate of genius
mplex kind, has been more variously and anti-
dged than either of his great fellow-tragedians.
 been called thinner and tamer than theirs, his
rical rather than poetical, his morality that of a
rit. On the other hand, he has been recognized
the most tragic of the Attic tragedians and the
tic of ancient poets, but also as the most
his social philosophy and the most various in
gical insight. At least though far removed from
ge of the national life, he is, both in patriotic
 his choice of themes, genuinely Attic; and if
unted on the stage by the dæmon of Socrates,"
 Socrates himself, the representative of an age
a seed-time as well as a season of decay. To
e general progress of dramatic literature owes
o any other ancient poet. Tragedy followed in
s in Greece and at Rome; comedy owed him
in the style of the very Aristophanes who
, and more in the sentiments of Menander;
e modern drama came to engraft the ancient
n crude growth, his was directly or indirectly
werful influence in the establishment of a living
etween them.

The great tragic masters and their contemporaries.

The incontestable pre-eminence of the three great tragic poets was acknowledged at Athens by the usage allowing no tragedies but theirs to be more than once performed, and by the law of Lycurgus (*c.* 330) which obliged the actors to use, in the case of works of the great masters, authentic copies preserved in the public archives. It is thus not impossible that the value of later Attic tragedy, of which the fertility continued considerable, has been under-rated. In all the names of 1400 tragedies and satyr-dramas are preserved; and tragic poets are mentioned of whose plays no names are known. Among the more celebrated Attic tragedians contemporary with the great writers, Ion of Chios (d. before 419) seems to have followed earlier traditions of style than Euripides; Agathon, who survived the latter, on the other hand, introduced certain innovations of a transnormal kind into the art of tragic composition.

Last period.

III. Of the *third period* of Greek tragedy the concluding limit cannot be precisely fixed. Down to the days of Alexander the Great, Athens remained the chief home of tragedy.

The successors of the great masters at Athens.

Though tragedies must have begun to be acted at the Syracusan and Macedonian courts, since Æschylus, Euripides, and Agathon had sojourned there,—though the practice of producing plays at the Dionysia before the allies of Athens must have led to their holding similar exhibitions at home,—yet before the death of Alexander we meet with no instance of a tragic poet writing or a tragedy written outside Athens. An exception should indeed be made in favour of the tyrant Dionysius of Syracuse, who (like Critias in his earlier days at Athens) was "addicted to" tragic composition. Not all the tragedians of this period, however, were Athenians born; though the names of Euphorion, the son of Æschylus, Iophon, the son of Sophocles, and Euripides and Sophocles, the nephew and the grandson respectively of their great namesakes, illustrate the descent of the tragic art as an hereditary family possession. Chæremon (fl. 380) already exhibits tragedy on the road to certain decay, for we learn that his plays were written for reading.

The Alexandrians.

Soon after the death of Alexander theatres are found spread over the whole Hellenic world of Europe and Asia—a result to which the practice of the conqueror and his father of celebrating their victories by scenic performances had doubtless contributed. Alexandria having now become a literary centre with which even Athens was in some respects unable to compete, while the latter still remained the home of comedy, the tragic poets flocked to the capital of the Ptolemies; and here, in the reign of Ptolemy Philadelphus (283–247) flourished the seven tragic poets famed as the "Pleias," who still wrote in the style and followed the rules observed by the Attic masters. Tragedy and the dramatic art continued to be favoured by the later Ptolemies; and about 100 B.C. we meet with the curious phenomenon of a Jewish poet, Ezechiel, composing Greek tragedies, of one of which (the *Exodus* from Egypt) fragments have come down to us. Tragedy, with the satyr-drama and comedy, survived in Alexandria beyond the days of Cicero and Varro, nor was their doom finally sealed till the Emperor Caracalla abolished theatrical performances in the Egyptian capital in 217 A.D.

The tragedy of the great masters.

During the whole of its productive age Greek tragedy seems to have adhered to the lines laid down by its great Attic masters; nor were these in most respects departed from by the Roman imitators of these poets and of their successors.

Subjects.

Tragedy was defined by Plato as an imitation of the noblest life. Its proper themes—the deeds and sufferings of heroes—were familiar to audiences intimately acquainted with the mythology of the national religion. To such themes Greek tragedy almost wholly confined itself; and in later days there were numerous books which discussed these myths of the tragedians. They only very exceptionally treated historic themes, though one great national calamity,[1] and a yet greater national victory,[2] and in later times a few other historical subjects,[3] were brought upon the stage. Such veiled historical allusions as critical ingenuity has sought not only in passages but in the entire themes of other Attic tragedies[4] cannot, of course, even if accepted as such, stamp the plays in which they occur as historic dramas. No doubt Attic tragedy, though after a different and more decorous fashion, shared the tendency of her comic sister to introduce allusions to contemporary events and persons; and the indulgence of this tendency was facilitated by the revision (διασκευή) to which the works of the great poets were subjected by them, or by those who produced their works after them.[5] So far as we know, the subjects of the tragedies before Æschylus were derived from the epos; and it was a famous saying of this poet that his dramas were "but dry scraps from the great banquets of Homer"—an expression which may be understood as including the poems which belong to the so-called Homeric cycles. Sophocles, Euripides, and their successors likewise resorted to the Trojan, and also to the Heraclean and the Theseau myths, and to Attic legend in general, as well as to Theban, to which already Æschylus had had recourse, and to the side or subsidiary myths connected with these several groups. These substantially remained to the last the themes of Greek tragedy, the Trojan myths always retaining so prominent a place that Lucian could jest on the universality of their dominion. Purely invented subjects were occasionally treated by the later tragedians; of this innovation Agathon was the originator.[6]

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[1] *Persæ.*

[2] *Eumenides.*

struc-

Thespis is said to have introduced the use of a *prologue* and a *rhesis* (speech)—the former being probably the opening speech recited by this solitary actor, the latter the dialogue between actor and chorus. It was a natural result of the introduction of the second actor that a second *rhesis* should likewise be added; and this tripartite division would be the earliest form of the *trilogy*,—three sections of the same myth forming the beginning, middle, and end of a single drama, marked off from one another by the choral songs. From this Æschylus proceeded to the treatment of these several portions of a myth in three separate plays, connected together by their subject and by being performed in sequence on a single occasion. This is the *Æschylean trilogy*, of which we have only one extant example, the *Oresteia*, as to which critics may differ whether Æschylus adhered in it to his principle that the strength should lie in the middle—in other words, that the interest should centre in the second play. In any case, the symmetry of the trilogy was destroyed by the practice of performing after it a satyr-drama, probably, as a rule, if not always, connected in subject with the trilogy, which thus became a *tetralogy*, though this term, unlike the other, seems to be a purely technical expression invented by the learned.[7]

Æs-
lean
gy.

tetra

Sophocles, a more conscious and probably a more critical artist than Æschylus, may be assumed from first to have elaborated his tragedies with greater care: to this, as well as to his innovation of the third actor, which materially added to the fulness of the action, we may attribute his introduction of the custom of contending for the prize with single plays. It does not follow that he never produced connected trilogies, though we have no example of such by him or any later author; on the other hand, there is no proof that either he or any of his successors ever departed from the Æschylean rule of producing three tragedies, followed by a satyr-drama, on the same day. This remained the third and last stage in the history of the construction of Attic tragedy. The tendency of its action towards complication was a natural progress, and is approved by Aristotle. This complication, in which Euripides excelled, led to his use of prologues, in which one of the characters opens the play by an exposition of the circumstances under which its action begins. This practice, though ridiculed by Aristophanes, was too convenient not to be adopted by the successors of Euripides, and Menander transferred it to comedy. As the dialogue increased in importance, so the dramatic significance of the chorus diminished. While in Æschylus it mostly, and in Sophocles occasionally, takes part in the action, its songs could not but more and more approach the character of lyrical *intermezzos*; and this they openly assumed when Agathon began the practice of inserting choral songs (*embolima*) which had nothing to do with the action of the play. In the general contrivance of their actions it was only natural that, as compared with Æschylus, Sophocles and Euripides should exhibit an advance in both freedom and ingenuity; but the palm due to a treatment at once piously adhering to the substance of the ancient legends and original in an effective dramatic treatment of them must be given to Sophocles. Euripides was, moreover, less skilful in untying complicated actions than in weaving them; hence his frequent resort[8] to the expedient of the *deus ex machina*, which Sophocles employs only in his latest play.[9]

The other distinctions to be drawn between the dramatic qualities of the three great tragic masters must be mainly based upon a critical estimate of the individual genius of each. In the characters of their tragedies, Æschylus and Sophocles avoided those lapses of dignity with which from one point of view Euripides has been charged by Aristophanes and other critics, but which from another connect themselves with his humanity. If his men and women are less heroic and statuesque, they are more like men and women. Aristotle objected to the later tragedians that, compared with the great masters, they were deficient in the drawing of character—by which he meant the lofty drawing of lofty character. In diction, the transition is even more perceptible from the "helmeted phrases" of Æschylus, who had Milton's love of long words and sonorous proper names, to the play of Euripides's "smooth and diligent tongue;" but to a sustained style even he remained essentially true, and it was reserved for his successors to introduce into tragedy the "low speech"—*i.e.*, the conversational language—of comedy. Upon the whole, however, the Euripidean diction seems to have remained the standard of later tragedy, the flowery style of speech introduced by Agathon finding no permanent favour.

Finally, Æschylus is said to have made certain reforms in tragic costume of which the object is self-evident,—to have improved the mask, and to have invented the *cothurnus* or buskin, upon which the actor was raised to ier stature. Euripides was not afraid of rags and ers; but the sarcasms of Aristophanes on this head seem ole to those who are aware that they would apply to g Lear as well as to Telephus.

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[1] Phrynichus, *Capture of Miletus*.

[2] Id., *Phœnissæ*; Æschylus, *Persæ* (*Persæ*-trilogy ?).

[3] Moschion, *Themistocles*; Theodectes, *Mausolus*; Lycophron, *Marathonii*; *Cassandrei*; *Seii*; Philiscus, *Themistocles*.

[4] Æschylus, *Septem c. Thebas*; *Prometheus Vinctus*; *Danaïs*-trilogy; Sophocles, *Antigone*; *Œdipus Coloneus*; Euripides, *Medea*.

[5] Quite distinct from this revision was the practice against which the law of Lycurgus was directed, of "cobbling and heeling" the dramas of the great masters by alterations of a kind familiar enough to the student of Shakespeare as improved by Colley Cibber. The later [illegible] appear to have occasionally transposed long speeches or [illegible] from one tragedy into another—a licence largely followed by the Roman dramatists, and called [illegible] by Latin writers.

[6] *Anthes* (*The Flower*).

[7] One satyric drama only is preserved to us, the *Cyclops* of Euripides, a dramatic version of the Homeric tale of the visit of Odysseus to Polyphemus. Lycophron, one of the poets of the Pleias, by using the satyr-drama (in his *Menedemus*) as a vehicle of personal ridicule, applied it to a purpose like that of Old Attic comedy.

[8] *Ion*; *Supplices*; *Iphigenia in Tauris*; *Electra*; *Helena*; *Hippolytus*; *Andromache*.

[9] *Philoctetes*.

The history of Greek comedy is likewise that of an entially Attic growth, although Sicilian comedy was lier in date than her Attic sister or descendant. The mer is represented by Epicharmus (fl. 500), and by the nes of one or two other poets. It probably had a orus, and, dealing as it did in a mixture of philosophical course, antithetical rhetoric, and wild buffoonery, neces- ily varied in style. Though in some respects it seems have resembled the Middle rather than the Old Attic nedy, its subjects sometimes, like those of the latter, ncided with the myths of tragedy, of which they were ubtless parodies. The so-called *mimes* of Sophron (fl. 0) were dramatic scenes from Sicilian life, intended, not the stage, but for recitation.

Attic comedy is usually divided into three periods or ecies, viz. :—

I. *Old Comedy*, which dates from the complete establish- nt of democracy by Pericles, though a comedy directed inst Themistocles is mentioned. The Megarean farcical tertainments had long spread in the rural districts of tica, and were now introduced into the city, where atinus and Crates (fl. 450) first moulded them into the ms of Attic art. The final victory of Pericles and the nocratic party may be reckoned from the ostracism of ucydides (444); and so eagerly was the season of freedom ployed by the comic poets that already four years after- rds a law—which was, however, only a short time in ce—limited their licence. Cratinus,[1] an exceedingly ld and broad satirist, apparently of conservative ten- ncies, was followed by Eupolis (446–after 415), every e of whose plays appears to have attacked some in- vidual,[2] by Phrynichus, and others; but the representative old comedy in its fullest development is Aristophanes 444–c. 380), a comic poet of unique and unsurpassed nius. Dignified by the acquisition of a chorus (though a less costly kind than the tragic) of masked actors, and scenery and machinery, and by a corresponding lite- y elaboration and elegance of style, Old Attic comedy vertheless remained true both to its origin and to the rposes of its introduction into the free imperial city. It rrowed much from tragedy, but it retained the phallic andonment of the old rural festivals, the licence of word d gesture, and the audacious directness of personal invec- n. These characteristics are not features peculiar to istophanes. He was twitted by some of the older comic ets with having degenerated from the full freedom of the t by a tendency to refinement, and he took credit to him- lf for having superseded the time-honoured *cancan* and stale practical joking of his predecessors by a nobler nd of mirth. But in boldness, as he likewise boasted, had no peer; and the shafts of his wit, though dipped wine-lees and at times feathered from very obscene fowl, w at high game.[3] He has been accused of seeking to grade what he ought to have recognized as good;[4] and it s been shown with complete success that he is not to be ten as an impartial or accurate authority on Athenian tory. But partisan as he was, he was also a genuine riot; and his very political sympathies—which were servative—were such as have often stimulated the most ective political satire, because they imply an antipathy every species of excess. Of the conservative quality of erence he was, however, altogether devoid; and his love for Athens was that of the most free-spoken of sons. Flexible even in his religious notions, he was in this as in other respects ready to be educated by his times; and, like a true comic poet, he could be witty at the expense even of his friends, and, it might almost be said, of himself. In wealth of fancy,[5] and in beauty of lyric melody, he ranks high among the great poets of all times.

The end of Old Comedy

The distinctive feature of Old, as compared with Middle Comedy, is the *parabasis*, the speech in which the chorus, moving towards and facing the audience, addressed it in the name of the poet, often abandoning all reference to the action of the play. The loss of the *parabasis* was involved in the loss of the chorus, of which comedy was deprived in consequence of the general reduction of expenditure upon the comic drama, culminating in the law of Cinesias (396).[6] But with the downfall of the independence of Athenian public life, the ground had been cut from under the feet of its most characteristic representative. The catastrophe of the city (405) had been preceded by the temporary over- throw of the democracy (411), and was followed by the establishment of an oligarchical "tyranny" under Spartan protection; and when liberty was restored (404), the citizens for a time addressed themselves to their new life in a soberer spirit and continued (or passed) the law prohibiting the introduction by name of any individual as one of the personages of a play. The change to which comedy had to accommodate itself was one which cannot be defined by precise dates, yet it was not the less inevitable in its progress and results. Comedy, in her struggle for existence, now chiefly devoted herself to literary and social themes—such as the criticism of tragic poets,[7] and the literary craze of women's rights[8]—and the transition to Middle Comedy accomplished itself. Of the later plays of Aristophanes, three[9] are without a *parabasis*, and in the last of those preserved to us[10] the chorus is quite insignificant.

Middle.

II. *Middle Comedy*, whose period extends over the remaining years of Athenian freedom, thus differed in substance as well as in form from its predecessor. It is represented by the names of thirty-seven writers (more than double the number of poets attributed to Old Comedy) among whom Eubulus, Antiphanes, and Alexis are stated to have been pre-eminently fertile and successful. It was a comedy of manners as well as character, although its ridicule of particular classes of men tended to the creation of standing types, such as parasites, courtesans, revellers, and—a favourite figure already drawn by Aristophanes[11]—the self-conceited cook. In style it necessarily inclined to become more easy and conversational; while in that branch which was devoted to the parodying of tragic myths, its purpose may have been to criticise, but its effect must have been to degrade. This species of the comic art had found favour at Athens already before the close of the great civil war; its inventor was the Thasian Hegemon, at whose *Gigantomachia* the Athenians were laughing on the day when the news arrived of the Sicilian disaster.

New.

III. *New Comedy*, which is dated from the establishment of the Macedonian supremacy (338) is merely a further development of *Middle*. If its favourite types were more numerous, including the captain (of mercenaries)—the original of a long line of comic favourites—the cunning slave, &c., they were probably also more conventional. New Comedy appears to have first constituted love intrigues the main subject of dramatic actions. The most famous of the 64 writers said to have belonged to this period of comedy were Philemon (fl. from 330), Menander (342-29),

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Archilochi.

Maricas (Hyperbolus); *Bapta* (Alcibiades); *Lacones* (Cimon), &c

Knights.

[4] *Clouds.*

[5] *Birds.*

[6] Strattis, *Choricida.*

[7] Aristophanes, *Frogs;* Phrynichus, *Musæ; Tragœdi.*

[8] Aristophanes, *Ecclesiazusæ.*

[9] *Lysistrata; Thesmophoriazusæ; Plutus II.*

[10] *Plutus.*

[11] *Æolosicon.*

and his contemporary Diphilus. Of these authors we know something from fragments, but more from their Latin adapters Plautus and Terence. As comedians of character, they were limited by a range of types which left little room for originality of treatment; in the construction of their plots they were skilful rather than varied. In style, as well as to some extent in construction, Menander took Euripides as his model, infusing into his comedy an element of moral and sentimental reflection, which refined if it did not enliven it. Yet it may be doubted whether either a high moral or a high artistic purpose animated this school of writers, and whether Epicurus in Landor's dialogue does injustice to Menander in suspecting him of "enjoying the follies of men in our rotten state as flies enjoy fruit in its decay." Fate or chance were the directing powers of his dramatic actions.

Decay of comedy.

New Comedy, and with it Greek comedy proper, is regarded as having come to an end with Posidippus (fl. c 280). Other comic writers of a later date are, however, mentioned, among them Rhinthon of Tarentum (fl. c. 300), whose mixed compositions have been called by various names, among them by that of *phlyacographies* (from *phlyax*, useless chatter). But Greek comedy ceased to be productive after it had been transplanted from Athens to Alexandria; and though even in its original form it long continued to be acted in imperial Rome, these are phases of its history which may here be passed by.

Results of religious origin of Attic drama.

The religious origin of the Attic drama impresses itself upon all its most peculiar features. Theatrical performances were held at Athens only at fixed seasons in the early part of the year—at the Bacchic festivals of the country Dionysia (vintage), the Lenæa (wine-press), probably at the Anthesteria, and above all, at the Great Dionysia, or the Dionysia *par excellence*, at the end of March and beginning of April, when in her most glorious age Athens was crowded with visitors from the islands and cities of her federal empire. As a part of religious worship, the performances took place in a sacred locality—the *Lenæum* on the south-eastern declivity of the Acropolis, where the first wine-press (*lenos*) was said to have been set up, and where now an altar of Bacchus (*thymele*) formed the centre of the theatre. For the same reason, the exhibitions claimed the attendance of the whole population, and room was therefore provided on a grand scale—according to the Platonic Socrates, for "more than 30,000" spectators. The performances lasted all day, or were at least, in accordance with their festive character, extended to as great a length as possible. To their religious origin is likewise to be attributed the fact that they were treated as a matter of state concern. The expenses of the chorus, which in theory represented the people at large, were defrayed on behalf of the state by the *liturgies* (public services) of wealthy citizens, chosen in turn by the tribes to be *choragi* (leaders, *i.e.*, providers of the chorus), the duty of training being, of course, deputed by them to professional persons (*chorodidascali*). Publicly appointed and sworn judges decided between the merits of the dramas produced in competition with one another: the successful poet, performers, and choragus were crowned with ivy, and the last-named was allowed at his own expense to consecrate a tripod in memory of his victory in the neighbourhood of the sacred Bacchic enclosure. Such a monument—one of the most graceful relics of ancient Athens—still stands in the place where it was erected, and recalls to posterity the victory of Lysicrates, achieved in the same year as that of Alexander on the Granicus. The dramatic exhibitions being a matter of religion and state, the entrance money, (*theoricum*) which had been introduced to prevent overcrowding, was from the time of Pericles provided out of the public treasury. The whole population had a right to its
Bacchic holiday; neither women, nor boys,
were excluded from theatrical spectacles at Ath

The religious character of dramatic perfor
Athens, and the circumstances under which th
ingly took place, likewise determined their e
costume and scenery. The actor's dress was
the festive Dionysian attire, of which it alway
the gay and variegated hues. The use of the
due to the actor's appearing in the open air and
tance from most of the spectators; its several sp
elaborated with great care, and adapted to the
types of theatrical character. The *cothurnus*, or
boot, which further raised the height of the tr
(while the comedian wore a thin-soled boot), wa
a relic of Bacchic costume. The scenery wa
simplicity of its original conception, suited to
performances; but in course of time the art of sc
ing came to be highly cultivated, and movable sc
contrived, together with machinery of the
kind required by the Attic drama, whether for
gods down from heaven, or for raising mortals a

On a stage and among surroundings thus co
it might seem as if little scope could have been
actor's art. But though the demands made upon
actor differed in kind even from those made
Roman successor, and still more from those
histrionic art has to meet in modern times, they
the less rigorous. Mask and buskin might in
stature, and the former might at once lend the a
expression to his appearance and the necessary
to his voice. But in declamation, dialogue,
passage, in gesticulation and movement, he
avoid the least violation of the general harmo
performance. At the same time, the refine
bye-play must, from the nature of the case,
impossible on the Attic stage; the gesticulation
been broad and massive; the movement slow
grouping hard in tragedy; and the recitation
surpassed in its weighty sameness that half-chant
the echoes have never wholly died out from
Not more than three actors, as has been seen, ap
any Attic tragedy. The actors were provided by
perhaps the performer of the first parts (*protago*
paid by the state. It was again a result of the
origin of Attic dramatic performances, and of
importance attached to them, that the actor's
was held in high esteem. These artists were as a
course free Athenian citizens, often the dramat
selves, and at times were employed in other b
the public service. In later days, when tra
migrated to Alexandria, and when theatrical
ments had spread over all the Hellenic world,
acting seems to have reached an unprecedented h
to have taken an extraordinary hold of the pu
Synods or companies of Dionysian artists aboun
were in possession of various privileges, and
instance at least (at Pergamus) of rich endowme
most important of these was the Ionic compa
lished first in Teos, and afterwards in Lebe
Colophon, which is said to have lasted longer th
a famous state. We likewise hear of strolling
performing *in partibus*. Thus it came to pass
vitality of some of the master-pieces of the Gre
is without a parallel in theatrical history; wh
actors were undoubtedly among the principal
effective agents of the spread of literary culture
a great part of the known world.

The theory and technical system of the drama
the critical powers both of dramatists, such as S
and of the greatest among Greek philosophers.

hed the subject incidentally, Aristotle has in his *Poetics* er 334) included an exposition of it, which, mutilated is, has formed the basis of all later systematic enquiries. specialities of Greek tragic dramaturgy refer above all he chorus; its general laws are those of the regular ma of all times. The theories of Aristotle and other lier writers were elaborated by the Alexandrians, many whom doubtless combined example with precept; they devoted themselves to commentaries on the old masters, h as those in which Didymus (*c.* 30 B.C.) abundantly elled, and collected a vast amount of learning on matic composition in general, which was doomed to ish, with so many other treasures, in the flames kindled religious fanaticism.

'The history of the Greek stage," says Sir Walter Scott, that of the dramatic art in general;" and herein no ubt lies the broad distinction to be drawn between the ma of the Greeks and the isolated growths previously ated in this sketch. Yet though such is the case,—though the Roman drama the native elements sink into insigni- nce when compared with those borrowed from the eks, and though the literary element in the modern ma of the West is directly or indirectly derived from same source,—the Greek drama, both tragic and comic, features of its own which it has been the principal aim the foregoing brief account of it to mark. Tragedy er lost the traces of its religious origin; and the festive poses of comedy are most signally apparent in precisely t period of its productivity whose works are least con- ial to modern feeling and taste. But such is the nderful power of the highest kind of art, that the gedy of the three great masters, though its themes are peculiar to itself that they have never been treated with same effect by the numberless writers of other peoples have essayed them, "hath ever been held the gravest, ralest, and most profitable of all other poems;" and such he commanding claim of genius, that Aristophanes, who tivated a species of comedy of an altogether eccentric d, occupies an eminence in his branch of the drama dly more contestable than that of the great tragic triad heirs. What is Hecuba to us that we should weep for ,—or Antigone that our sympathy should accompany on her holy errand, forbidden by human laws, but en- ed upon her by the behest of Zeus and of Justice lling with the gods below,—or Agamemnon that we uld thrill with horror when his cries announce the aking of his doom? Why can we laugh at the ribald artees of hide-seller and sausage-seller, careless of the its of the former of these advanced politicians, and catch ething of the dew of the rain-bringing maidens as it upon their beloved land, where the Bromian joy greets advent of spring? Because in all these instances, and every other, the art of the Greek drama, while winged the individual power of genius, is at the same time true ts purposes as an art, and in harmony with Nature, who not teach her laws or surrender her secrets of a sudden to all.

n its most productive age, as well as in the times of its line and decay, the ROMAN drama exhibits the continued xistence of native forms by the side of those imported n Greece—either kind being necessarily often subject to influence of the other. Italy has ever been the native d of acting and of scenic representation; and though nan dramatic literature is in the main but a faint reflex Greek examples, yet there is perhaps no branch of nan literary art more congenial than this to the soil nce it sprang.

Origin of its native forms.

he beginnings of dramatic performances in Italy are to ought in the rural festivities which doubtless from a very early period developed in lively intermixture the elements of the dance, of jocular and abusive improvisations of song, speech, and dialogue, and of an assumption of character such as may be witnessed in any ordinary conversation among southern Italians at the present day. The occasions of these festivities were religious celebrations, public or private—among the latter more especially weddings, which have in all ages been provocative of mirthful demonstrations. The so-called *Fescennine* verses (from *fascinum*, or from Fescennium in southern Etruria), which were afterwards confined to weddings, and ultimately gave rise to an elaborate species of artistic poetry, never merged into actual dramatic performances.

Saturæ.

In the *saturæ*, on the other hand—a name originally due to the goatskins of the shepherds, but from primitive times connected with the *fullness* of both performers and performance—there seems from the first to have been a dramatic element; they were probably comic songs or stories recited with gesticulation and flute accompaniment. Introduced into the city, these entertainments received a new impulse from the performances of the Etruscan players (*ludiones*), who had been brought into Rome when scenic games (*ludi scenici*) were, in 364 B.C., for purposes of religious propitiation, first held there.

Istriones.

These *istriones*, as they were called at Rome (*istri* had been their native name), who have had the honour of transmitting their appellation to the entire *histrionic* art and its professors, were at first only dancers and pantomimists in a city where their speech was unintelligible. But their performances encouraged and developed those of other players and mountebanks, so that after the establishment of the regular drama at Rome on the Greek model, the *saturæ* came to be performed as farcical after-pieces (*exodia*), until they gave way to other species.

Mimi.

Of these the *mimi* were at Rome probably coeval in their beginnings with the stage itself, where those who performed them were afterwards known under the same name, possibly in the place of an older appellation (*planipedes*, bare-footed) These loose farces, after being probably at first performed independently, were then played as after-pieces, till in the imperial period, when they reasserted their predominance, they were again produced by themselves. At the close of the republican period the *mimus* had found its way into literature (through D. Laberius and others), and had been assimilated in both form and subjects to other varieties of the comic drama—preserving, however, as its distinctive feature, a preponderance of the mimic or gesticulatory element. Together with the *pantomimus* (v. *infra*) the *mimus* continued to prevail in the days of the empire, having transferred its innate grossness (for it was originally a representation of low life) to its treatment of mythological subjects, with which it dealt in accordance with the demands of a "lubrique and adulterate age." As a matter of course, the *mimus* freely borrowed from other species, among which, so far as they were of native Italian origin,

Atellanæ.

the *Atellane fables* (from Atella in Campania) call for special mention. Usually supposed to be of Oscan birth, they originally consisted in delineations of the life of small towns, in which dramatic and other satire has never ceased to find a favourite butt. The principal personages in these living sketches gradually assumed a fixed and conventional character, which they retained even when, after the final overthrow of Campanian independence (210), the *Atellanæ* had been transplanted to Rome. Here the heavy father or husband (*pappus*), the ass-eared glutton (*maccus*), the full-cheeked, voracious chatterbox (*bucco*), and the wily sharper (*dorsenus*) became accepted comic types, and with others of a similar kind were handed down, to reappear in the modern Italian drama. In these characters lay the essence of the *Atellanæ*; their plots were extremely simple; the dialogue (perhaps interspersed with songs in the Saturnian metre) it was left to the performers to improvise. In course of time these plays also assumed a literary form, being written out at length by their authors; but under the empire they were gradually absorbed in the pantomimes.

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The regular Roman drama, on the other hand, was of foreign (*i.e.*, Greek) origin; and its early history, at all events, attaches itself to more or less fixed dates. It begins with the year 240 B.C., when at the *ludi Romani*, held with unusual splendour after the first Punic war, the victory was, according to Macedonian precedent, celebrated by the first production of a tragedy and a comedy on the Roman stage. The author of both, who appeared in person as an actor, was Livius Andronicus (b. 278 or earlier), a native of the Greek city of Tarentum, where the Dionysiac festivals enjoyed high popularity. His models were in tragedy the later Greek tragedians and their revisions of the three great Attic masters, in comedy no doubt Menander and his school. These continued the examples of the regular Roman drama during the whole of its course, even when it resorted to native themes.

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gedy.

The nature of Roman tragedy admits of no doubt, although our conclusions respecting its earlier progress are only derived from analogy, from scattered notices especially of the titles of plays, and from such fragments—mostly very brief—as have come down to us. Of the known titles of the tragedies of Livius Andronicus, six belong to the Trojan cycle, and this preference consistently maintained itself among the tragedians of the "Trojugenæ;" next in popularity seem to have been the myths of the house of Tantalus, of the Pelopidæ, and of the Argonauts. The distinctions drawn by later Roman writers between the styles of the tragic poets of the republican period must in general be taken on trust. The Campanian Cn. Nævius (fl. from 236) wrote comedies as well as tragedies, so that the rigorous separation observed among the Greeks in the cultivation of the two dramatic species was at first neglected at Rome. His realistic tendency, displayed in that fondness for political allusions which brought upon him the vengeance of a noble family (the Metelli) incapable of understanding a joke of this description, might perhaps under more favourable circumstances have led him more fully to develop a new tragic species invented by him. But the *fabula prætexta* or *prætextata* (from the purple-bordered robe worn by higher magistrates) was not destined to become the means of emancipating the Roman serious drama from the control of Greek examples. In design, it was national tragedy on historic subjects of patriotic interest—which the Greeks had only treated in isolated instances; and one might at first sight marvel why, after Nævius and his successors had produced skilful examples of the species, it should have failed to overshadow and outlast in popularity a tragedy telling the oft-told foreign tales of Thebes and Mycenæ, or even the pseudo-ancestral story of Troy. But it should not be forgotten to how great an extent so-called early Roman history consisted of the traditions of the *gentes*, and how little the party-life of later republican Rome lent itself to a dramatic treatment likely to be acceptable both to the nobility and to the multitude. As for the emperors, the last licence they would have permitted to the theatre was a free popular treatment of the national history; if Augustus prohibited the publication of a tragedy by his adoptive father on the subject of *Œdipus*, it was improbable that he or his successors should have sanctioned the performance of plays dealing with the earthly fortunes of Divus Julius himself, or with the story of Marius, or that of the Gracchi, or any of the other tragic themes of later republican or imperial history. The historic drama at Rome thus had no opportunity for a vigorous life, even could tragedy have severed its main course from the Greek literature of which it has been called a "free-hand copy." The *prætextæ* of which we know chiefly treat—possibly here and there helped form[1]—legends of a hoary antiquity, or celebrate ba chronicled in family or public records;[2] and in the end the species died a natural death.[3]

ætexta.

Q. Ennius (239–168), the favourite poet of the great families, was qualified by his Tarentine education, which taught the Oscan youth the Greek as well as the Latin tongue (so that he boasted "three souls"), to become the literary exponent of the Hellenizing tendencies of his age of Roman society. Nearly half of the extant names of his tragedies belong to the Trojan cycle; and Euripides was clearly his favourite source and model. M. Pacuvius (b. c. 229), like Ennius subject from his youth up to the influences of Greek civilization, and the first Roman dramatist who devoted himself exclusively to the tragic drama, was the least fertile of the chief Roman tragedians, but was regarded by the ancients as indisputably superior to Ennius. He again was generally (though not uniformly) held to have been surpassed by L. Accius (b. 170), a learned scholar and prolific dramatist, of whose plays 50 titles and a very large number of fragments have been preserved. The plays of the three last-named poets maintained themselves on the stage till the close of the republic; and Accius was quoted by the emperor Tiberius.[4] Of the other tragic writers of the republic several were *dilettanti*—such as the great orator and eminent politician C. Julius Strabo; the cultivated officer Q. Tullius Cicero, who made an attempt, disapproved by his illustrious brother, to introduce the satyr-drama into the Roman theatre; L. Cornelius Balbus, a Cæsarean partisan; and finally C. Julius Cæsar himself. Tragedy continued to be cultivated under the earlier emperors; and of one author, the famous and ill-fated L. Annæus Seneca (4 B.C.–65 A.D.), a series of works has come down to us. In accordance with the character of their author's prose-work, they exhibit a strong predominance of the rhetorical element, and a pomposity of style far removed from that of the poets Sophocles and Euripides, from whom Seneca derived his themes. The metrification of his plays is very strict, and they were doubtless intended for recitation, whether or not also designed for the stage. A few tragic poets are mentioned after Seneca, till about the reign of Domitian (81–96) the list comes to an end. The close of Roman tragic literature is obscurer than its beginning; and, while there are traces of tragic performances at Rome as late as even the 6th century, we are ignorant how long the works of the old masters of Roman tragedy maintained themselves on the stage.

It would obviously be an error to draw from the plays of Seneca—unfortunately the only examples of Roman tragedy we possess—conclusions as to the method and style of the earlier writers. In general, however, no important changes seem to have occurred in the progress of Roman tragic composition. The later Greek plays remained, so far as can be gathered, the models in treatment; and inasmuch as at Rome the single plays were performed by themselves, there was every inducement to make their action as full and complicated as possible. The dialogue-scenes (*deverbia*) appear to have been largely interspersed with musical passages (*cantica*); but the effect of the latter must have suffered from the barbarous custom of having the songs sung by boy placed in front of the flute-player (*cantor*), while the tor accompanied them with gesticulations. The chorus nlike the Greek) stood on the stage itself and seems casionally at least to have taken part in the action. But e whole of the musical element can hardly have attained so full a development as among the Greeks. The ivisions of the action appear at first to have been three; om the addition of prologue and epilogue may have arisen e invention (probably due in tragedy to Varro) of the xed number of five acts. In style, such influence as the enius of Roman literature could exercise must have been n the direction of the rhetorical and the pathetic; a surlus of energy on the one hand, and a defect of poetic richess on the other, can hardly have failed to characterize hese, as they did all the other productions of earlier Roman oetry.

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[1] Nævius, *Lupus* (*The Wolf*); *Romulus*; Ennius, *Sabinæ* (*The Sabine Women*); Accius, *Brutus*.

[2] Nævius, *Clastidium* (*Marcellus?*); Ennius, *Ambracia*; Pacuvius, *Paulus*; Accius, *Æneadæ* (*Decius?*).

[3] Balbus's *Iter* (*The Mission*), an isolated play on an episode of the Pharsalian campaign, seems to have been composed for the mere private delectation of its author and hero. *Octavia*, a late prætexta ascribed to Seneca, was certainly not written by him.

[4] "Oderint dum metuant" Atreus.

In Roman comedy two different kinds—respectively alled *palliata* and *togata* from the names of dress—were istinguished,—the former treating Greek subjects and mitating Greek originals, the latter professing a native haracter. The *palliata* sought its originals especially in New Attic comedy; and its authors, as they advanced in efinement of style, became more and more dependent upon heir models, and unwilling to gratify the coarser tastes of he public by local allusions or gross seasonings. But that kind of comedy which shrinks from the rude breath of opular applause usually has in the end to give way to less queamish rivals; and thus, after the species had been ultivated for about a century (*c.* 250–150 B.C.), *palliatæ* eased to be composed except for the amusement of small ircles, though the works of the most successful authors, lautus and Terence, kept the stage even after the establishment of the empire. Among the earlier writers of *alliatæ* were the tragic poets Andronicus, Nævius, and Ennius, but they were alike surpassed by T. Maccius lautus (254–184), nearly all of whose comedies esteemed enuine by Varro—not less than 20 in number—have been reserved. He was exclusively a comic poet, and though e borrowed his plots from the Greeks—from Diphilus and hilemon apparently in preference to the more refined enander—there was in him a genuinely national as well s a genuinely popular element. Of the extent of his riginality it is impossible to judge; probably it lies in his laboration of character and the comic details of his ialogue rather than in his plots. Modern comedy is ndebted to him in all these points; and in consequence of his fact, as well as of the attention his text has for nguistic reasons received from scholarship both ancient nd modern, his merits have met with their full share of ecognition. Statius Cæcilius (an Insubrian brought to Rome as a captive *c.* 200) stands midway between Plautus nd Terence, but no plays of his remain. P. Terentius Afer (*c.* 185–159) was, as his cognomen implies, a native f Carthage, of whose conqueror he enjoyed the patronage. His six extant comedies seem to be tolerably close renderings of their Greek originals, nearly all of which were plays f Menander. It was the good fortune of the works of erence to be preserved in an exceptionally large number f MSS. in the monastic libraries of the Middle Ages, and has (as will be seen) to become a main link between the ncient and the Christian drama. As a dramatist he is istinguished by correctness of style rather than by variety n his plots or vivacity in his characters; his chief merit—nd at the same time the quality which has rendered him o suitable for modern imitation—is to be sought in the olite ease of his dialogue. In general, the characteristics of he *palliatæ*, which were divided into five acts, are those of he New Comedy of Athens, like which they had no chorus; r purposes of explanation from author to audience the ologue sufficed; the Roman versions were probably terser than their originals, which they often altered by the process called *contaminatio*.

Togatæ.

The *togatæ*, in the wider sense of the term, included all Roman plays of native origin—among the rest the *prætextæ*, in contradistinction to which and to the transient species of the *trabeatæ* (from the dress of the knights) the comedies dealing with the life of the lower classes were afterwards called *tabernariæ* (from *taberna*, a shop), a name suited by some of their extant titles,[1] while others point to the treatment of provincial scenes.[2] The *togata*, which was necessarily more realistic than the *palliata*, and doubtless fresher as well as coarser in tone, flourished in Roman literature between 170 and 80 B.C. In this species Titinius, all whose plays bear Latin titles and were *tabernariæ*, was succeeded by the more refined L. Afranius, who, though still choosing national subjects, seems to have treated them in the spirit of Menander. His plays continued to be performed under the empire, though with an admixture of elements derived from that lower species, the pantomime, to which they also were in the end to succumb. The Romans likewise adopted the burlesque kind of comedy called from its inventor *Rhinthonica*, and by other names (*cf. ante*).

The Roman theatre.

The end of Roman dramatic literature was dilettantism and criticism; the end of the Roman drama was spectacle and show, buffoonery and sensual allurement. It was for this that the theatre had passed through all its early troubles, when the political puritanism of the old school had upheld the martial games of the circus against the enervating influence of the stage. In those days the guardians of Roman virtue had sought to diminish the attractions of the theatre by insisting upon its remaining as uncomfortable as possible; but as was usual at Rome, the privileges of the upper orders were at last extended to the population at large, though a separation of classes continued to be characteristic of a Roman audience. The first permanent theatre erected at Rome was that of Gn. Pompeius (55 B.C.), which contained nearly 18,000 seats; but even of this the portion allotted to the performers (*scæna*) was of wood; nor was it till the reign of Tiberius (22 A.D.) that, after being burnt down, the edifice was rebuilt in stone. See THEATRE.

Actors.

Though a species of amateur literary censorship, introduced by Pompeius, became customary in the Augustan age, in general the drama's laws at Rome were given by the drama's patrons—in other words, the production of plays was a matter of private speculation. The exhibitions were contracted for with the officials charged with the superintendence of public amusements (*curatores ludorum*); the actors were slaves trained for the art, mostly natives of Southern Italy or Greece. Many of them rose to reputation and wealth, purchased their freedom, and themselves became directors of companies; but though Sulla might make a knight of Roscius, and Cæsar and his friends defy ancient prejudice, the stigma of civil disability (*infamia*) continued to adhere to the profession. The actor's art was carried on at Rome under conditions differing in other respects from those of the Greek theatre. The Romans loved a full stage, and from the later period of the republic liked to see it crowded with supernumeraries. This accorded with their military instincts, and with the general grossness of their tastes, which led them in the theatre as well as in the circus to delight in spectacle and tumult, and to applaud Pompeius when he furnished forth the return of Agamemnon in the *Clytæmnestra* with a grand total of 600 heavily-laden mules. On the other hand, the actors were nearer to the spectators in the Roman theatre than in the Greek, the stage (*pulpitum*) not being separated from the first rows of the audience by an orchestra occupied by the chorus; and this led in earlier times to the absence of masks, variously-coloured wigs serving to distinguish the age of the characters. Roscius, however, is said (in consequence of an obliquity of vision disfiguring his countenance) to have introduced the use of masks; and the innovation, though disapproved of, afterwards maintained itself. The tragic actors wore the *crepida*, corresponding to the *cothurnus*, and a heavy toga, which in the *prætexta* had the purple border giving its name to the species. The conventional costumes of the various kinds of comedy are likewise indicated by their names. The comparative nearness of the actors to the spectators encouraged the growth of that close criticism of acting for which Italy has always been famous, and which manifested itself in all the ways familiar to modern audiences. Where there is criticism, devices are apt to spring up for anticipating or directing it; and the evil institution of the *claque* is modelled on Roman precedent. In fine, though the art of acting at Rome must have originally formed itself on Greek example and precept, it was doubtless elaborated with a care unknown to the greatest Attic artists. Its most famous representatives were Gallus, called after his emancipation Q. Roscius Gallus (d. c. 62 B.C.), who, like the great "English Roscius," excelled equally in tragedy and comedy, and his younger contemporary Clodius Æsopus, a Greek by birth, likewise eminent in both branches of his art, though in tragedy more particularly. Both these great actors are said to have been constant hearers of the great orator Hortensius; and Roscius wrote a treatise on the relations between oratory and acting. In the influence of oratory upon the drama are perhaps to be sought the chief among the nobler features of Roman tragedy to which a native origin may be fairly ascribed.

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[1] *Augur; Cinerarius* (*The Crimper*); *Fullonia* (*The Fuller's Trade*); *Libertus* (*The Freedman*); *Tibicina* (*The Flute-girl*).

[2] *Brundisinæ; Ferentinatis; Setina.*

The ignoble end of the Roman—and with it of the ancient classical—drama has been already foreshadowed. The elements of dance and song, never integrally united with the dialogue in Roman tragedy, were now altogether separated from it. While it became customary simply to recite tragedies to the small audiences who continued (or, as a matter of courtesy, affected) to appreciate them, the *pantomimus* commended itself to the heterogeneous multitudes of the Roman theatre by confining the performance of the actor to gesticulation and dancing, a chorus singing the accompanying text. The species was developed with extraordinary success already under Augustus by Pylades and Bathyllus; and so popular were these entertainments, that even eminent poets, such as Lucan (d. 65 A.D.), wrote the librettos for them, of which the subjects were generally mythological, only now and then historical, and chiefly of an amorous kind. A single masked performer was able to enchant admiring crowds by the art of gesticulation and movement only. In what direction this art tended, when suiting itself to the demands of a recklessly sensual age, may be gathered from the remark of one of the last pagan historians of the empire, that the introduction of pantomimes was a sign of the general moral decay of the world which began with the beginning of the monarchy. Comedy more easily lost itself in the cognate form of the *mimus*, which survived all other kinds of comic entertainments because of its more audacious immorality and open obscenity. Women took part in these performances, by means of which, as late as the 6th century, a *mima* acquired a celebrity which ultimately raised her to the imperial throne. Meanwhile the regular drama had lingered on, enjoying in all its forms imperial patronage in the days of the literary revival under Hadrian (117–138); but the perennial taste for the spectacles of the amphitheatre, which reached its climax in the days of Constantine the Great (306–337), hastened [illegible] downfall of the dramatic art in general. It was absolutely extinguished even by the irruptions of northern barbarians; but a bitter adversary had by this time risen into power. The whole authority of the Christian church had, without usually caring to distinguish between the nobler and the looser elements in the drama, involved all its manifestations in a consistent condemnation; and when the faith of that church was acknowledged as the religion of the Roman empire, the doom of the theatre was sealed. This doom was not undeserved; for the remnants of the literary drama had long been overshadowed by entertainments such as both earlier and later Roman emperors—Domitian and Trajan as well as Galerius and Constantine—had found themselves obliged to prohibit in the interests of public morality and order, by the bloody spectacles of the amphitheatre, and by the maddening excitement of the circus; the art of acting had become the pander of the lewd or frivolous itch of eye and ear; and the theatre had contributed its utmost to the demoralization of a world. The attitude taken up by the Christian church towards the stage was in general as unavoidable as its particular expressions were at times heated by fanaticism or distorted by ignorance. Had she not visited with her anathema a wilderness of decay, she could not herself have become—what she little dreamt of becoming—the nursing mother of the new birth of an art which seemed incapable of regeneration.

Though already in the 4th century actors and mountebanks had been excluded from the benefit of Christian sacraments, and excommunication had been extended to those who visited theatres instead of churches on Sundays and holidays, and though similar enactments had followed at later dates, yet the entertainments of the condemned profession had never been entirely suppressed, and had even occasionally received imperial patronage. Gradually, however, the *mimes* and their fellows became a wandering fraternity, who doubtless appeared at festivals when they were wanted and vanished again into the deepest obscurity which has ever covered that mysterious existence—a stroller's life. It was thus that these strange intermediaries of civilization carried down such traditions as survived of the acting drama of pagan antiquity into the succeeding ages.

While the scattered and persecuted strollers thus kept alive something of the popularity, if not of the loftier traditions, of their art, neither, on the other hand, was there an utter absence of written compositions to bridge the gap between ancient and modern dramatic literature. In the midst of the condemnation with which the Christian church visited the stage, its professors, and votaries, we find individual ecclesiastics resorting in their writings to both the tragic and the comic form of the ancient drama. These isolated productions, which include (in the latter part of the 4th century) the *Passion of Christ*, usually attributed to St Gregory Nazianzen, were doubtless mostly written for educational purposes, whether Euripides and Lycophron, or Menander, Plautus, and Terence served as the outward models. The same was probably the design of the famous "comedies" of Hrotsvitha, the Benedictine nun of Gandersheim, in Eastphalian Saxony, which associate themselves in the history of Christian literature with the spiritual revival of the 10th century in the days of Otto the Great. While avowedly imitated in form from the comedies of Terence, these religious exercises derive their themes—martyrdoms,[1] and miraculous or otherwise startling conversions

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[1] *Gallicanus*, Part II.; *Sapientia*.

[2] *Gallicanus*, Part I.; *Callimachus*; *Abraham*; *Paphnutius*.

ls of Christian saints. Thus from perhaps the
centuries Germany and France, and through
means of the Norman Conquest, England,
nted with what may be called the literary
a. It was no doubt occasionally performed
ı under the care of monks or nuns, or by the
selves; an exhibition of the former kind
o *Play of St Katharine*, acted at Dunstable
1110 in "copes" by the scholars of the
rey, afterwards abbot of St Albans. Nothing
t except the fact of its performance, which
ıot regarded as a novelty.
s of the cloister came in time to blend them-
ore popular forms of the early Christian
hat extent the mimes, or *joculatores* (as in
dle Ages they came to be more generally
alive the usage of entertainments more
matic than the minor varieties of their per-
cannot say; but we know that in Northern
t a very early date appropriated the begin-
ligious drama to secular uses. Doubtless in
ıd Teutonic populations there survived the
ligious rites containing dramatic elements,
n festivals, of Roman or other origin, com-
ething of their character to the Christian, at
ulatores were apt to appear. In different
entertainers suited themselves to different
th the rise of native literatures to different
cies. The literature of the *troubadours* of
h communicated itself to Spain and Italy,
isolated contact [1] with the beginnings of
rama; in Northern France the *jongleurs*, as
were now called, were confounded with the
sang the *chansons de geste* commemorative of
As appointed servants of particular house-
re here, and afterwards in England, called
om *ministeriales*) and *minstrels*. Such a
us (as he is called) was Taillefer, who rode
ght at Hastings, singing his songs of Roland
gne, and tossing his sword in the air and
in. In England such accomplished minstrels
the less versatile gleemen of pre-Norman
here as elsewhere the humbler members of
led from castle to convent, to village-green
exhibiting as *jugglers* their pantomimic and

erary and the professional element had thus
come tributaries to the main stream of the
drama, which had its source in the *liturgy*
itself. The service of the mass contains in
elements, and combines with the reading out
Scripture by the priest, its *epical* part, a
the anthems and responses of the congrega-
ry early period—certainly already in the 5th
s usual to increase the attractions of public
cial occasions by living pictures illustrating
rative and accompanied by songs; and thus
nt of action gradually introduced itself into
When the epical part of the liturgy was con-
s spectacular and to some degree mimical
lyrical accompaniment being of course
liturgical mystery—the earliest form of the
na—was in existence. This had certainly
shed as early as the 10th century, when on
ical festivals it was customary for the priests
he churches the *offices* (as they were called)
ds, the Innocents, the Holy Sepulchre, &c.,
in connection with the gospel of the day. In France in the 12th, or perhaps already in the 11th century, short Latin texts were written for these liturgical mysteries; these included passages from the popular legend of St Nicholas as well as from scriptural story. In the same century the further step was taken of composing these texts in the vernacular—the earliest example being the mystery of the Resurrection. In time a whole series of mysteries was joined together; a process which was at first roughly and then more elaborately pursued in France and elsewhere, and finally resulted in the *collective mystery*—a mere scholars' term of course, but one to which the principal examples of the English mystery-drama correspond.

The collective mystery.

Mysteries, miracles, and morals distinguished.

The productions of the mediæval religious drama it is usual technically to divide into three classes. The *mysteries* proper deal with scriptural events only, their purpose being to set forth, with the aid of the prophetic or preparatory history of the Old Testament, and more especially of the fulfilling events of the New, the central mystery of the Redemption of the world, as accomplished by the Nativity, the Passion, and the Resurrection. But in fact these were not kept distinctly apart from the *miracle-plays*, or *miracles*, which are strictly speaking concerned with the legends of the saints of the church; and in England the name *mysteries* was not in use. Of these species the miracles must more especially have been fed from the resources of the monastic literary drama. Thirdly, the *moralities*, or *moral-plays*, teach and illustrate the same truths; not, however, by direct representation of scriptural or legendary events and personages, but allegorically, their characters being personified virtues or qualities. Of the moralities the Norman *trouvères* had been the inventors; and doubtless this innovation connects itself with the endeavour, which in France had almost proved victorious by the end of the 13th century, to emancipate dramatic performances from the control of the church.

The clergy and the religious drama.

The attitude of the clergy towards the dramatic performances which had arisen out of the elaboration of the services of the church, but which soon admitted elements from other sources, was not, and could not be, uniform. As the plays grew longer, their paraphernalia more extensive, and their spectators more numerous, they began to be represented outside as well as inside the churches, and the use of the vulgar tongue came to be gradually preferred. Miracles were less dependent on this connection with the church services than mysteries proper; and lay associations, guilds, and schools in particular, soon began to act plays in honour of their patron saints in or near their own halls. Lastly, as scenes and characters of a more or less trivial description were admitted even into the plays acted or superintended by the clergy, as some of these characters came to be depended on by the audiences for conventional extravagance or fun, every new Herod seeking to out-Herod his predecessor, and the devils and their chief asserting themselves as indispensable favourites, the comic element in the religious drama increased; and that drama itself, even where it remained associated with the church, grew more and more profane. The endeavour to sanctify the popular tastes to religious uses, which connects itself with the institution of the great festival of Corpus Christi (1264, confirmed 1311), when the symbol of the mystery of the Incarnation was borne in solemn procession, led to the closer union of the dramatic exhibitions (hence often called *processus*) with this and other religious feasts; but it neither limited their range, nor controlled their development.

At times favoured, at times denounced by the clergy, dramatic entertainments thus lustily flourished for a series of centuries, in some countries more, in others less, religious in their character, and variously reinforced by the efforts

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Virgins (Provençal mystery of the 12th or 11th cenof the craftsmen of the acting profession. In France, where they had always preserved a secular side, they soonest advanced into forms connecting themselves with later growths of the drama. At Paris the fraternity of the *Bazoche* (clerks of the Parliament and the Châtelet) in 1303 acquired the right of conducting the popular festivals; but after the *Confrérie de la Passion*, who devoted themselves originally to the performance of passion-plays, had obtained a royal privilege for this purpose in 1402, the *Bazoche* gave itself up to the production of moralities. A third association, calling itself the *Enfans sans souci* (the Devil-may-cares), having about the same time acquired the right of acting *sotties*—short comic plays with allegorical figures—the other companies took a leaf out of their book, interwove their mysteries and moralities with comic scenes from popular life, and gradually began to confine themselves to secular themes. Thus the transition to the regular drama here easily prepared itself; already in 1395 we find the brethren of the *Passion* performing a serious play on the story of *Griseldis*; and among the abundant literature of *sotties* and *farces* (from Italian *farsa*, Latin *farcita*), which after mingling real types with allegorical personages had come to exclude the latter, the immortal *Maistre Pierre Patelin* (acted in 1480 by the *Bazoche*) is, however slight in plot, in all essentials a comedy. No Italian mystery has been preserved from an earlier date than 1243, about which time associations were in this country also founded for the production of religious plays. These seem to have differed little from those of Northern Europe except by a less degree of coarseness in their comic characters. Plays on Old Testament subjects were called *figure*, on New *vangeli*; in the 15th and 16th centuries they were elaborated and produced with great care, and bore various names, of which *rappresentazioni* was the most common.[1] The spectacular magnificence of theatrical displays accorded with that of the processions, both ecclesiastical and lay,—the *trionfi* as they were called in the days of Dante,—and the religious drama gradually acquired an academical character assimilating it to the classical attempts which gave rise to the regular Italian drama. The poetry of the Troubadours, which had come from Provence into Italy, here frequently took a dramatic form, and perhaps suggested his early experiments in this to Petrarch, the father of the Italian Renaissance. After his death there are traces of similar literary efforts in the *volgare Provenzale* dialect. Meanwhile remnants of the ancient popular entertainments had survived in the improvised farces acted at the courts, in the churches (*farsa spirituale*), and among the people; the Roman carnival had preserved its waggon-plays (*carri*); and numerous links remained to connect the popular modern comedy of the Italians with the *Atellanes* and *mimes* of their ancestors. In Spain, where all traces of the ancient Roman theatre (except its architectural remains) had disappeared after the Moorish conquest, the extant remains of the religious drama date from a still later period than the Italian—the 13th or 14th century. Its beginnings presented themselves in an advanced form, which aroused the opposition of the clergy, who sought to take the plays under their own control. In the secular literature of Spain nothing dramatic can be proved to have existed till the latter part of the 15th century. It had probably been customary from early times to insert in the mysteries so-called *entremeses* or interludes; but it is not till 1473 that in the couplets of *Mingo Revulgo* (*i.e.*, Domingo Vulgus, the common people), and about the same time, in another dialogue by the same author, we have attempts of a kind resembling the Italian *contrasti* (v. *infra*). In Germany, on the other hand (the history of whose drama so widely differs from that of the Spanish), religious plays were performed probably as early as the 12th century at the Christmas and Easter festivals. Other festivals were afterwards celebrated in the same way, but up to the Reformation Easter enjoyed the preference. About the 14th century miracle-plays began to be frequently performed; and as these often treated subjects of historical interest, local or other, the transition to the barren beginnings of the German historical drama was afterwards easy. Though these early German plays often have an element of the moralities, they were not as in France blended with the drolleries of the professional strollers (*fahrende Leute*), which, carried on chiefly in carnival time, gave rise to the Shrove-Tuesday plays (*Fastnachtsspiele*), scenes from common life largely interspersed with practical fun. To these last a more enduring literary form was first given in the 15th century by Hans Rosenplüt, called Schnepperer—or Hans Schnepperer, called Rosenblüt—the predecessor of Hans Sachs. By this time a connexion was establishing itself in Germany between the dramatic amusements of the people and the literary labours of the *master-singers*; but the religious drama proper survived in Catholic Germany far beyond the times of the Reformation, and was not suppressed in Bavaria and Tyrol till the end of the 18th century.[1]

Omitting any notice of traces remaining of the religious drama in other European countries, we come to our own, from whose literature a fair idea may be derived of the general character of these mediæval productions. The *miracle-plays*, *miracles*, or *plays* (these being the terms used in England) of which we hear in London in the 12th century, were probably written in Latin and acted by ecclesiastics; but already in the following century mention is made—in the way of prohibition—of plays acted by professional players. (Isolated moralities of the 12th century are not to be regarded as popular productions.) In England as elsewhere, the clergy either sought to retain their control over the religious plays, which continued to be occasionally acted in churches even after the Reformation, or else reprobated them with or without qualifications. In Cornwall miracles in the native Cymric dialect were performed at an early date; but those which have been preserved are apparently copies of English (with the occasional use of French) originals; they were represented, unlike the English plays, in the open country, in extensive amphitheatres constructed for the purpose.

The flourishing period of English miracle-plays begins with the practice of their performance by trading-companies in the towns. Of this practice Chester is said to have set the example (1268–1276); it was followed in the course of the 13th and 14th centuries by many other towns, including Wakefield, Coventry, York, Newcastle-on-Tyne, Leeds, Lancaster, Preston, Kendal, Wymondham, Dublin, and London, in which last the performers were the parish clerks. Three collections, in addition to some single examples, of such plays have come down to us—viz., the *Towneley* plays, which were probably acted at the fairs of Woodkirk, near Wakefield, and those bearing the names of *Chester* and of *Coventry*. Their dates, in the forms in which they have come down to us, are more or less uncertain, that of the *Towneley* may be even earlier than the 14th century; the *Chester* may be ascribed to the close of the 14th or the earlier part of the 15th; the body of the *Coventry* probably belongs to the 15th or 16th. Many of individual plays in these collections were doubtless ded on French originals; others are taken direct from pture, from the apocryphal gospels, or from the legends he saints. Their characteristic feature is the combina of a whole series of plays into one *collective* whole, exting the entire course of Bible history from the creation the day of judgment. For this combination it is ecessary to suppose that they were generally indebted oreign examples, though there are several remarkable cidences between the Chester plays and the French *tère du Vieil Testament.*

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[1] Such a piece was the *San Giovanni e San Paolo* (1488), by Lorenzo the Magnificent, the prince who afterwards sought to reform the Italian stage by paganizing it.

[1] The passion-play of Oberammergau, familiar in its present artistic form to so many visitors, was instituted under special circumstances in the days of the Thirty Years' War (1634). Various reasons account for its having been allowed to survive.

The manner of these plays," we read in a description of those hester, dating from the close of the 16th century, "were:— y company had his pageant, which pageants were a high scaffold two rooms, a higher and a lower, upon four wheels. In the r they apparelled themselves, and in the higher room they ed, being all open at the top, that all beholders might hear and them. The places where they played them was in every street. y began first at the abbey gates, and when the first pageant was ed, it was wheeled to the high cross before the mayor, and so very street, and so every street had a pageant playing before n at one time till all the pageants appointed for the day were ed; and when one pageant was near ended, word was brought street to street, that so they might come in place thereof, exlingly orderly, and all the streets have their pageants afore them at one time playing together; to see which plays was great t, and also scaffolds and stages made in the streets in those es where they determined to play their pageants."

Each play, then, was performed by the representative of articular trade or company, after whom it was called the ers', glovers', &c., *pageant;* while a general prologue spoken by a herald. As a rule the movable stage ficed for the action, though we find horsemen riding up the scaffold, and Herod instructed to "rage in the pond and in the strete also." There is no probability t the stage was, as in France, divided into three platforms h a dark cavern at the side of the lowest, appropriated pectively to the Heavenly Father and His angels, to nts and glorified men, to mere men, and to souls in hell. t the last-named locality was frequently displayed in the glish miracles, with or without fire in its mouth. The stumes were in part conventional,—divine and saintly rsonages being distinguished by gilt hair and beards, rod being clad as a Saracen, the demons wearing hideous ads, the souls black and white coats according to their d, and the angels gold skins and wings.

Doubtless these performances abounded in what seem to ludicrous features, and though their main purpose was ious, they were not in England at least intended to be void of fun. But many of these features are in truth ly homely and *naïf*, and the simplicity of feeling they hibit is at times not without its pathos. The occasional cessive grossness is due to an absence of refinement of ste rather than to an obliquity of moral sentiment. In s, as in other respects, the *Coventry Plays*, which were sibly written by clerical hands, show an advance upon e others. In the same plays is already to be observed an ment of abstract figures, which connects them with a fferent species of the mediæval drama.

The *moralities* corresponded to the love for moral allegory hich manifests itself in so many periods of our literature, d which, while dominating the whole field of mediæval erature, was nowhere more assiduously and effectively ltivated than in England. It is necessary to bear this in ind, in order to understand what to us seems so strange, e *popularity* of the moral-plays, which indeed never ualled that of the miracles, but sufficed to maintain the rmer species till it received a fresh impulse from the conction established between it and the "new learning," gether with the new political and religious ideas and estions, of the Reformation age. Moreover, a specially pular element was supplied to these plays, which in manner of representation differed in no essential point from the miracles, in a character borrowed from the latter, and, in the moralities, usually provided with a companion whose task it was to lighten the weight of such abstractions as Sapience and Justice. These were the Devil and his attendant the *Vice*, of whom the latter seems to have been of native origin, and, as he was usually dressed in a fool's habit, was probably suggested by the familiar custom of keeping an attendant fool at court or in great houses. The Vice had many *aliases* (*Shift, Ambidexter, Sin, Fraud, Iniquity*, &c.), but his usual duty is to torment and teaze the Devil his master for the edification and diversion of the audience. He was gradually blended with the domestic fool, who survived in the regular drama.

The Devil and the Vice.

Groups of English moralities.

The earlier English moralities[1]—from the reign of Henry VI. to that of Henry VII.—usually allegorize the conflict between good and evil in the mind and life of man, without any side-intention of theological controversy; such also is still essentially the purpose of the morality we possess by Henry VIII.'s poet, the witty Skelton,[2] and even of another, perhaps the most perfect example of its class, which in date is already later than the Reformation. But if such theology as *Every-Man* teaches is the orthodox doctrine of Rome, its successor, R. Wever's *Lusty Juventus*, breathes the spirit of the dogmatic reformation of the reign of Edward VI. Theological controversy largely occupies the moralities of the earlier part of Elizabeth's reign, and connects itself with political feeling in a famous morality,[3] Sir David Lyndsay's *Satire of the Three Estaitis*, written on the other side of the border, where such efforts as the religious drama proper had made had been extinguished by the Reformation. Only a single English political morality proper remains to us, which belongs to the beginning of the reign of Elizabeth.[4] Yet another series connects itself with the ideas of the Renaissance rather than the Reformation, treating of intellectual progress rather than of moral conduct;[5] this extends from the reign of Henry VIII. to that of his younger daughter.

Transition from the morality to the regular drama.

The transition from the morality to the regular drama in England was effected on the one hand by the intermixture of historical personages with abstractions—as in Bishop Bale's *Kyng Johan* (c. 1548)—which easily led over to the *Chronicle History;* on the other by the introduction of types of real life by the side of abstract figures. This latter tendency, of which instances occur in earlier plays, is observable in several of the 16th century moralities;[6] but before most of these were written, a further step in advance had been taken by a man of genius, John Heywood (d. 1565), whose *interludes*[7] were short farces in the French manner, dealing entirely with real—very real—men and women. Orthodox and conservative, he had at the same time a keen eye for the vices as well as the follies of his age, and not the least for those of the clerical profession. Other writers, such as T. Ingeland,[8] took the same direction; and the allegory of abstractions was thus undermined on the stage, very much as in didactic literature the ground had been cut from under its feet by the *Ship of Fooles*. Thus the *interludes*—a name which had been used for the moralities themselves from an early date—facilitated the advent of comedy, without having superseded the earlier form. Both moralities and miracle-plays survived into the Elizabethan age, after the regular drama had already begun its course.

Heywood's interludes.

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[1] *The Castle of Perseverance;* Medwall, *Nature; The World and the Child; Hycke-Scorner*, &c.

[2] *Magnyfycence.*

[3] *New Custome;* N. Woodes, *The Conflict of Conscience*, &c.

[4] *Albyon Knight.*

[5] Rastell, *Nature of the Four Elements;* Redford, *Wit and Science; The Marriage of Wit and Science.*

[6] *Jack Juggler; Tom Tiler and his Wife*, &c.

[7] *The Four P's*, &c.

[8] *The Disobedient Child.*

Such, in barest outline, was the progress of dramatic entertainments in the principal countries of Europe, before the revival of classical studies brought about a return to the examples of the classical drama, or before this return had distinctly asserted itself. It must not, however, be forgotten that from an early period in England as elsewhere had flourished a species of entertainments, not properly speaking dramatic, but largely contributing to form and foster a taste for dramatic spectacles. The *pageants*—as they were called in England—were the successors of those *ridings* from which, when they gladdened "Chepe," Chaucer's idle apprentice would not keep away; but they had advanced in splendour and ingenuity of device under the influence of Flemish and other foreign examples. Costumed figures represented before gaping citizens the heroes of mythology and history, and the abstractions of moral, patriotic, or municipal allegory; and the city of London clung with special fervour to these exhibitions, which the Elizabethan drama was neither able nor—as represented by most of its poets who composed devices and short texts for these and similar shows—willing to oust from popular favour. Some of the greatest and some of the least of our dramatists were the ministers of pageantry; and perhaps it would have been an advantage for the the future of the theatre, if the legitimate drama and the *Triumphs of Old Drapery* had been more jealously kept apart.

ageants.

he Renaissance nd the ational rama.

The literary influence which finally transformed the growths noticed above into the national dramas of the several countries of Europe, was in a word the influence of the Renaissance. Among the remains of classical antiquity which were studied, translated, and imitated, those of the drama necessarily held a prominent place. Never altogether lost sight of, they now became subjects of devoted research and models for careful copies, first in one of their own, then in modern, tongues; and these essentially literary endeavours came into more or less direct contact with, and acquired more or less control over, the already existing entertainments of the stage. Thus the stream of the modern drama, whose source and contributories have been described, was brought back into the ancient bed, from which its flow diverged into a number of national courses, unequal in impetus and strength, and varying in accordance with the manifold conditions of their progress. Of these it remains to pursue the most productive or important.

he odern lian rama.

The priority in this as in most of the other aspects of the Renaissance belongs to ITALY. In ultimate achievement, the Italian drama fell short of the fulness of the results obtained elsewhere—a surprising fact when it is considered, not only that the Italian language had the vantage-ground of closest relationship to the Latin, but that the genius of the Italian people has at all times inspired it with a predilection for the drama. The cause is doubtless to be sought in the absence from Italian national life during a long period, and more especially during that contemporary with the rise and earlier promise of Italian dramatic literature, of those loftiest and most potent impulses of popular feeling to which a national drama owes so much of its strength. This absence was due partly to the peculiarities of the Italian character, partly to the political and ecclesiastical experiences Italy was fated to undergo. The Italians were strangers to the enthusiasm of patriotism, which was as the breath in the nostrils of our Elizabethan age, as well as to the single-minded religiosity which identified Spain with the spirit of the Catholic Revival. The clear-sightedness of the Italians had something to do with this—for they were too intelligent to believe in their tyrants, and too free from illusions to deliver up their minds to their priests. The chilling and enervating effects of a pressure of foreign domination, such as no Western people with a history and a civilization like those of Italy has ever experienced, did the rest, and for many generations rendered impotent the higher efforts of the dramatic art. No basis was permanently found for a really national tragedy; while literary comedy, after turning from the direct imitation of Latin models to a more popular form, lost itself in an abandoned immorality of tone and in reckless insolence of invective against particular classes of society. Though its productivity long continued, the poetic drama more and more concentrated its efforts upon subordinate or subsidiary species, artificial in origin and decorative in purpose, and surrendered its substance to the overpowering aids of music, dancing, and spectacle. Only a single form of the Italian drama, the improvised comedy, remained truly national; and this was of its nature dissociated from higher literary effort. The revival of Italian tragedy in later times is due partly to the imitation of French models, partly to the endeavour of a brilliant genius to infuse into his art the historical and political spirit. Comedy likewise attained to new growths of considerable significance, when it was sought to accommodate its popular forms to the representation of real life in a wider range, and again to render it more poetical in accordance with the tendencies of modern romanticism.

The regular Italian drama, in both its tragic and its comic branches, began with a reproduction, in the Latin language, of classical models; but tragedy in its beginnings showed a tendency which it was before long to treat themes of national historical interest. Two earliest tragedies of which we hear, written by the Paduan historian Mussato about 1300, were both copies of Seneca; but while the one (*Achilleïs*) treated a classical theme, the other dealt with the history of a famous tyrant of the author's native city (*Eccerinis*). In the next century events of recent or contemporary history were similarly dealt with;[1] but the majority of its Latin dramas were doubtless written to suit the tastes of the friends and patrons of the Italian Renaissance, who, like Lorenzo the Magnificent, wished to domesticate the heathen gods and goddesses on a stage hitherto occupied by the sacred figures of Christian belief. Such were the Latin imitations and translations of Greek and Latin tragedies and comedies by Bishop Martirano, the friend of Lorenzo's son Pope Leo X., on the adventure of Danaë[2] and other subjects; the famous *Progne* of G. Corraro (d. 1464), the nephew of an earlier Pope; and the efforts of Pomponius Laetus, who, with the aid of Cardinal Riaro, sought to revive the ancient theatre, especially that of Plautus and Terence, at Rome. Many Latin comedies are mentioned from the 15th century, during which, as during its predecessor, Latin continued the dominant language of the stage in Italy. Nor was the representation even of Greek plays altogether unknown; it was by her performance of the *Electra* of Sophocles that Alessandra Scala caused Politian to envy Orestes.

Early in the 16th century, tragedy began to be written in the native tongue; but it retained from the first, and never wholly lost, the impress of its origin. Whatever the source of its subjects—which, though mostly of classical origin, were occasionally derived from native romance, or even due to invention—they were all treated with a predilection for the horrible, inspired by the example of Seneca, though no doubt encouraged by a perennial national taste. The chorus, stationary on the stage as in old Roman gedy, was not reduced to a merely occasional appearance ween the acts till the beginning of the 17th century, or ited altogether from the tragic drama till the earlier half the 18th. Thus the changes undergone by Italian gedy were for a long series of generations chiefly confined the form of versification and the choice of themes; nor s it, at all events till the last century of the course it s hitherto run, more than the after-growth of an after-owth. The honour of having been the earliest tragedy in lian seems to belong to Galeotto's *Sofonisba* (1502), a ce in 15 or 20 acts, regardless of unity of scene. A. da stoia's *Pamfila* (1508) followed, of which the subject was en from Boccaccio, though the names of the characters re Greek. The play usually associated with the beginning Italian tragedy—that with which "th' Italian scene first rned to glow"—was another *Sofonisba*, acted before o X. in 1515, and written in blank verse (*verso sciolto*) tead of the *ottava* and *terza rima* of the earlier trage-ns (retaining, however, the lyric measures of the orus), by Trissino, who was employed as nuncio by that pe. Other tragedies of the former half of the 16th ntury were the *Rosmunda* of Rucellai, a nephew of renzo the Magnificent (1516); Alamanni's *Antigone* 32); the *Canace* of Sperone Speroni, the envious gnus of Tasso, who, like Guarini, took Sperone's borate style for his model; the *Orazia*, the earliest matic treatment of this famous subject, of the notorious etino (1549); and the nine tragedies of G. Cinthio, ong which *L'Orbecche* (1541) is accounted the best and bloodiest. Cinthio, the author of those *Hecatommithi* which Shakespeare was indebted for so many of his sub-ts, was (supposing him to have invented these) the first lian who was the author of the fables of his own mas; he introduced some novelties into dramatic con-uction, separating the prologue and probably also the logue from the action, and has by some been regarded the inventor of the pastoral drama. In the latter half the 16th century may be mentioned the *Didone* and the *rianna* of L. Dolce, the translator of Seneca (1565); *Hadriana* (acted before 1561 or 1586) of L. Groto, ich treats the story of *Romeo and Juliet*; Tasso's *rrimondo* (1587); the *Tancredi* of Asinari (1588); and e *Merope* of Torelli (1593), the last who employed the tionary chorus (*coro fisso*) on the Italian stage. Leonico's *dato* (1550) is noticeable as supposed to have given rise the *tragedia cittadina*, or domestic tragedy, of which there e few examples in the Italian drama, and De Velo's *Tamar* 586), as written in prose. Subjects of modern historical in-rest were in this period treated only in isolated instances.[1]

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[1] Landivio, *De Captivitate Ducis Jacobi* (Jacopo Piccinino, d. [illegible]) *Tragœdia*; Verardo, *Ferdinandus* (of Aragon) *Servatus*; *Historia Baetica* (expulsion of the Moors from Granada).

[2] *Imber Aureus.*

The tragedians of the 17th century continued to pursue e beaten track, at times in vain, seeking by the intro-ction of musical airs to compromise with the danger th which their art was threatened of being (in Voltaire's rase) extinguished by the beautiful monster, the opera, w rapidly gaining ground in the country of its origin. e OPERA.) To Count P. Bonarelli (1589–1659), the hor of *Solimano*, is on the other hand ascribed the first use of the chorus in Italian tragedy. The innovation of use of rhyme attempted in the learned Pallavicino's *inegildo* (1655), and defended by him in a discourse fixed to the play, was in Italy no more than in England to achieve a permanent success; its chief repre-tative was afterwards Martelli (d. 1727), whose rhymed xandrian verse (*Martelliano*), though on one occasion d in comedy by Goldoni, failed to commend itself to popular taste. By the end of the 17th century Italian edy seemed destined to expire, and the great tragic r Cotta had withdrawn in disgust at the apathy of the public towards the higher forms of the drama. The 18th century was, however, to witness a change, the beginning of which are attributed to the institution of the Academy of the Arcadians at Rome (1690). The principal efforts of the new school of writers and critics were directed to the abolition of the chorus, and to a general increase of freedom in treatment. Before long the Marquis S. Maffei with his *Merope* (first printed 1713) achieved one of the most brilliant successes recorded in the history of dramatic literature. This play, which is devoid of any love-story, long continued to be considered the master-piece of Italian tragedy; Voltaire, who declared it "worthy of the most glorious days of Athens," adapted it for the French stage, and it inspired a celebrated production of the English drama.[2] It was followed by a tragedy full of horrors,[3] noticeable as having given rise to the first Italian dramatic *parody*; and by the highly esteemed productions of Granelli (d. 1769) and his contemporary Bettinelli. The influence of Voltaire had now come to predominate over the Italian drama; and, in accordance with the spirit of the times, greater freedom prevailed in the choice of tragic themes. Thus the greatest of Italian tragic poets, Count V. Alfieri (1749–1803), found his path prepared for him. Alfieri's grand and impassioned treatment of his subjects caused his faultiness of form, which he never altogether overcame, to be forgotten. The spirit of a love of freedom which his creations[4] breathe was the herald of the national ideas of the future. Spurning the usages of French tragedy, his plays, which abound in soliloquies, owe part of their effect to an impassioned force of declamation, part to those "points" by which Italian acting seems pre-eminently capable of thrilling an audience. He has much—besides the subjects of two of his dramas[5]—in common with Schiller; but his amazon-muse (as Schlegel called her) was not schooled into serenity, like the muse of the German poet. Among his numerous plays (21), *Merope* and *Saul*, and perhaps *Mirra*, are accounted his master-pieces.

Maffei.

Alfieri.

Tragedians since Alfieri.

The political colouring given by Alfieri to Italian tragedy reappears in the plays of U. Foscolo (*c.* 1760–1827) and A. Manzoni (1784–1873), both of whom are under the influence of the romantic school of modern literature; and to these names must be added those of S. Pellico (1789–1854) and G. B. Niccolini (1785–1861), whose most celebrated dramas[6] treat national themes familiar to all students of modern history and literature. While Italian tragedy has upon the whole adhered to its love of strong situations and passionate declamation, its later growths have shown a capability of development precluding the supposition that its history is closed. The art of tragic acting at the present day probably stands higher in Italy than in any other European country; if the tragic muse were to be depicted with the features of a living artist, it is those of Adelaide Ristori which she would assume.

Italian comedy.

popu
al forms

In comedy, the efforts of the scholars of the Italian Renaissance for a time went side by side with the progress of the popular entertainments noticed above. While the *contrasti* of the close of the 15th and of the 16th century were disputations between pairs of abstract or allegorical figures, in the *frottola* human types take the place of abstractions, and more than two characters appear. To the *farsa* (a name used of a wide variety of entertainments) a new literary as well as social significance was given by the Neapolitan court poet Sannazaro (*c.* 1492); about the same time a "*capitano valoroso*," Venturino of Pesara, first brought on the modern stage the *capitano glorioso* or *spavente*, the

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[1] Mondella, *Isifile* (1582); Fulgni, *Bragadino* (1589).

[2] Home, *Douglas*.

[3] Lazzaroni, *Ulisse il Giovane* (1719).

[4] *E.g.*, *Bruto I.* and *II.*

[5] *Filippo*; *Maria Stuarda*.

[6] Pellico, *Francesca da Rimini*; Niccolini, *Giovanni da Procida*; *Beatrice Cenci*.

Commedia dell'arte.

Masked comedy.

military braggart who owed his origin both to Plautus[1] and to the Spanish officers who abounded in the Italy of those days. The popular character-comedy, a relic of the ancient *Atellanes*, likewise took a new lease of life—and this in a double form. The *improvised* comedy (*commedia a sogetto*) was now as a rule performed by professional actors, members of a *craft*, and was thence called the *commedia dell'arte*, which is said to have been invented by Francesco (called Terenziano) Cherea, the favourite player of Leo X. Its scenes, still unwritten except in skeleton (*scenario*), were connected together by the ligatures or links (*lazzi*) of the *arlecchino*, the descendant of the ancient Roman *sannio* (whence our *zany*). Harlequin's summit of glory was probably reached early in the 17th century, when he was ennobled in the person of Cecchino by the Emperor Matthias; of Cecchino's successors Zaccagnino and Truffaldino, we read that "they shut the door in Italy to good harlequins." Distinct from this growth is that of the *masked* comedy, the action of which was chiefly carried on by certain typical figures in masks, speaking in local dialects,[2] but which was not improvised, and indeed from the nature of the case hardly could have been. Its inventor was A. Beolco of Padua, who called himself Ruzzante (joker), and who published six comedies in various dialects, including the Greek of the day (1530). This was the masked comedy to which the Italians so tenaciously clung, and in which, as all their own and inimitable by no other nation, they took so great a pride that even Goldoni was unable to overthrow it.

Early Italian regular comedy.

Ariosto

Meanwhile the Latin imitations of Roman, varied by occasional translations of Greek, comedies early led to the production of Italian translations, several of which were performed at Ferrara in the 15th century, and before its close to the composition of what is regarded as the first original Italian comedy—in other words, as the first of the modern drama. But the claim to this honour of Boiardo's *Timone* (before 1494) is doubtful—not in time,[3] but because this play is only in part original, being founded upon, and in a great measure taken from, a dialogue of Lucian's; since moreover its personages are abstractions, it represents at most the transition from the moralities. The "first Italian comedy in verse," Ricchi's *I Tre Tiranni* (before 1530), is likewise a morality, and Trissino's comedy, which followed, a mere adaptation of the *Menæchmi* of Plautus. About this time, however, the *commedia erudita*, or scholarly comedy, began to be cultivated by a succession of eminent writers, among whom the title of the father of modern comedy, if it belongs to any man, belongs to Ariosto (1474–1533). His comedies (though the first two were originally written in prose) are in blank verse, to which he gave a singular mobility by the dactylic ending of the line (*sdrucciolo*). Ariosto's models were the masterpieces of the *palliata*, and his morals those of his age, which equalled those of the worst days of ancient Rome or
Byzantium in looseness, and surpassed them in
He chose his subjects accordingly; but hi
genius displayed itself in the effective drawin
acter,[4] and more especially in the skillfu
ment of complicated intrigues.[5] Such, with an
brilliancy of wit and lasciviousness of tone, a
the characteristics of Machiavelli's (1469–15
prose comedy, the *Mandragola* (*The Magic Drau*
in their climacteric, of the plays of P. Aretino (14
especially the prose *Marescalco*, whose name, i
said, ought to be written in asterisks. Other co
the 16th century were B. Accolti, whose *Virgi*
before 1513) treats the story from Boccac
reappears in *All's Well that Ends Well*; G. B.
J. Nardi, noteworthy as decent and moral in
tendency; G. Cecchi, F. d'Ambra, A. F. Grazzini
or Secchi, and L. Dolce—all writers of romant
of intrigue in verse or prose.

During the same century the *pastoral drama*
in Italy. The origin of this peculiar species—
the bucolic idyll in a dramatic form, and which
itself to the introduction of both mytholo
allegorical elements—was purely literary, and aro
out of the classical studies and tastes of the R
Its first example was the renowned scholar A.
Orfeo (1472), which begins like an idyll and
tragedy. Intended to be performed with musi
pastoral drama is the parent of the opera—thi
work tells its story simply. N. da Correggio's (1
Cefalo, or *Aurora*, and others followed, before
Beccari produced, as totally new of its kind, his
pastoral drama *Il Sagrifizio*, in which the comi
predominates. But an epoch in the history of t
is marked by the *Aminta* of Tasso (1573), in who
is allegorically mirrored the Ferrara court. A
choral lyrics of great beauty, it presents an
treatment of a social and moral problem; and sin
ception of the characters, all of whom think and
nothing but love, is artificial, the charm of the
not in the interest of its action, but in the p
sweetness of its sentiment. This work was the
many others, and the pastoral drama reached its
popularity in the famous *Pastor Fido* (written be
of B. Guarini, which, while founded on a tragic
introduces into its complicated plot a comic elem
with a satirical intention. Thus, both in Itali
other literatures, the pastoral drama became
species, characterized like the great body o
pastoral poetry in general by a tendency eith
the artificial or towards the burlesque. Its
affected the entire growth of Italian comedy,
the *commedia dell'arte*, and impressed itself in
fied form upon the opera. (See OPERA). Th
Italian masters of the last-named species, so fa
claim to be included in the poetic drama, wer
(1668–1750) and P. Metastasio (1698–1782).

The comic dramatists of the 17th century a
as followers of the classical and of the roman
G. B. Porta and G. A. Cicognini (whom Goldoni
as full of whining pathos and common place d
as still possessing a great power to interest) bein
as the leading representatives of the former. B
of these largely intermixed groups of writers
all its fertility, prevail against the competition
hand of the musical drama, and on the other of t
farcical entertainments and of those introduced

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[1] Pyrgopolinices in the *Miles Gloriosus*.

[2] The masked characters, each of which spoke the dialect of the place he represented, were (according to Baretti) *Pantalone*, a Venetian merchant; *Dottore*, a Bolognese physician; *Spaviento*, a Neapolitan braggadocio; *Pullicinella*, a wag of Apulia; *Giangurgulo* and *Coviello*, clowns of Calabria; *Gelsomino*, a Roman beau; *Brighella*, a Ferrarese pimp; and *Arlecchino*, a blundering servant of Bergamo. Besides these and a few other such personages (of whom four at least appeared in each play), there were the *Amorosos* or *Innamoratos*, men or women (the latter not before 1560, up to which time actresses were unknown in Italy) with serious parts, and *Smeraldina*, *Colombina*, *Spilletta*, and other *servettas* or waiting-maids. All these spoke Tuscan or Roman, and wore no masks.

[3] Boiardo died in 1494, in or after which year Nardi's *Amicizia* was written; while Dovizio's (afterwards Cardinal of Bibbiena) disreputable but entertaining *Calandra*, a prose comedy, which protests that it is not taken from Plautus, is thought to have been composed not long before its representation in 1508.

[4] *La Lena; Il Negromanta.* [5] *La Cassaria; I*

[6] Of Machiavelli's other comedies one is in verse, the o
adaptations from Plautus and Terence, are in prose.

tion of Spanish examples. Italian comedy had fallen into decay, when its reform was undertaken by the wonderful theatrical genius of C. Goldoni (1707-1793). One of the most fertile and rapid of playwrights (of his 150 comedies 16 were written and acted in a single year), he at the same time pursued definite aims as a dramatist. Disgusted with the conventional buffoonery, and ashamed of the rampant immorality, of the Italian comic stage, he drew his characters from real life, whether of his native city (Venice)[1] or of society at large, and sought to enforce virtuous and pathetic sentiments without neglecting the essential objects of his art. Happy and various in his choice of themes, he produced, besides comedies of general human character,[2] plays on subjects drawn from literary biography[3] or from fiction.[4] Goldoni, whose style was considered defective by the purists whom Italy has at no time lacked, met with a severe critic and a temporarily successful rival in Count C. Gozzi (1722-1806), who sought to rescue the comic drama from its association with the real life of the middle classes, and to infuse a new spirit into the figures of the old masked comedy by the invention of a new species. His themes were taken from Neapolitan[5] and Oriental[6] fairy tales, to which he accommodated some of the standing figures upon which Goldoni had made war. This attempt at mingling fancy and humour—occasionally of a directly satirical turn[7]—was in harmony with the tendencies of the modern romantic school, and Gozzi's efforts, which though successful found hardly any imitators in Italy, have a family resemblance to those of Tieck. During the latter part of the 18th and the early years of the present century comedy continued to follow the course marked out by its acknowledged master Goldoni, under the influence of the sentimental drama of France and other countries. Villi, Nelli, the Marquis Albergati Capacelli, Sografi, Federici, and Signorelli (the historian of the drama) are mentioned among the writers of this school; to the present century belong Count Giraud, Marchisio (who took his subjects especially from commercial life), and Nota, a fertile writer, among whose plays are three treating the lives of poets. Of still more recent date are Bon and Brofferio. Though no recent Italian comedies have acquired so wide a celebrity as that which has been obtained by the successful productions of the recent French stage, there seems no reason to predict a barren future for Italian comedy any more than for Italian tragedy. Both the one and the other have survived periods of a seemingly hopeless decline; tragedy has been rescued from the pedantry of a timid classicism, and comedy from the conventionalism of its most popular but least progressive form; and neither the opera nor the ballet has succeeded in ousting from the national stage the legitimate forms of the national drama.

To the above summary of the history of the modern Italian drama it would not have been inappropriate to append a brief account of that of the MODERN GREEK. The dramatic literature of the later Hellenes is a creation of the literary movement which preceded their glorious struggle for independence, or which may be said to form part of that struggle. After beginning with dramatic dialogues of a patriotic tendency, it took a step in advance with the tragedies of J. R. Nerulos[8] (1778-1850), whose name belongs to the political as well as to the literary history of his country. His comedies—especially one directed against the excesses of journalism[9]—largely contributed to open a literary life for the modern Greek tongue. Among the earlier patriotic Greek dramatists of the present century are T. Alkæos, J. Zampelios (whose tragic style was influenced by that of Alfieri),[10] S. K. Karydis, and A. Valaoritis. A. Zoiros[11] is noteworthy as having introduced the use of prose into Greek tragedy, while preserving to it that association with sentiments and aspirations which will probably long continue to pervade the chief productions of modern Greek literature. The love of the theatre is ineradicable from Attic as it is from Italian soil; and the tendencies of the young dramatic literature of Hellas seem to justify the hope that a worthy future awaits it.

Spanish drama.

Italy produced many brilliant growths, from which the dramatic literatures of other nations largely borrowed; but SPAIN is the only country of modern Europe which shares with England the honour of having achieved, at a relatively early date, the creation of a genuinely national form of the regular drama. So proper to Spain was the form of the drama which she produced and perfected, that to it the term *romantic* has been specifically applied, though so restricted a use of the epithet is clearly unjustifiable. The influences which from the Romance peoples—in whom Christian and Germanic elements mingled with the legacy of Roman law, learning, and culture—spread to the Germanic nations were represented with the most signal force and fulness in the institutions of chivalry,—to which, in the words of Scott, "it was peculiar to blend military valour with the strongest passions which actuate the human mind, the feelings of devotion and those of love." These feelings, in their combined operation upon the national character, and in their reflection in the national literature, were not peculiar to Spain; but nowhere did they so long or so late continue to animate the moral life of a nation. Outward causes contributed to this result. For centuries after the crusades had become a mere memory, Spain was a battle ground between the cross and the crescent. And it was precisely at the time when the Renaissance was establishing new starting-points for the literary progress of Europe, that Christian Spain rose to the height of Catholic as well as national self-consciousness by the expulsion of the Moors and the conquest of the New World. From their rulers or rivals of so many centuries the Spaniards had derived that rich glow of colour which became permanently distinctive of their national-life, and more especially of its literary and artistic expressions; they had also perhaps derived from the same source an equally characteristic refinement in their treatment of the passion of love. The ideas of Spanish chivalry—more especially religious devotion and a punctilious sense of personal honour—asserted themselves (according to a process often observable in the history of civilization) with peculiar distinctness in literature and art, after the great achievements to which they had contributed in other fields had already been wrought. The ripest glories of the Spanish drama belong to an age of national decay—mindful, it is true, of the ideas of a greater past. The chivalrous enthusiasm pervading so many of the master-pieces of its literature is indeed a characteristic of the Spanish nation in all, even in the least hopeful, periods of its later history; and the religious ardour breathed by these works, though associating itself with what is called the Catholic Reaction, is in truth only a manifestation of the spirit which informed the noblest part of the Reformation movement itself. The Spanish drama neither sought nor could seek to emancipate itself from views and forms of religious life more than ever sacred to the Spanish people since the glorious days of Ferdinand and Isabella; and it is not in the beginnings but in the great age of Spanish dramatic literature that there is often most difficulty in distinguishing between what is to be termed a religious and what a secular play. After Spain had thus, the first after England among modern European countries, fully unfolded that incomparably richest expression of national life and sentiment in an artistic form—a truly national dramatic literature,—the terrible decay of her greatness and prosperity gradually impaired the strength of a brilliant but, of its nature, dependent growth. In the absence of high original genius the Spanish dramatists began to turn to foreign models, though little supported in such attempts by popular sympathy; and it is only in more recent times that the Spanish drama has sought to reproduce the ancient forms from whose master-pieces the nation had never become estranged, while accommodating them to tastes and tendencies shared by later Spanish literature with that of Europe at large.

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[1] *Momolo Cortesan* (*Jerome the Accomplished Man*); *La Bottega del Caffè*, &c.

[2] *La Vedova Scaltra* (*The Cunning Widow*); *La Putta Onorata* (*The Respectable Girl*); *La Buona Figlia*; *La B. Sposa*; *La B. Famiglia*; *La B. Madre* (the last of which was unsuccessful; "goodness," says Goldoni, "never displeases, but the public weary of everything"), &c.; and *Il Burbero Benefico* called in its original French version *Le Bourru Bienfaisant*.

[3] *Molière*; *Terenzio*; *Tasso*.

[4] *Pamela*; *Pamela Maritata*; *Il Filosofo Inglese* (*Mr Spectator*).

[5] *L'Amore delle tre Melarance* (*The Three Lemons*); *Il Corvo*.

[6] *Turandot*; *Zobeide*.

[7] *L'Amore delle tre M.* (against Goldoni); *L'Angellino Belverde* (*The Small Green Bird*), (against Helvetius, Rousseau, and Voltaire).

[8] *Aspasia*; *Polyxena*.

[9] *Ephemeridophobos*.

[10] *Timoleon*; *Konstantinos Palæologos*; *Rhigas of Pheræ*.

[11] *The Three Hundred*, or *The Character of the Ancient Hellenes* (Leonidas); *The Death of the Orator* (Demosthenes); *A Scion of Timoleon*, &c.

Early efforts

The earlier dramatic efforts of Spanish literature may without inconvenience be briefly dismissed. The reputed author of the *Coplets of Mingo Revulgo* (R. Cota the elder) likewise composed the first act of a story of intrigue and character, purely dramatic but not intended for representation. This tragic comedy of *Calisto and Melibœa*, which was completed (in 21 acts) by 1499, afterwards became famous under the name of *Celestina*; it was frequently imitated and translated, and was adapted for the Spanish stage by R. de Zepeda in 1582. But the father of the Spanish drama was J. de la Enzina (b. c. 1468), whose *representaciones* under the name of "eclogues" were dramatic dialogues of a religious or pastoral character. His attempts were imitated more especially by Gil Vicente (fl. 15[illegible]–15[illegible]), a Portuguese who wrote both in Spanish and in his native tongue—the dramatic literature of which is said to have produced nothing of equal merit afterwards. (The [illegible] literary drama is held to have begun with the [illegible] of Vicente's contemporary, F. de Sa de Miranda.) A further impulse came, as was natural, from Spaniards [illegible] in Italy, and especially from B. de T. Naharro, who in [illegible] published, as the chief among the "firstlings [illegible]" (*Propaladia*), a series of eight [illegible] generally applied in Spanish literature to [illegible] of drama. He claimed some knowledge of the [illegible] of the ancient drama, divided his plays into [illegible] and [illegible] them with an [illegible] their subjects, and [illegible] as well as [illegible] Inquisi- [illegible]

Gil Vicente [illegible]

[illegible]

sketched the humble resources which were at the command of Lope de Rueda (fl. 1544–1567), a mechanic of Seville, who with his friend the bookseller Timoneda, and two brother authors and actors in his strolling company, succeeded in bringing dramatic entertainments out of the churches and palaces into the public places of the towns, where they were produced on temporary scaffolds. The manager carried about his properties in a corn sack; and the "comedias" were still only "dialogues, and a species of eclogues between two or three shepherds and a shepherdess," enlivened at times by intermezzos of favourite comic figures, such as the negress or the Biscayan, "played with inconceivable talent and truthfulness by Lope." One of his plays at least,[3] and one of Timoneda's,[4] seem to have been taken from an Italian source; others mingled modern themes with classical apparitions;[5] one of Timoneda's was (perhaps again through the Italian) from Plautus.[6] Others of a slighter description were called *pasos*,—a species afterwards termed *entremeses* and resembling the modern French *proverbes*. With these popular efforts of Lope de Rueda and his friends a considerable dramatic activity began in the years 1560–1590 in several Spanish cities, and before the close of this period permanent theatres began to be fitted up at Madrid. Yet Spanish dramatic literature might still have been led to follow Italian in turning to an imitation of classical models. Two plays by G. Bermudez (1577), called by their learned author "the first Spanish tragedies," treating the national subject of Inez de Castro, but divided into five acts, composed in various metres, and introducing a chorus; a *Dido* (c. 1580) by C. de Virues (who claimed to have first divided dramas into three *jornadas*); and the tragedies of L. L. de Argensola (acted 1585, and praised in *Don Quixote*) alike pointed in this direction.

Such were the alternatives which had opened for the Spanish drama, when at last, about the same time as that of the English, its future was determined by writers of original genius. The first of these was the immortal Cervantes, who, however, failed to anticipate by his earlier plays (1584–1588) the great (though to him unproductive) success of his famous romance. In his endeavour to give a poetic character to the drama he fell upon the expedient of introducing personified abstractions speaking a "divine" or elevated language—a device which was for a time favourably received. But these plays exhibit a neglect or ignorance of the laws of dramatic construction; their action is episodical; and it is from the realism of these episodes (especially in the *Numancia*, which is crowded with both figures and incidents), and from the power and flow of the declamation, that their effect must have been derived. When in his later years (1615) Cervantes returned to dramatic composition, the style and form of the national drama had been definitively settled by a large number of writers, the brilliant success of whose acknowledged chief may previously have diverted Cervantes from his labours for the theatre. His influence upon the general progress of dramatic literature is, however, to be sought, not only in his plays, but also in those *novelas* [illegible] to which more than one drama is indebted for its plot, and for much of its dialogue to boot.

Lope de Vega (1562–1635), one of the most astonishing [illegible] the world has known, permanently established [illegible] national forms of the Spanish drama. Some of these [illegible] their beginnings taken over by him from ruder [illegible]; some were cultivated with equal or even [illegible] by subsequent authors; but in variety, as [illegible] of dramatic production, he has no rivals. He

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[3] [illegible] Ingannati).

[4] *Cornelia* (*Il Negromante*).

[5] [illegible] Medora, and Neptune as *deus ex machina* —

[illegible]

[6] *Menennos*.

ı was such that he wrote about 1500 plays,
ramatic works classed as *autos sacramentales*
, and a vast series of other literary composi-
sputably prejudiced his reputation with those
is but a name and a number. Yet as a
e more fully exemplifies the capabilities of
heatre than any of his successors, though as
n may deserve the palm. Nor would it be
agine a truer representative of the Spain of
. poet who, after suffering the hardships of
ile, and the pangs of passion, sailed against
e faith in the Invincible Armada, subse-
e a member of the Holy Inquisition and of
t Francis, and after having been decorated by
the cross of Malta and a theological doctorate,
e nobility, and idolized by the nation, ended
s of Jesus and Mary on his lips. From the
ı writer we may best learn the manners and
s, the ideas of religion and honour, of the
Philippine age, the age when she was most
he eyes of Europe and most glorious in her
ith all its inventiveness and vigour, the
primarily set itself the task of pleasing his
ery spirit of whose inner as well as outer life
mirrored in his dramatic works. In them
e words of Lope's French translator Baret,
nt, the clamour, the conflict of unforeseen
able to unreflecting spectators; perpetual
essed to an unextinguishable national pride;
of passions dear to a people never tired of
f; the absolute sway of the point of honour;
n of revenge; the adoration of symbols;
d burlesque, everywhere beloved of the
t here never defiled by obscenities, for this
sense of delicacy, and the foundation of its
bility; lastly, the flow of proverbs which at
from the *gracioso*" (the comic servant
in the Spanish drama by Lope)—"the com-
ature of those who possess no other."
of Lope, and those of the national Spanish
neral, are divided into classes which it is
always easy, and which there is no reason
m always to have intended, to keep distinct
other. After in his early youth composing
oral plays, and allegorical moralities in the
began his theatrical activity at Madrid about
e plays which he thenceforth produced have
ted under the following heads. The *comedias*,
are in verse, include (1) the so-called *c. de*
—not comedies proper, but dramas the prin-
ges in which are taken from the class of society
cloak and sword. Gallantry is their main
eresting and complicated, but well-constructed
ous intrigue their chief feature; and this is
panied by an underplot in which the *gracioso*
. Their titles are frequently taken from the
or proverbial phrases of the people,[1] upon the
sted by which the plays often (as Mr Lewes
presses it) constitute a kind of gloss (*glosa*) in
is the favourite species of the national
tre; and to the plots of the plays belonging to it
other nations owes a debt almost incalculable
2) The *c. heróicas* are distinguished by some of
ges being of royal or very high rank, and by
being often historical and largely[2] (though not
invariably[3]) taken from the national annals, or founded on contemporary or recent events.[4] Hence they exhibit a greater gravity of tone; but in other respects there is no difference between them and the cloak and sword comedies with which they share the element of comic underplots. Occasionally Lope condescended in the opposite direction, to (3) plays of which the scene is laid in common life, but for which no special name appears to have existed.[5]

Religious

Comedias de santos.

Autos sacramentales.

Entremeses.

Meanwhile, both he and his successors were too devoted sons of the church not to acknowledge in some sort her claim to influence the national drama. This claim she had never relinquished, even when she could no longer retain an absolute control over the stage. For a time, indeed, she was able to reassert even this; for the exhibition of all secular plays was in 1598 prohibited by the dying Philip II., and remained so for two years; and Lope with his usual facility proceeded to supply religious plays of various kinds. After a few dramas on scriptural subjects he turned to the legends of the saints; and the *comedias de santos*, of which he wrote a great number, became an accepted later Spanish variety of the miracle-play. True, however, to the popular instincts of his genius, he threw himself with special zeal and success into the composition of another kind of religious plays—a development of the Corpus Christi pageants, in honour of which all the theatres had to close their doors for a month. These were the famous *autos sacramentales* (*i.e.*, solemn "acts" or proceedings in honour of the Sacrament), which were performed in the open air by actors who had filled the cars of the sacred procession. Of these Lope wrote about 400. These entertainments were arranged on a fixed scheme, comprising a prologue in dialogue between two or more actors in character (*loa*), a farce (*entremes*), and the *auto* proper, an allegorical scene of religious purport, as an example of which Ticknor cites the *Bridge of the World*,—in which the Prince of Darkness in vain seeks to defend the bridge against the Knight of the Cross, who finally leads the Soul of Man in triumph across it. Not all the *entremeses* of Lope and others were, however, composed for insertion in these *autos*. This long-lived popular species, together with the old kind of dramatic dialogue called *eclogues*, completes the list of the varieties of his dramatic works.

The school of Lope.

The example of Lope was followed by a large number of writers, and Spain thus rapidly became possessed of a dramatic literature almost unparalleled in quantity—for in fertility also Lope was but the first among many. Among the writers of Lope's school, his friend G. de Castro (1569–1631) must not be passed by, for his *Cid*[6] was the basis of Corneille's; nor J. P. de Montalvan (1612–1638), "the first-born of Lope's genius," the extravagance of whose imagination, like that of Lee, culminated in madness. Soon after him died (1639) Ruiz de Alarcon, in whose plays, as contrasted with those of Lope, has been recognized the distinctive element of a moral purpose. To G. Tellez, called Tirso de Molina (d. 1648), no similar praise seems due; but the frivolous gaiety of the inventor of the complete character of Don Juan was accompanied by ingenuity in the construction of his excellent[7] though at times "sensational"[8] plots. F de Roxas y Zorilla (b. 1607), who was largely plundered by the French dramatists of the latter half of the century, survived Molina for about a generation. In vain scholars

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le Madrid (*The Steel Water of Madrid*); *Dineros son*
e Dog in the Manger), &c.
a de Sevilla (*The Star of Seville*, *i.e.*, Sancho the Brave);
do (Columbus), &c.

[3] *Roma Abrasada* (*R. in Ashes*—Nero).

[4] *Arauco Domado* (*The Conquest of Arauco*, 1560).

[5] *La Moza de Cantaro* (*The Water-maid*).

[6] *Las Mocedades* (*The Youthful Adventures*) *del Cid*.

[7] *Don Gil de las Calzas Verdes* (*D. G. in the Green Breeches*)

[8] *El Burlador de Sevilla y Convivad de Pierra* (*The Deceiver of Seville*, *i.e.*, Don Juan, *and the Stone Guest*)

of strictly classical tastes protested in essays in prose and verse against the ascendency of the popular drama: the prohibition of Philip II. had been recalled two years after his death and was never renewed: and the activity of the theatre spread through the towns and villages of the land, everywhere under the controlling influence of the school of writers who had established so complete a harmony between the drama and the tastes and tendencies of the people.

Calderon. The glories of Spanish dramatic literature reached their height in P. Calderon de la Barca (1600–1681), though in the history of the Spanish theatre he holds only the second place. He elaborated some of the forms of the national drama, but brought about no changes of moment in any of them. Even the brilliancy of his style, glittering with a constant reproduction of the same family of tropes, and the variety of his melodious versification, are mere intensifications of the poetic qualities of Lope, while in their moral and religious sentiments, and their general views of history and society, there is no difference between the two. Like Lope, Calderon was a soldier in his youth and an ecclesiastic in his later years; like him he suited himself to the tastes of both court and people, and applied his genius with equal facility to the treatment of religious and of secular themes. In fertility he was inferior to Lope (for he wrote not many more than 100 plays); but he surpasses the elder poet in richness of style, and more especially in fire of imagination. In his *autos* (of which he is said to have left not less than 73), Calderon probably attained to his most distinctive excellence; some of these appear to take a wide range of allegorical invention,[1] while they uniformly possess great beauty of poetical detail. Other of his most famous or interesting pieces are *comedias de santos*.[2] In his secular plays Calderon treats as wide a variety of subjects as Lope, but it is not a dissimilar variety; nor would it be easy to decide whether a poet so uniformly admirable within his limits has achieved greater success in romantic historical tragedy,[3] in the comedy of amorous intrigue,[4] or in a dramatic work combining fancy and artificiality in such a degree that it has been diversely described as a romantic caprice and as a philosophical poem.[5]

Contemporaries of Calderon During the life of the second great master of the Spanish drama there was little apparent abatement in the productivity of its literature; while the *autos* continued to flourish in Madrid and elsewhere, till in 1765 (shortly before the expulsion of the Jesuits from Spain) their public representation was prohibited by royal decree. In the world of fashion, the opera had reached Spain already during Calderon's lifetime, together with other French influences, and the great dramatist had himself written one or two of his plays for performance with music. But the regular national drama continued to command popular favour; and with A. Moreto (1618–1669) may be said to have even taken a fresh step.

Moreto and the comedias de figuron. While he wrote in all the forms established by Lope and cultivated by Calderon, his manner seems most nearly to approach the master-pieces of French and later English comedy of character; he was the earliest writer of the *comedias de figuron*, in which the most prominent personage is (in Congreve's phrase) "a character of affectation," in other words, the Spanish fop of real life.[6] His master-piece, a favourite of many stages, is one of the most graceful and pleasing of modern comedies—simple but interesting in plot, and true to nature, with something like Shakespearean truth.[7] Other writers trod

more closely in the footsteps of the masters with
ing any noticeable changes in the form of th
drama; even the *saynete* (tit-bit), which owes i
Benavente (fl. 1645), was only a kind of *entre*
Spanish drama in all its forms retained its comr
the nation, because they were alike popular in
character; nor is there any other example of s
an adaptation of a national art to the national
sentiment in its ethics and æsthetics, in the nat
plots of the plays (whatever their origin), in the
their actions, in the conduct and tone and in
costume of their characters.

National as it was, and because of this very q
Spanish drama was fated to share the lot of th
so fully represented. At the end of the 17t
when the Spanish throne at last became the dec
of discord among the Governments of Europe, t
people lay, in the words of a historian of its
"like a corpse, incapable of feeling its own i
That national art to which it had so faithfully
fallen into decline and decay with the spirit of S
By the time of the close of the great war, the t
sunk into a mere amusement of the populace, wh
the greater part of the 18th century, while
the old masters the measure of favour which ac
traditional esteem, continued to uphold the
tives of the old drama in its degeneracy—auth
level of their audiences. But the Spanish court
French, and France in the drama, even more th
other form of art, was the arbiter of taste in Euro
the restoration of peace accordingly began isolate
to impose the French canons of dramatic theo
follow the example of French dramatic practic
the middle of the century these endeavours ass
definite form. Montiano's bloodless tragedy o
(1750), which was never acted, was accompanie
course endeavouring to reconcile the doctrin
author with the practice of the old Spanish dram
play itself was in blank verse (a metre never
Calderon, though occasionally by Lope), inste
old national ballad-measures (the romance-mea
assurance and the rhymed *redondilla* quatrain)
by the old masters among the variety of metres
by them. The earliest Spanish comedy in the F
(a translation only, though written in the natio
(1751), and the first original Spanish comedy o
model, Moratin's *Petimetra* (*Petite-Maîtresse*), prin
with a critical dissertation, likewise remained un
1770, however, the same author's *Hormesinda*,
drama on a national theme and in the national
adhering to the French rules, appeared on the s
similar attempts followed in tragedy by the s
and others (including Ayala, who ventured i
compete with Cervantes on the theme of Num
in comedy by Yriarte and Jovellanos (afterwar
under Godoy), who produced a sentimental
Diderot's manner.[9] But these endeavours faile
any change in the popular theatre, which wa
success raised from its deepest degradation
la Cruz (b. 1731), a fertile author of light
genuine humour, especially *saynetes*, depicting t
of the middle and lower classes. In literary
Huerta's voluminous collection of the old plays (
a new impulse to dramatic productivity, and t
continued between representatives of the old s
as Comella (fl. 1780) and of the new, such as t
Moratin (1760–1828), whose comedies—of wa

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[1] *El Divino Orfeo*, &c.

[2] *El Mágico Prodigioso*; *El Purgatorio de San Patricio*; *La Devocion de la Cruz*.

[3] *El Príncipe Constante* (Don Ferdinand of Portugal).

[4] *La Dama Duende* (*The Fairy Lady*).

[5] *Vida es Sueño* (*Life is a Dream*).

[6] *El Lindo Don Diego* (*Pretty Don Diego*.)

[7] *Desden con el Desden* (*Disdain against Disdain*).

[8] Luzan, *La Razon contra la Moda* (Lachaussée, *Le Préjug*

[9] *El Delinquente Honrado* (*The Honoured Culprit*).

and most successful· was in prose—raised him to the foremost position among the dramatists of his age. In tragedy N. de Cienfuegos (d. 1809) likewise showed some originality. After, however, the troubles of the French domination and the war had come to an end, the precepts and examples of the new school failed to reassert themselves. The Spanish dramatists of the present century, after passing, as in the instances of F. Martinez de la Rosa and Breton de los Horreros, from the system of French comedy to the manner of the national drama, appear either to have stood under the influence of the French romantic school, or to have returned once more to the old national models. Among the former class A. Gil y Zarate, among the latter J. Zorilla, are mentioned as specially prominent. Meanwhile the old popular religious performances are not wholly extinct in Spain, and their relics may long continue to survive there. Whatever may be the future history of one of the most remarkable of dramatic literatures, it may confidently be predicted that so long as Spain is Spain, her theatre will not be permanently denationalized, and that the revolutions it may be destined to undergo are unlikely to extinguish, in whatever degree they may repress, its conservative elements.

The beginnings of the regular drama in FRANCE, which here, without absolutely determining, potently swayed its entire course, sprang directly from the literary movement of the Renaissance. Du Bellay sounded the note of attack which converted that movement in France into an endeavour to transform the national literature; and in Ronsard the classical school of poetry put forward its conquering hero and sovereign lawgiver. Among the disciples who gathered round Ronsard, and with him formed the "Pleiad" of French literature, Stephen Jodelle (1532–1572), the reformer of the French theatre, soon held a distinguished place. The stage of this period left ample room for the enterprise of this youthful writer. The popularity of the old entertainments had reached its height when Louis XII., in his conflict with Pope Julius II., had not scrupled to call in the aid of Pierre Grégoire (Gringore), and when the *Mère Sotte* had mockingly masqueraded in the petticoats of Holy Church. Under Francis I. the Inquisition had to some extent succeeded in repressing the audacity of the actors, whose follies were at the same time an utter abomination in the eyes of the Huguenots. For a time the very mysteries had been prohibited. Meanwhile, isolated translations of Italian[2] or classical[3] dramas had in literature begun the movement which Jodelle now transferred to the stage itself. His tragedy, *Cléopatre Captive*, was produced there on the same day as his comedy, *L'Eugène*, in 1552, his *Didon se sacrifiant* following in 1558. Thus at a time when a national theatre was perhaps impossible in a country distracted by civil and religious conflicts, whose monarchy had not yet welded together a number of provinces attached each to its own traditions, and whose population, especially in the capital, was enervated by frivolity or enslaved by fanaticism, was born that long-lived artificial growth, the so-called classical tragedy of France. For French comedy, though subjected to the same influences as tragedy, had a national basis upon which to proceed, and its history is partly that of a modification of old popular forms.

The history of French tragedy begins with the *Cléopatre Captive*, in the representation of which the author, together with other members of the "Pleiad," took part. It is a tragedy in the manner of Seneca, devoid of action and provided with a ghost and a chorus. Though mainly written in the five-foot Iambic couplet, it already contains passages in the Alexandrine metre, which soon afterwards La Péruse by his *Médée* (pr. 1556) established in French tragedy, and which Jodelle employed in his *Didon*. Numerous tragedies followed in the same style by various authors, among whom Bounyn produced the first French regular tragedy on a subject neither Greek nor Roman,[4] and the brothers De la Taille,[5] and J. Grevin,[6] distinguished themselves by their style. Though in the reign of Charles IX. a vain attempt was made by Filleul to introduce the pastoral style of the Italians into French tragedy[7] (while the Brotherhood of the Passion was intermingling with pastoral plays its still continued reproductions of the old entertainments, and the religious drama making its expiring efforts), the classical school, in spite of all difficulties, prevailed. Monchrestien exhibited unusual vigour of rhetoric;[8] and in R. Garnier (1545–1601) French tragedy reached the greatest height in nobility and dignity of style, as well as in the exhibition of dramatic passion, to which it attained before Corneille. In his tragedies[9] choruses are still interspersed among the long Alexandrine tirades of the dialogue.

Comedy under Italian influence.

During this period, comedy had likewise been influenced by classical models; but the distance was less between the national farces and Terence, than between the mysteries and moralities, and Seneca and the Greeks. *L'Eugène* differs little in style from the more elaborate of the old farces; and while it satirizes the foibles of the clergy without any appreciable abatement of the old licence, its theme is the favourite burden of the French comic theatre of all times—*le cocuage*. The examples, however, which directly facilitated the productivity of the French comic dramatists of this period, among whom Jean de la Taille was the first to attempt a regular comedy in prose,[10] were those of the Italian stage, which in 1576 established a permanent colony in France, destined to survive there till the close of the 17th century, by which time it had adopted the French language, and was ready to coalesce with French actors, without, however, relinquishing all remembrance of its origin. R. Belleau (1528–1577), a member of the "Pleiad," produced a comedy in which the type (already approached by Jodelle) of the swaggering captain appears;[11] J. Grevin copied Italian intrigue, characters, and manners;[12] O. de Turnèbe (d. 1581) borrowed the title of one Italian play[13] and perhaps parts of the plots of others; the Florentine F. d'Amboise (d. 1558) produced versions of two Italian comedies;[14] and the foremost French comic poet of the century, P. de Larivey (1550–1612), likewise an Italian born (of the name of Pietro Giunto), openly professed to imitate the poets of his native country. His plays are more or less literal translations of L. Dolce,[15] Secchi,[16] and other Italian dramatists; and this lively and witty author, to whom Molière owes much, thus connects two of the most important and successful growths of the modern comic drama.

French tragedy and comedy in the 17th century before Corneille.

Before, however, either tragedy or comedy in France entered into the period of their history when genius was to illuminate both with creations of undying merit, they had, together with the general literature of the country, passed through a new phase of the national life. The troubles and terrors of the great civil and religious wars of the 16th century had in certain spheres of society produced a reaction towards culture and refinement; and the seal had been set upon the results of the Renaissance by Malherbe, the

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[1] *El Si de las Niñas* (*The Young Maidens' Consent*).

[2] Trissino, *Sofonisba*.

[3] Sophocles, *Antigone*; *Electra*; Euripides, *Hecuba*; Terence, *Andria*, Aristophanes, *Plutus* (by Ronsard, 1549).

[4] *La Soltane* (1561).

[5] *Daire* (*Darius*).

[6] *La Mort de César*.

[7] *Achille* (1563).

[8] *Les Lacènes*; *Marie Stuart* or *L'Ecossaise*.

[9] *La Juive*, &c.

[10] *Les Corrivaux* (1573).

[11] *La Reconnue* (Le Capitaine Rodomont).

[12] *Les Esbahis*.

[13] *Les Contens* (S. Parabosco, *I Contenti*).

[14] *Les Néapolitaines*; *Les Désespérades de l'Amour*.

[15] *Les Laquais* (*Ragazzo*).

[16] *Les Tromperies* (*Gli Inganni*).

father of French style. The people continued to solace or distract its weariness and its sufferings with the help of the ministers of that half-cynical gaiety which has always lighted up the darkest hours of French popular life. In the troublous days preceding Richelieu's definitive accession to power (1624) the *Tabarinades*—a kind of street dialogue recalling the earliest days of the popular drama—had made the Pont-Neuf the favourite theatre of the Parisian populace. Meanwhile the influence of Spain, which Henry IV. had overcome in politics, had throughout his reign and afterwards been predominant in other spheres, and not the least in that of literature. The *stilo culto*, of which Gongora was the native Spanish, Marino the Italian, and Lyly the English representative, asserted its dominion over the favourite authors of French society; the pastoral romance of Honoré d'Urfé—the text-book of pseudo-pastoral gallantry—was the parent of the romances of the Scudérys and De la Calprenède; the Hôtel de Rambouillet was in its glory; the true (not the false) *précieuses* sat on the heights of intellectual society; and Balzac (ridiculed in the earliest French dramatic parody)[1] and Voiture were the dictators of its literature. Much of the French drama of this age is of the same kind as its romance-literature, like which it fell under the polite castigation of Boileau's satire. Heroic love (quite a technical passion), "fertile in tender sentiments," seized hold of the theatre as well as of the romances; and Calprenède (1610–1663), G. de Scudéry[2] (1601–1667) and his sister (1607–1701), and others were equally fashionable in both species. Meanwhile Spanish and Italian models continued to influence both branches of the drama. Everybody knew by heart Gongora's version of the story of "young Pyramus and his love Thisbe" as dramatized by Th. Viaud (1590–1626); and the sentiment of Tristan[3] (1601–1655) overpowered Herod on the stage, and drew tears from Cardinal Richelieu in the audience. Even Duryer's (1609–1659) style, otherwise superior to that of his contemporaries, is stated to have been Italian in its defects. A mixture of the forms of classical comedy with elements of Spanish and of the Italian pastoral was attempted with great temporary success by A. Hardi (1560–1631), a playwright who thanked Heaven that he knew the precepts of his art while preferring to follow the demands of his trade. The mixture of styles begun by him was carried on by Racan (1589–1670), Rotrou (1609–1650), and others; and among these comedies of intrigue in the Spanish manner the earliest efforts of Corneille himself[4] are to be classed. Rotrou's noteworthier productions[5] are later in date than the event which marks an epoch in the history of the French drama, the appearance of Corneille's *Cid* (1636).

Corneille.

His tragedies

P. Corneille (1606–1684) is justly revered as the first, and in some respects the unequalled, great master of French tragedy, whatever may have been unsound in his theories, or defective in his practice. The attempts of his predecessors had been without life, because they lacked really tragic characters and the play of really tragic passions; while their style had been either pedantically imitative or a medley of plagiarisms. He conquered tragedy at once for the national theatre and for the national literature, and this not by a long tentative process of production, but by a few master-pieces,—for in his many later tragedies he never again proved fully equal to himself. The French tragedy, of which the great age begins with the *Cid*, *Horace*, *Cinna*, and *Polyeucte*, was not, whatever it professed to be, a copy of the classical tragedy of Greeks or Romans, or an imitation of the Italian imitations of these; nor, though in
his later tragedies Corneille depended less a
characters, and more and more, after the fas
Spaniards, upon situations, were the forms of
drama able to assert their dominion over the F
stage. The mould of French tragedy was cast b
but the creative power of his genius was unab
with more than a few examples. His range of
characters was limited; he preferred, he said,
of having made his women too heroic to tha
made his men effeminate. His actions incline
to the exhibition of conflicts political rather t
ethical in their significance. The defects of h
of less moment; but in this, as in other respe
with all his strength and brilliancy, not one of
of artists who are at once the example and th
their successors.

In comedy also Corneille begins the first gr
epoch of French dramatic literature; for it was
Molière owed the inspiration of the tone and
he made those of the higher forms of French co
Le Menteur (the parent of a numerous dramati
was itself derived from a Spanish original,[7] w
not (as was the case with the *Cid*) transform into
new. French tragi-comedy Corneille can hard
to have invented; and of the mongrel growth of
comedy, domestic drama or *drame*, he rather sug
exemplified the conditions.

The tragic art of Racine (1639–1699) a
rather than surpasses that of his older contempo
works reflect the serene and settled formality o
which the sun of monarchy shone with an eff
clouds seemed capable of obscuring, and in whi
of a nation seemed reducible to the surroundings
The tone of the poetic literature of such an
necessarily unreal, because the range of its ideas
and because its forms seem to exist by an
authority. Madame de Sévigné said of Racine,
so well suit themselves to the successive ph
life of Louis XIV., that in his later years he lo
he had formerly loved his mistresses; and this
events indicates the range of passions which
tragic muse. His heroes are all of one type-
gracious gloriousness; his heroines vary in the
but they are all the "trophies of love,"[8] with th
of the scriptural figures, which stand apart from

T. Corneille (1625–1709), Campistron, Duc
and Quinault (1637–1688) were mere followe
both of the great masters of tragedy, though the
achieved a reputation of his own in the bastar
the opera. The form of French tragedy thus
like everything else which formed part of t
Louis XIV.," proclaimed itself as the definiti
model of its kind, and was accepted as such
sive world. Proud of its self-imposed fett
tragedy dictatorially denied the liberty of w
deprived itself to the art of which it claime
the highest examples. Yet, though calling its
it had not caught the essential spirit of the tr
Greeks. The elevation of tone which char
serious drama of the age of Louis XIV. is
tion, but its heights do not lose themselve
peopled by the myths of a national religio
sonages are conventional like its themes, but
tion is with itself only; Orestes and Iphige
brought with them the cries of the stern godd
flame on the altar of Artemis; their passio

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[1] "Du Peschier" (de Barry), *La Comédie des Comédies.*

[2] *L'Amour Tyrannique.*

[3] *Marianne.*

[4] *Mélite; Clitandre*, &c.

[5] *Le Véritable Saint Genais; Venceslas.*

[6] Steele, *The Lying Lover*; Foote, *The Liar*; Gold

[7] Ruiz de Alarcon, *La Verdad Sospechosa.*

[8] *Andromaque; Phèdre; Bérénice*, &c.

[9] *Est*

speech are cadenced by a modern measure. In construction, the simplicity and regularity of the ancient models are stereotyped into a rigid etiquette by the exigencies of the court-theatre, which is but an apartment of the palace. The unities of time and place, with the Greeks mere rules of convenience, French tragedy imposes upon itself as a permanent yoke. The Euripidean prologue is judiciously exchanged for the exposition of the first act, and the lyrical element essential to Greek tragedy is easily suppressed in its would-be copy; lyrical passages still occur in some of Corneille's early master-pieces,[1] but the chorus is consistently banished, to reappear only in Racine's latest works[2] as a scholastic experiment appropriate to a conventual atmosphere. Its uses for explanation and comment are served by the expedient, which in its turn becomes conventional, of the conversations with *confidants* and *confidantes*, which more than sufficiently supply the foil of general sentiments. The epical element is allowed full play in narrative passages, more especially in those which relate parts of the catastrophe,[3] and, while preserving the stage intact from realisms, suit themselves to the generally rhetorical character of this species of the tragic drama. This character impresses itself more and more upon the tragic art of a rhetorical nation in an age when the loftiest themes are elsewhere (in the pulpit) receiving the most artistic oratorical treatment, and develops in the style of French tragedy the qualities which cause it to become something between prose and poetry—or to appear (in the phrase of a French critic) like prose in full dress. The force of this description is borne out by the fact that the distinction between the versification of French tragedy and that of French comedy is at times an imperceptible one.

The universal genius of Voltaire (1694–1778) found it necessary to shine in all branches of literature, and in tragedy to surpass predecessors whom his own authority declared to have surpassed the efforts of the Attic muse. He succeeded in impressing the world with the belief that his innovations had imparted a fresh vitality to French tragedy; in truth, however, they represent no essential advance in art, but rather augmented the rhetorical tendency which paralyzes true dramatic life. Such life as his plays possess lies in their political and social sentiments, their invective against tyranny,[4] and their exposure of fanaticism.[5] In other respects his versatility was barren of enduring results. He might take his themes from French history,[6] or from Chinese,[7] or Egyptian,[8] or Syrian,[9] from the days of the Epigoni[10] or from those of the Crusades;[11] he might appreciate Shakespeare, with a more or less partial comprehension of his strength, and condescendingly borrow from and improve the barbarian.[12] But he added nothing to French tragedy where it was weakest—in character; and where it was strongest—in diction—he never equalled Corneille in fire or Racine in refinement. While the criticism to which French tragedy in this age at last began to be subjected has left unimpaired the real titles to immortality of its great masters, the French theatre itself has all but buried in respectful oblivion the dramatic works bearing the name of Voltaire—a name second to none in the history of modern progress and of modern civilization.

The tragic stage.

As it is of relatively little interest to note the ramifications of an art in its decline, the contrasts need not be pursued among the contemporaries of Voltaire, between his imitator Saurin (1706–1781), Saurin's royalist rival De Belloy (1727–1775), Racine's imitator Lagrange-Chancel (1676–1758), and Voltaire's own would-be rival, the "terrible" Crébillon the elder (1674–1762), who professed to vindicate to French tragedy, already mistress of the heavens through Corneille, and of the earth through Racine, Pluto's supplementary realm, but who, though thus essaying to carry tragedy lower, failed to carry it further. In the latter part of the 18th century French classical tragedy as a literary growth was dying a slow death, however numerous might be the leaves which sprouted from the decaying tree. Its form had been permanently fixed; and even Shakespeare, as manipulated by Ducis[13] (1733–1816)—an author whose tastes were better than his times—failed to bring about a change. "It is a Moor, not a Frenchman, who has written this play," cried a spectator of Ducis's *Othello* (1791); but though Talma might astonish the theatre, Shakespeare's influence over the French drama was only gradually preparing itself, by means more especially of Letourneur's translation (1776–1782), which attracted the sympathy of Diderot and the execrations of the aged Voltaire. The command which classical French tragedy continued to assert over the stage was due in part, no doubt, to the love of Roman drapery which in more than one sense characterized the Revolution, and which was by the Revolution handed down to the Empire. It was likewise, and more signally, due to the great actors who freed the tragic stage from much of its artificiality and animated it by their genius. No great artist has ever more generously estimated the labours of a predecessor than Talma (1763–1826) judged those of Le Kain (1728–1778); but it was Talma himself whose genius was pre-eminently fitted to reproduce the great figures of antiquity in the mimic world, which, like the world outside, both required and possessed its Cæsar. He, like Rachel (1821–1858) after him, reconciled French classical tragedy with nature; and it is upon the art of great original actors such as these that the theatrical future of this form of the drama in France depends. Mere whims of fashion—even when inspired by political feeling—will not waft back to it a real popularity; nor will occasional literary aftergrowths, however meritorious, such as the effective *Lucrèce* of F. Ponsard, and the attempts of even more recent writers, suffice to re-establish a living union between it and the progress of the national literature.

Comedy.

Molière.

The rival influences under which classical tragedy has become a thing of the past in French literature connect themselves with the history of French comedy, which under the co-operation of other influences produced a wide variety of growths. The germs of most of these—though not of all—are to be found in the works of the most versatile, and, in some respects, the most consummate comic dramatist the world has known,—Molière (1622–1693). What Molière found in existence was a comedy of intrigue, derived from Spanish or Italian examples, and the elements of a comedy of character, in French and more especially in Italian farce and ballet-pantomime. Corneille's *Menteur* had pointed the way to a fuller combination of character with intrigue, and in this direction Molière's genius exercised the height of its creative powers. After beginning with farces, he produced in the earliest of his plays (from 1652), of which more than fragments remain, comedies of intrigue which are at the same time marvellously lively pictures of manners, and then proceeded with the *École des Maris* (1661) to begin a long series of masterpieces of comedy of character. Yet even these, the chief of which are altogether unrivalled in dramatic literature, do not exhaust the variety of his productions. To define the range of his art is as difficult as to express in words the essence of his genius. For though he has been copied ever since he wrote, neither his spirit nor his manner has descended in full to any of his copyists, whole schools of whom have missed elements of both. A Molière can only be judged in his relations to the history of comedy at large. He was indeed the inheritor of many forms and styles—remaining a stranger to those of Old Attic comedy only, rooted as it was in the political life of a free imperial city; though even the rich extravagance of Aristophanes's burlesque was not left wholly unreproduced by him. Molière is both a satirist and a humourist; he displays at times the sentiments of a loyal courtier, at others that gay spirit of opposition which is all but indispensable to a popular French wit. His comedies offer elaborate and subtle—even tender—pictures of human character in its eternal types, lively sketches of social follies and literary extravagances, and broad appeals to the ordinary sources of vulgar merriment. Light and perspicuous in construction, he is master of the delicate play of irony, the penetrating force of wit, and the expansive gaiety of frolicsome fun. Faithful to the canons of artistic taste, and under the safe guidance of true natural humour, his style suits itself to every species attempted by him. His morality is the reverse of rigid, but its aberrations are not those of prurience, nor its laws those of pretence; and wholly free as he was from the didactic aim which is foreign to all true dramatic representation, the services he rendered to his art are not the less services rendered to society, concerning which the laughter of true comedy tells the truth. He raised the comedy of character out of the lower sphere of caricature, and in his greatest creations subordinated to the highest ends of all dramatic composition the plots he so skilfully built, and the pictures of the manners he so faithfully reproduced.

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[1] *Le Cid; Polyeucte.*

[2] *Esther; Athalie.*

[3] Corneille, *Rodogune;* Racine, *Phèdre.*

[4] *Brutus; La Mort de César; Sémiramis.*

[5] *Œdipe; Le Fanatisme (Mahomet).*

[6] *Adélaïde du Guesclin.*

[7] *L'Orphelin de la Chine.*

[8] *Tanis et Zélide.*

[9] *Les Guèbres.*

[10] *Olimpie.*

[11] *Tancrède.*

[12] *La Mort de César; Zaïre (Othello).*

[13] *Hamlet; Le Roi Lear, &c.*

lière's tem- raries d suc- sors.

Even among the French comic dramatists of this age there must have been many who "were not aware" that Molière was its greatest poet. For though he had made the true path luminous to them, their efforts were still often of a tentative kind, and one was reviving *Patelin* while another was translating the *Andria*. A more unique attempt was made in one of the very few really modern versions of an Aristophanic comedy, which deserves to be called an original copy—*Les Plaideurs* of Racine. The tragic poets Quinault and Campistron likewise wrote comedies, one[1] or more of which furnished materials to contemporary English dramatists, as did one of the felicitous plays in which Boursault (1638–1701) introduced Mercury and Æsop into the theatrical *salon*.[2] But if the mantle of Molière can be said to have fallen upon any of his contemporaries or successors, this honour must be ascribed to J. F. Regnard (1655–1709), who imitated the great master in both themes and characters,[3] while the skilfulness of his plots, and his gaiety of the treatment even of subjects tempting into the by-path of sentimental comedy,[4] entitle him to be regarded as a comic poet of original genius. In the next generation (that of Voltaire) this by-path threatened to become the chosen walk of comedy, though Gresset (1709–1777) still attempted comedy of character,[5] and the witty Piron (1689–1778) produced something like a new type in the hero of his epigrammatic, but hardly dramatic, *Métromanie*. Marivaux (1688–1763), "the French *Spectator*," whose minute analysis of the tender passion[6] excited the scorn of Voltaire, forms the connecting link between comedy and the mixed species of the sentimental or "tearful" domestic drama, which still retained the name, but no longer pursued the ends, of the comic art. The most effective and professedly didactic dramatic moralists of this school were Destouches[7] (1680–1754) and Nivelle de la Chaussée (1692–1754), in whose hands French comedy became a champion of the sanctity of marriage[8] and reproduced the sentiments—in one instance[9] even the characters—of Richardson.

Melpomene, humbly shod with the sock, and Thalia, dissolved in tears, had now entered into partnership. The species which varied as *comédie larmoyante* or as *tragédie bourgeoise*, and which ruled or was to rule supreme in so many dramatic literatures of Europe, more and more firmly established its hold on that of France. In the hands of Diderot (1713–1784) it sought to proclaim itself as an agent of social reform, and as an apostle of the gospel of philanthropy; but the execution of these works fell short of their aims;[10] it was, in Mme. de Staël's words, "the affectation of nature," not nature itself which they exhibited. Their author announced them as examples of a third dramatic form—the *genre sérieux*—which he declared to be the consummation of the dramatic art. Making war upon the frigid artificiality of classical tragedy, he banished verse from the new species. The effect of these plays was intended to spring from their truth to nature—a truth such as no spectator could mistake, and which should bring home its moral teachings to the business as well as the bosoms of all. The theatre was to become a real and realistic school of the principles of society and of the conduct of life—it was, in other words, to usurp functions with which it has no concern, and to essay the reformation of mankind. The idea was neither new nor just, but its speciousness will probably continue to commend it to many benevolent minds, whensoever and in whatsoever shape it is revived.

From this point the history of the French drama becomes that of a conflict between an enfeebled artistic school and a tendency which is hardly to be dignified by the name of a school at all. Beaumarchais (1732–1799), who for his early sentimental plays, in which he imitated Diderot, invented the appellation *drame*—so convenient in its vagueness that it became the accepted name of the hybrid species to which they belonged—in two works of a very different kind, the famous *Barbier de Séville* and the still more famous *Mariage de Figaro*, boldly carried comedy back into its old Spanish atmosphere of intrigue; but while surpassing all his predecessors in the skill with which he constructed his frivolous plots, he drew his characters with a lightness and sureness of touch peculiar to himself, animated his dialogue with an unparalleled brilliancy of wit, and seasoned action as well as dialogue with a political and social meaning, which caused his epigrams to become proverbs, and which marks his *Figaro* as a herald of the Revolution. Such plays as these were ill suited to the rule of the despot whose vigilance could not overlook their significance. The comedy of the empire is, in the hands of Collin d'Harleville, Picard, A. Duval, Étienne, and others, mainly a harmless comedy of manners; nor was the attempted innovation of N. Lemercier (1771–1840)—who was fain to invent a new species, that of historical comedy—more than a flattering self-delusion. The theatre had its share in all the movements and changes which caused in

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[1] Quinault, *L'Amour Indiscret* (Newcastle and Dryden's *Sir Martin Marall*).

[2] *Le Mercure Galant; Ésope à la Ville; Ésope à la Cour* (Vanbrugh, *Æsop*).

[3] *Le Bal* (*M. de Pourceaugnac*); Géronte in *Le Légataire Universel* (Argan in *Le Malade Imaginaire*); *La Critique du L.* (*La C. de l'École des Femmes*).

[4] *Le Joueur; Le Légataire Universel.* [5] *Le Méchant.*

[6] *Le Jeu de l'Amour et du Hasard; Le Legs; La Surprise de l'Amour; Les Fausses Confidences; L'Épreuve.*

[7] *Le Dissipateur; Le Glorieux,* &c.

[8] *La Fausse Antipathie; Le Préjugé à la Mode; Mélanide.*

[9] *Paméla.*

[10] *Le Fils Naturel ou les Épreuves de la Vertu; Le Père de Famille.*

he impulse which gave rise to the revolu-
na itself was to undergo was not one of

Those branches of the drama which belong
the history of the opera, or which associate
th it, are here passed by. (See OPERA).
was the *vaudeville* (from Val de Vire in
ich began as an interspersion of pantomime
f popular songs, and which, after the Italian
een removed from it, was cultivated by
–1765) and Marmontel (1723–1799). The
as Rousseau,[2] likewise composed *opérettes*—
of opera, at first of the pastoral sort; and
pecies easily entered into combination. The
per, of which the invention is also attributed
in its latter development became merely a
ated by music, though usually in little need
ation.

me of the regular drama, however, demanded
ther kind. At the Théâtre Français, or
içaise, whose history as that of a single
ors had begun in 1680, the party-strife of the
elf audible; and the most prominent tragic
volution, M. J. de Chénier (1764–1811), a
oltaire in dramatic poetry as well as in
sophy, wrote for the national stage the
a—with a political moral[4]—in which in the
ar 1789 Talma achieved his first complete
the victorious Revolution proclaimed among
that of the theatres in Paris, of which soon
0 were open. In 1807 the empire restricted
9, and reinstated the Théâtre Français in sole
nearly such) of the right of performing the

No writer of note was, however, tempted
y the rewards and other encouragements
poleon to produce such a classic tragedy as
ould have willingly stamped out of the earth.
of C. Delavigne (1794–1844) represent the
the expiring efforts of the classical to the
nnings of the romantic school of the French
is it must suffice to say that it derives some of
ics from the general movement of romanticism
us ways and at various points of time trans-
every modern European literature, others
rical tendency which is a French national
r Hugo was its conquering founder; A. Dumas
03–1870) its middleman. The marvellous
tic genius of the former, always in extremes,
more signally so than in the drama; the
Briareus, working with many hands besides
e name of A. de Vigny (1799–1863),
l" (1804–1876), A. de Musset (1810–1857),
ic "proverbes" and other pieces of a similar
licate flavour all their own, and perhaps that
(1803–1870), who invented not only Spanish
Spanish dramatist,[5] may be all with more or
classed in the romantic school, which in its
to an end as a productive body of writers.
owever, the brief classical revival begun by
d continued, in closer relation to modern ideas,
and by E. Augier, which overthrew the

While the theatrical ability of E. Scribe
supplied a long series of productions attest-
dvance of the playwright's mastery over the
craft, and while the name of his competitors,
f some of whom he held his own against the
the latest developments of the French drama possess a social and often a moral interest of greater depth, while they are not inferior in technical skill to anything that has preceded them. After a fashion which would have startled even Diderot, the younger A. Dumas has undertaken to reform society by means of the stage; O. Feuillet and others have, with perhaps fewer prefaces, applied themselves to the solution of the same "problems;" and whatever style will best succeed with the public is the style of V. Sardou.

The future of the French theatre and of the French drama.

That the theatre will lose the hold it possesses over the intellectual and moral sympathies of nearly the whole of the educated, and of a great part of the uneducated population of France, seems hardly within the range of probability. But this is not tantamount to a prophecy that the creative activity of French dramatic literature is certain to endure. The art of acting is not dependent upon a contemporary literary productivity; Talma and Mdlle. Mars (1779–1847) flourished in one of the most barren ages of the French literary drama; the authors and actors of the *sotties*, like those of the *Palais Royal* farces of our own day, could strike their roots in the lightest of soils. The constantly accumulating experience and the apparently inexhaustible fertility of the art of acting in France may ensure to it a future not less brilliant than its past; and the judicious policy of not leaving the leading theatres at the mercy of shifting fashion will at all events supply the possibility of maintaining a high histrionic standard. So long as the French nation continues to maintain its ascendency over other nations in much that adorns and brightens social life, the predominant influence of the French theatre over the theatres of other nations is likewise assured. But in the end its own future must be ruled by that progress or decay of French dramatic literature. The history of that literature shows periods of marvellously rapid advance, of hardly less swift decline, and of frequent though fitful recovery. Its future may be equally varied; but it will not be less dependent on the conditions which in every people, ancient or modern, are indispensable to national vigour and vitality. Should the calamity—for it would be nothing less—befall modern civilization of a hopeless degeneration of the French drama, the fault will lie in the severance of self-consciousness from self-control; and, under other circumstances, but with even deeper regret, the story of the Roman theatre of the later Empire may have to be told again.

ENGLISH DRAMA.

Among the nations of Germanic descent, but one—our own—succeeded under the influence of the Renaissance movement in transforming the last growths of the mediæval drama into the beginnings of a great and enduring national dramatic literature. This transformation connects itself with one of the greatest epochs of the national history, or, more properly speaking, forms part of it; the Elizabethan drama and the Elizabethan age are, it is no exaggeration to assert, equally inconceivable the one without the other.

Beginning of the regular drama.

It has been seen how already in the reign of Edward VI., the breath of a new age with its "new learning" had quickened the relatively inanimate species of the morality into the first *chronicle history* (still intermingled with remnants of the earlier species); and how at an even earlier date John Heywood's *interludes* had bridged the distance separating from only partially relieved abstractions the concrete directness of comedy proper. Soon afterwards, the study and imitation of the ancient classical drama were introduced into the English world of letters; and under their influence tragedy and comedy, which might otherwise have from the first coalesced, were in their early growths in our literature kept asunder, though not absolutely so. Already, in Queen Mary's reign, translation was found the readiest form of expression offering itself to literary scholar-

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ter; *Jeannot et Jeannette.*
alantes; Le Devin du Village.
[4] *Charles IX. ou l'École des Rois.*
lara Gazul.

rliest
medies.

ship, and Italian examples helped to commend Seneca, the most modern of the ancient tragedians, as a favourite author for such exercises. With the year of Elizabeth's accession began a series of translations of his plays by Jasper Heywood (John Heywood's son) and others; and to the direct influence of one of Seneca's tragedies[1] is to be ascribed the composition of the first tragedy proper in the English tongue, the *Gorboduc* (afterwards renamed *Ferrex and Porrex*) of T. Sackville, Lord Buckhurst, with whom T. Norton was joint author (1562). Though, unlike *Gorboduc*, classical in theme, and in some respects approaching nearer to the true conception of tragedy in their treatment of dramatic passion, the nearly contemporary *Apius and Virginia* (*c.* 1563) and Preston's *Cambises King of Percia*, in the roughness of their form more closely resemble the old religious drama; of other tragedies on classical subjects we have only the names, except in the instance of Gascoigne's *Jocasta*, a free version of the *Phœnissæ* of Euripides (1566), and of R. Edwards's *Damon and Pithias* (printed 1571), which calls itself a comedy, and is in fact a mixture of both species. Simultaneously with the influence, directly or indirectly exercised, of classical literature, that of Italian, both dramatic and narrative, asserted itself; early works from this source were the first *Romeo and Juliet* (not preserved, but apparently anterior in date even to *Gorboduc*), *Tancred and Gismunda* (1563 ?), and G. Whetstone's *Promos and Cassandra* (printed 1578), from which Shakespeare took the story of *Measure for Measure*.

ronicle
stories.

From the double danger which threatened our tragic drama in the days of its infancy—that it would congeal on the cold heights of classical themes, or dissolve its vigour in the glowing heat of a passion fiercer than that of the Italians (*Inglese Italianato è un diavolo incarnato*)—it was preserved, more than by any other cause, by its happy association with the traditions of the national history. The crude growth of the chronicle history proved strong enough to assert itself by the side of tragedy based on classical and Italian models; and in a series of works of more or less uncertain dates, a vein was worked from which Shakespeare was to draw the richest ore. Among these rude compositions, which intermixed the blank verse introduced by *Gorboduc* with prose, and freely mingled comic with tragic elements—works half-epic, half-dramatic, and popular in form as they were national in theme,—are the *Famous Victories of Henry V.*, acted before 1588, *The Troublesome Raigne of King John* (printed 1591), and the *True Chronicle History of King Leir* (acted 1593). A still further step in advance was taken in what really deserves the title of the *Tragedy* of *Sir Thomas More* (*c.* 1590), not so much on account of the relative nearness of the subject to the time of its treatment, as because of the tragic responsibility of character here already clearly worked out.

Such had been the beginnings of tragedy in England up to the time when the genius of dramatists worthy to be called the predecessors of Shakespeare, under the influence of a creative literary epoch, seized the form ready to their hands. The birth of comedy, at all times a process of less labour, had slightly preceded that of tragedy in the history of our drama. Isolated Latin comedies had been produced in the original or in English versions or reproductions as early as the reign of Henry VIII., and the morality and its descendant, the interlude, pointed the way towards nationalizing and popularizing types equally fitted to divert Roman and Italian and English audiences. Thus the earliest extant English comedy, N. Udall's *Ralph Roister Doister*, which cannot be dated later than 1551, may be described as a genuinely English adaptation of Plautus, while its successor, *Gammer Gurton's Needle*, printed 1575, and probably written by (Bishop) Still, has an original, and in consequence a slighter, though by no means unamusing, plot. In the main, however, our early English comedy, while occasionally introducing characters of genuinely native origin, and appealing to the traditional humours of Will Summer, the court-fool of Henry VIII.,[2] or Grim, the collier of Croydon,[3] was content to borrow its themes from Italian or classical sources; Ariosto's *I Suppositi* found a translator in Gascoigne[4] (1566), and the *Menæchmi* of Plautus translators or imitators in writers of rather later dates.[5] While on the one hand the mixture of tragic with comic motives was already leading in the direction of tragi-comedy, the precedent of the Italian pastoral drama encouraged the introduction of figures and stories from classical mythology; and the rapid and versatile influence of Italian comedy seemed likely to continue to control the progress of the lighter branch of the English drama.

Out of such promises as these the glories of our drama were ripened by the warmth and light of the great Elizabethan age—of which the beginnings may fairly be reckoned from the third decennium of the reign to which it owes its name. The queen's steady love of dramatic entertainments could not of itself have led, though it undoubtedly contributed, to such a result. Against the attacks which a nascent puritanism was already directing against the stage by the hands of Northbrooke, the repentant playwright Gosson, Stubbes, and others, were to be set not only the barren favour of royalty, and the more direct patronage of great nobles, but the fact that literary authorities were already weighing the endeavours of the English drama in the balance of respectful criticism, and that in the abstract at least the claims of both tragedy and comedy were upheld by those who shrunk from the desipience of idle pastimes. As the popularity of the stage increased, the functions of playwright and actor, whether combined or not, began to hold out a reasonable promise of personal gain. Nor, above all, was that higher impulse, which leads men of talent and genius to attempt forms of art in harmony with the tastes and tendencies of their times, wanting to the group of writers who can be remembered by no nobler name than that of Shakespeare's predecessors.

The lives of all of these are, of course, in part contemporary with the life of Shakespeare himself; nor was there any substantial difference in the circumstances under which most of them, and he, led their lives as dramatic authors. A distinction was manifestly kept up between poets and playwrights. Of the contempt entertained for the actor's profession some fell to the share of the dramatist; "even Lodge," says Dr Ingleby, "who had indeed never trod the stage, but had written several plays, and had no reason to be ashamed of his antecedents, speaks of the vocation of the play-maker as sharing the odium attaching to the actor." Among the dramatists themselves good fellowship and literary partnership only at times asserted themselves as stronger than the tendency to mutual jealousy and abuse; of all chapters of dramatic history, the annals of the early Elizabethan stage perhaps least resemble those of Arcadia.

Moreover, the theatre had hardly found its strength as a powerful element in the national life, when it was involved in a bitter controversy, with which it had originally no connection, on behalf of an ally whose sympathy with it can only have been of a very limited

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[1] [illegible]

[2] *Misogonus.* [3] *The History of the Collier.* [4] *The Supposes.*

[5] *A Historie of Error* (?), 1577; *The Menaechmi taken out of Plautus* (pr. 1595).

L The Marprelate controversy in 1589 led to a page of stage plays which proved only tempotary; but general result of the attempt to make the stage a cle of political abuse and invective was beyond a doubt oarsen and degrade both plays and players. The remedy was at last applied, when from about the year 4 the chief London actors became divided into two t rival companies—the Lord Chamberlain's and the d Admiral's—which alone received licences. Instead alf-a-dozen or more companies whose jealousies comicated themselves to the playwrights belonging to n, there were now, besides the Children of the Chapel, established bodies of actors, directed by steady and, in full sense of the word, respectable men. To the Lord mberlain's Company, which, after being settled at "the ater," moved to the Globe on the Bankside in 1599, kespeare and Richard Burbadge, the greatest of the abethan actors, belonged; the Lord Admiral's was naged by Philip Henslowe, the author of the *Diary*, and ward Alleyn, the founder of Dulwich College, and was imately, in 1600, settled at the Fortune. In these and er houses were performed the plays of our Elizabethan matists, with few adventitious aids, the performance ng crowded into a brief afternoon, when it is obvious t only the idler sections of the population could attend. woman might appear at a playhouse unless masked; on stage, down to the Restoration, women's parts continued be acted by boys.

It is futile to take no account of such outward circumnces as these and many which cannot here be noted in veying the progress of the literature of the Elizabethan ama. No dramatic literature which has any claim to k beside it—not that of Athens nor those of modern ly and Spain, nor those of France and Germany in ir classic periods—had to contend against such odds; mighty inherent strength alone ensured to it the ality which it so triumphantly asserted, and which bled it to run so unequalled a course.

Among Shakespeare's predecessors John Lyly (1554-60), whose plays were all written for the Children of the apel and the Children of St Paul's, holds a position rt in our dramatic literature. The euphuism, to ich his famous romance gave its name, likewise distinshes his mythological,[1] quasi-historical,[2] allegorical,[3] and irical[4] comedies. But his real service to the progress our drama is to be sought neither in his choice of jects nor in his imagery—though to his fondness for fairye and for the whole phantasmagoria of legend, classical well as romantic, his contemporaries, and Shakespeare in ticular, were indebted for a stimulative precedent. It in his adoption of Gascoigne's innovation of writing ys in prose; and in his having, though under the ters of an affected and vicious style, given the first mple of brisk and vivacious dialogue—an example which even such successors as Shakespeare and Jonson re indebted. Thomas Kyd (d. c. 1594), the author of the nish *Tragedy*, possesses some of the characteristics, t none of the genius, of the greatest tragic dramatist o preceded Shakespeare. No higher tribute than this is rdly the due of Christopher Marlowe (1564-1593), ose violent end prematurely closed a poetic career of zling brilliancy. His earliest play, *Tamburlaine the at*, in which the use of blank verse was introduced on the English public stage, was full of the "high unding terms" of an extravagant and often bombastic tion, is already marked by the passion which was this t's most characteristic feature, and which was to find expression so luxuriant in his *Doctor Faustus* and so surpassingly violent in his *Jew of Malta*. His master-piece, *Edward II.*, is a tragedy of singular pathos and of a dramatic power unapproached by any of his contemporaries. George Peele (1552-1596-7) was a far more versatile writer even as a dramatist; but though his plays contain passages of exquisite beauty, not one of them is worthy to be ranked by the side of Marlowe's *Edward II.*, compared with which, if indeed not absolutely, Peele's *Chronicle of Edward I.* still stands on the level of the species to which its title and character alike assign it. His finest play is undoubtedly *David and Bethsabe*, which resembles *Edward I.* in construction, but far surpasses it in beauty of language and versification, besides treating its subject with greatly superior dignity. If the difference between Peele and Shakespeare is still in many respects besides that of genius an immeasurable one, we seem to come into something like a Shakespearian atmosphere in more than one passage of the plays of the unfortunate Robert Greene (1561-1592), unfortunate perhaps in nothing more enduringly than in his notorious enmity to Shakespeare himself. His genius, which shone most brightly in plays treating English life and scenes, was in the main free from the pedantry which occasionally besets the flight of Peele's and even of Marlowe's muse; and his most delightful work[5] at all events seems to breathe something of that indescribable freshness which we recognize, if not as a peculiarly Shakespearian characteristic, at least as one belonging to none but a truly national art. Thomas Lodge (c. 1558-1625), Thomas Nash the redoubtable pamphleteer (c. 1565-c. 1602), Henry Chettle (1564-c. 1667), who worked the chords of both pity[6] and terror[7] with equal vigour, and Anthony Munday (1553-1633), better remembered for his city pageants than for his plays, are among the other more generally known writers of the early Elizabethan drama, though not all of them can strictly speaking be called predecessors of Shakespeare.

Peele.

Greene.

Common characteristics of the early Elizabethans.

The common characteristics of nearly all these dramatists were in accordance with those of the great age to which they belonged. Stirring times called for stirring themes, such as those of "Mahomet, Scipio, and Tamerlane;" and these again for a corresponding vigour of treatment. Neatness and symmetry of construction were neglected for fulness and variety of matter. Novelty and grandeur of subject seemed well matched by a swelling amplitude and often reckless extravagance of diction. As if from an inner necessity, the balance of rhymed couplets gave way to the impetuous march of blank-verse; "strong lines" were as inevitably called for as strong situations and strong characters. Distinct as the chief of these poets are from one another by the marks impressed upon both form and matter by individual genius, yet the stamp of the age is upon them all. Writing for the stage only, of which some of them possessed a personal experience, they acquired an instinctive insight into the laws of dramatic cause and effect, and infused a warm vitality into the dramatic literature which they produced, so to speak, for immediate consumption. On the other hand, the same cause made rapidity of workmanship indispensable to a successful playwright. *How* a play was produced, how many hands had been at work upon it, what loans and what spoliations had been made in the process, were considerations of less moment than the question *whether* it was produced, and whether it succeeded. His harness—frequently double or triple—was inseparable from the lusty Pegasus of the early English drama, and its genius toiled, to borrow the phrase of the Attic comedian, "like an Arcadian mercenary."

The Woman in the Moon, *Sapho and Phao*.

Alexander, Campaspe, and Diogenes.

Endimion; *Midas*.

[4] *Gallathea*.

[5] *Friar Bacon and Friar Bungay*.

[6] *Patient Grissill* (with Dekker and Haughton)

[7] *Hoffman, or A Revenge for a Father*.

(1634) composed one of the loftiest and loveliest of English poems. *Comus* has been judged and condemned as a drama,—unjustly, for the dramatic qualities of a mask are not essential to the species. Nor need its history in England have here been referred to, were it not so inseparably connected with that of the Elizabethan drama. In later times the mask merged into the opera, or continued a humble life of its own apart from contact with higher literary effort. It is strange that our later poets should have done so little to restore to its nobler uses, and to invest with a new significance, a form of so proved a flexibility as the poetic mask.

The annals of our drama proper in the period reaching from the closing years of Elizabeth to the outbreak of the great Revolution include, together with numerous names relatively insignificant, many illustrious in the history of our poetic literature. Among Shakespeare's contemporaries and successors there is, however, but one who by the energy of his genius, not less than by the circumstances of his literary career, stands in a position of undisputed primacy among his fellows. Ben Jonson (1573–1635), to whom in his latter days a whole generation of younger writers did homage as to their veteran chief, was alone in full truth the founder of a school or family of dramatists. Yet his pre-eminence did not (whatever he or his followers may have thought) extend to both branches of the regular drama. In tragedy he fell short of the highest success; the weight of his learning lay too heavily upon his efforts to draw from deeper sources than those which had sufficed for Shakespeare. Such as they are, his tragic works[1] stand almost, though not quite, alone in this period as examples of sustained effort in historic tragedy proper. G. Chapman (1557 or 1559–1634) treated stirring themes, more especially from modern French history,[2] always with vigour, and at times with genuine effectiveness; but though rich in beauties of detail, he failed in this branch of the drama to follow Shakespeare even at a distance in the supreme art of fully developing a character by means of the action. Mention has already been made of Ford's isolated effort in the direction of historic tragedy and of those excursions into the still popular domain of the chronicle history by T. Heywood, Dekker, and others, which are to be regarded as nothing more than retrogressions. With the great body of the English dramatists of the end of the next period, tragedy had passed into a phase where its interest depended mainly upon plot and incident. The [illegible] tragedies and tragi-comedies which [illegible] constitute together a growth of a[illegible] exuberance, and in mere extent [illegible] Byzantium to ancient Britain, [illegible] of ancient Rome to the tyrants [illegible] equally a [illegible] variety. The sources from [illegible] were derived had been [illegible] Italian, Spanish, and [illegible] British [illegible] fiction in its [illegible] forms, the [illegible]

Domestic tragedy of this description was indeed no novelty on the English stage; Shakespeare himself may have touched, with his master-hand, more than one effort of this kind;[3] but T. Heywood (c. 1570–c. 1605) may be regarded as the first who achieved any work of considerable literary value of this class,[4] to which some of the plays of T. Dekker (c. 1570–c. 1640), T. Middleton, and others likewise more or less belong. Yet in contrast to this wide variety of sources, and consequent apparent variety of themes, the number of *motives* employed—at least as a rule—in the tragic drama of this period was comparatively small and limited. Hence it is that, notwithstanding the diversity of subjects among the tragic dramas of such writers as Marston, Webster, Fletcher, Ford, and Shirley, an impression of sameness is left upon us by a connected perusal of these works. Politic ambition, conjugal jealousy, absolute female devotion, unbridled masculine passion, such are the motives which constantly recur in the Decameron of our later Elizabethan drama. And this impression is heightened by the want of moderation, by the excess of passion, which these dramatists so habitually exhibit in the treatment of their favourite themes. All the tragic poets of this period are not equally amenable to this charge; in J. Webster[5] (d. c. 1650), master as he is of the effects of the horrible, and in J. Ford[6] (1586–c. 1640), surpassingly seductive in his sweetness, the monotony of exaggerated passion is broken by those marvellously sudden and subtle touches through which their tragic genius creates its most thrilling effects. Nor will the tendency to excess of passion which F. Beaumont (1586–1616) and J. Fletcher (1576–1625) undoubtedly exhibit be confounded with their distinctive power of sustaining tenderly pathetic characters and situations in a degree unequalled by any of their contemporaries—a power seconded by a beauty of diction and softness of versification which for a time raised them to the highest pinnacle of popularity, and which entitles them in their conjunction, and Fletcher as an independent worker, to an enduring pre-eminence among their fellows. In their morals Beaumont and Fletcher are not above the level of their age. The manliness of sentiment which ennobles the rhetorical genius of P. Massinger (1584–1640), and the gift of poetic illustration which entitles J. Shirley (1595–1666) to be remembered as something besides the latest and the most fertile of this group of dramatists, have less direct bearing upon the general character of the tragic art of the period. The common features of the romantic tragedy of this age are sufficiently marked, but not capable of obscuring the distinctive features in its individual writers which it is the highest function of criticism to discover and establish.

In comedy, on the other hand, the genius and the insight of Jonson pointed the way to a steady and legitimate advance. His theory of "humours" (which found the most palpable expression in two of his earliest plays[7]) translated into the ordinary language of dramatic art, [illegible] the paramount importance in the comic drama of the creation of distinctive human types. In the actual [illegible] of these it was impossible that Jonson [illegible] Shakespeare; but in the consciousness [illegible] indicated the highest sphere of a [illegible] rendered to the drama a direct [illegible] had left unperformed. By the rest of [illegible] and his successors, some of whom (such [illegible] avowedly to follow in his footsteps, [illegible] occasionally rivalled in individual

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[1] [illegible] Tragedy.

[2] [illegible] K[illegible].

[3] [illegible] Tragedy.

[4] [illegible] *of Ma'd.*

[5] [illegible]

[6] [illegible] *The Broken Heart.*

[7] [illegible] *Every Man out of his Humour.*

ımic creations : in the entirety of its achieve-
ınius as a comic dramatist remained un-
The favourite types of Jonsonian comedy, to
. J. Marston (1575–1624), and Chapman had,
large extent, added others of their own, were
th incessant zeal and remarkable effect by
ıoraries and successors. It was after a very
on from that in which the Roman comedians
ordinary types of the New Attic comedy, that
ible *verve* of T. Middleton (1574–1624), the
ıctivity of Fletcher, the observant humour of
1590–*c.* 1640), and the artistic versatility of
to mention many later and lesser names—
ınumerable pictures of contemporary life the
e and foibles of mankind. As comedians of
than one of these surpassed the old master,
listinctness and correctness,—the fruits of the
ing genius that ever fitted a learned sock to
lities of life,—but in a lightness which did not
ureness of touch; while in the construction
ıccess of abundant new materials, and the
city in treatment which is the result of
ıxperience, enabled them to maintain a steady
us our comic dramatic literature from Jonson
ınsurpassed as a comedy of manners, while as
ıaracter it at least defies comparison with any
literary growth preceding or contemporane-
Though the younger generation, of which W.
1611 or 1615–1643) may be taken as an
unequal in originality or force to its prede-
ıo little exhausted was the vitality of the
ts traditions survived the *interregnum* of the
ıd connected themselves in some measure with
of English comedy.

against which in its closing period the old
a had to contend have been already noticed.
ıks and triumphs at court and at the houses
, with their Olympuses and Parnassuses built
s, and filled with goddesses and nymphs clad
us costumes designed by his inventive hand,
geants and shows by land and water,—from
ournaments at Whitehall to the more philoso-
at the Inns of Court and the academical plays
ities,—down even to the brief but thrilling
citements of Bartholomew Fair and the
motions" of the puppets,—in all these ways
ctions of the theatrical public were tempted
n performers—French and Spanish actors,
ch actresses—paid visits to London. But the
ıa held its ground. The art of acting main-
ıt least on the level to which it had been
Shakespeare's associates and contemporaries,
Heminge, Alleyn, Lewin, Taylor, and others
sort." The profession of actor came to be
ly than of old separated from that of
ıough they were still (as in the case of Field)
ımbined. But this rather led to an increased
of artistic merit in actors who valued the
ir own profession and whose co-operation the
; to esteem as of independent significance.
purged from the barbarism of the old school
Women's parts were still acted by boys, many
ned to considerable celebrity; and a practice
inued which placed the English theatre at a
lisadvantage as compared with the Spanish
ver obtained), and which probably to some
l upon the licence of expression assumed
tists. The arrangement of the stage, which
pid succession of scenes without any necessity
; organically connected with one another, remained essentially the same as in Shakespeare's days, though the primitive expedients for indicating locality had begun to be occasionally exchanged for scenery more or less appropriate to the place of action. Costume was apparently cultivated with much greater care; and there is no reason to suppose that the English stage of this period had not gone as far as was expedient in a direction in which in feebler times so vast an amount of effort has come to be spent. The drama still depended in the main upon its literary essentials and upon the actor's art; but the system of prologues and epilogues, and of dedications to published plays, was more uniformly employed than it had been by Shakespeare as the conventional method of recommending authors and actors to the favour of individual patrons, and to that of their chief patron, the public.

The drama and Puritanism.

Up to the outbreak of the Civil War the drama in all its forms continued to enjoy the favour or good-will of the court, although a close supervision was exercised over all attempts to make the stage the vehicle of political references or allusions. The regular official agent of this supervision was the Master of the Revels; but under James I. a special ordinance, in harmony with the king's ideas concerning the dignity of the throne, was passed "against representing any modern Christian king in plays on the stage." The theatre could hardly expect to be allowed a liberty of speech in reference to matters of state denied to the public at large; and occasional attempts to indulge in the freedom of criticism dear to the spirit of comedy met with more or less decisive repression and punishment.[1] But the sympathies of the dramatists were so entirely on the side of the court, that the real difficulties against which the theatre had to contend came from a directly opposite quarter. With the growth of Puritanism the feeling of hostility to the stage increased in a large part of the population, well represented by the civic authorities of the capital. This hostility found many ways of expressing itself. The attempts to suppress the Blackfriars theatre (1619, 1631, 1633) proved abortive; but the representation of stage plays continued to be prohibited on Sundays, and during the prevalence of the plague in London in 1637 was temporarily suspended altogether. The desire of the Puritans of the more pronounced type openly aimed at a permanent closing of the theatres. The war between them and the dramatists was accordingly of a life-and-death kind. On the one hand, the drama heaped its bitterest and often coarsest attacks upon whatever savoured of the Puritan spirit; gibes, taunts, caricatures in ridicule and aspersion of Puritans and Puritanism make up a great part of the comic literature of the later Elizabethan drama and of its aftergrowth in the reigns of the first two Stuarts. This feeling of hostility, to which Shakespeare was no stranger,[2] though he cannot be connected with the authorship of one of its earliest and coarsest expressions,[3] rose into a spirit of open defiance in some of the masterpieces of Ben Jonson;[4] and the comedies of his contemporaries and successors[5] abound in caricatured reproductions of the more common or more extravagant types of Puritan life. On the other hand, the moral defects, the looseness of tone, the mockery of ties sanctioned by law and consecrated by religion, the tendency to treat middle-class life as the hunting-ground for the amusements of the upper classes, which degraded so much of the dramatic literature of the age, intensified the Puritan opposition to all and any stage plays. A patient endeavour to reform instead of suppressing the drama was not to be looked for from such adversaries, should they ever possess the means of carrying out their views; and so soon as Puritanism should victoriously assert itself in the state, the stage was doomed. Among the attacks directed against it in its careless heyday of prosperity Prynne's *Histrio Mastix* (1632), while it involved its author in shamefully cruel persecution, did not remain wholly without effect upon the tone of the dramatic literature of the subsequent period; but the quarrel between Puritanism and the theatre was too old and too deep to end in any but one way, so soon as the latter was deprived of its protectors. The Civil War began in August 1642; and early in the following month was published the Ordinance of the Lords and Commons, which, after a brief and solemn preamble, commanded "that while these sad causes and set-times of humiliation do continue, public stage plays shall cease and be forborne." Many actors and playwrights followed the fortunes of the royal cause in the field; some may have gone into a more or less voluntary exile; upon those who lingered on in the familiar haunts the hand of power lay heavy; and though there seems reason to believe that dramatic entertainments of one kind or another continued to be occasionally presented, stringent ordinances gave summary powers to magistrates against any players found engaged in such proceedings (1647), and bade them treat all stage-players as rogues, and pull down all stage galleries, seats, and boxes (1648). A few dramatic works were published in this period; while at fairs about the country were acted farces called "drolls," consisting of the most vulgar scenes to be found in popular plays. Thus, the life of the drama was not absolutely extinguished; and its darkest day proved briefer than perhaps either its friends or its foes could have supposed.

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[1] Chapman, Marston (and Jonson), *Eastward Hoe* (1605); Middleton, *A Game at Chess* (1624); Shirley and Chapman, *The Ball* (1632); Massinger (?), *The Spanish Viceroy* (1634).

[2] *Twelfth Night.*

[3] *The Puritan, or The Widow of Watling Street,* by "W. S." (Wentworth Smith ?)

[4] *The Alchemist; Bartholomew Fair.*

[5] Chapman, *An Humorous Day's Mirth;* Marston, *The Dutch Courtesan;* Middleton, *The Family of Love.*

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Already "in Oliver's time" private performances took place from time to time at noblemen's houses and (though not undisturbed) in the old haunt of the drama, the Red Bull. In 1656 the ingenuity of Sir William Davenant (1606–1669), whose name, though not otherwise eminent in our dramatic literature, is memorable as connecting together two distinct periods in it, ventured on a bolder step in the production of a quasi-dramatic entertainment "of declamation and music;" and in the following year he brought out with scenery and music a piece which was afterwards in an enlarged form acted and printed as the first part of his opera, *The Siege of Rhodes*. This entertainment he afterwards removed from the private house where it had been produced to the Cockpit, where he soon ventured upon the performance of regular plays written by himself. Thus, under the cover of two sister arts, whose aid was in the sequel to prove by no means altogether beneficial to its progress, the English drama had boldly anticipated the Restoration, and was no longer hiding its head when that much desired event was actually brought about. Soon after Charles II.'s entry into London, two theatrical companies are known to have been acting in the capital. For these companies patents were soon granted, under the names of "the Duke (of York)'s" and "the King's Servants," to Davenant and one of the brothers Killigrew respectively,—the former from 1662 acting at Lincoln's Inn Fields, then at Dorset Garden in Salisbury Court, the latter from 1663 at the Theatre Royal near Drury Lane. These companies were united from 1682, a royal licence being granted in 1695 to a rival company which performed in Lincoln's Inn Fields, and which migrated to Covent Garden in 1733. Meanwhile Vanbrugh had in 1705 built the theatre in the Haymarket; and a theatre in Goodman's Fields—afterwards rendered famous by the first appearance of Garrick—led a fitful existence from 1729 to 1733. The Act of 1737 deprived the Crown of the power of licensing any more theatres; so that the history of the English stage for a long period was confined to a limited area. The rule which prevailed after the Restoration, that neither of the rival companies should ever attempt a play produced by the other, operated beneficially both upon the activity of dramatic authorship and upon the progress of the art of acting, which was not exposed to the full effects of that deplorable spirit of personal rivalry which leads actors, in order to outshine their fellows, to attempt parts for which they often have no special qualification. There can be little doubt that the actor's art has rarely flourished more in England than in the days of T. Betterton (1635–1710) and his contemporaries, among whose names those of Hart, Mohun, Kynaston, Nokes, Mrs Barry, Mrs Betterton, Mrs Bracegirdle, and Mrs Eleanor Gwynne have, together with many others, survived in various connections among the memories of the Restoration age. No higher praise has ever been given to an actor than that which Addison bestowed upon Betterton, in describing his performance of *Othello* as a proof that Shakespeare could not have written the most striking passages of the character otherwise than he has done.

It may here be noticed, that the fortunes of the Irish theatre in general followed those of the English, of which of course it was merely a branch. Of native dramatic compositions in earlier times not a trace remains in Ireland; and the drama was introduced into that country as an English exotic—apparently already in the reign of Henry VIII., and more largely in that of Elizabeth. The first theatre in Dublin was built in 1635; but in 1641 it was closed, and even after the Restoration the Irish stage continued in a precarious condition till near the end of the century.

Already in the period preceding the outbreak of the civil war the English drama had perceptibly sunk from the height to which it had been raised by the great Elizabethans. When it had once more recovered possession of that arena with which no living drama can dispense, it would have been futile to demand that the dramatists should return altogether into the ancient paths, unaffected by the influences, native or foreign, in operation around them. But there was no reason why the new drama should not, like the Elizabethan, be true in spirit to the higher purposes of the dramatic art, to the nobler tendencies of the national life, and to the eternal demands of moral law. Because the later Stuart drama was as a whole untrue to these, and, while following its own courses, never more than partially returned from the aberrations to which it condemned itself, its history is that of a decay which the indisputable brilliancy, borrowed or original, of many of its productions is incapable of concealing.

Owing in part to the influence of the French theatre, which by this time had taken the place of the Spanish as the ruling drama of Europe, the separation between tragedy and comedy is clearly marked in our post-Restoration plays. Comic scenes are still occasionally introduced into tragedies by some of our dramatists who adhered more closely to the Elizabethan models (such as Otway and Crowne), but the practice fell into disuse; while the endeavour to elevate comedy by pathetic scenes and motives is one of the characteristic marks of the beginning of another period in our dramatic literature. The successive phases through which English tragedy passed in the later Stuart times cannot be always kept distinct from one another; and the guidance offered by the theories put forth by some of the dramatists in support of their practice is often delusive. Following the example of Corneille, Dryden and his contemporaries and successors were fond of proclaiming their adherence to this or that principle of dramatic construction or form, and of upholding, with much show of dialectical acumen, maxims derived by them from French or other sources, or elaborated with modifications and variations of their own, but usually amounting to little more than what Scott calls "certain romantic whimsical imitations of the dramatic art." The student of the drama will find much both to entertain and to instruct him in these prefaces, apologies, dialogues, and treatises; he will acknowledge that Dryden's incomparable vigour does not desert him either in the exposing or in the upholding of fallacies; and that even Rymer,[1] usually regarded as having touched the nadir of dramatic criticism, is not wholly without grains of salt. But Restoration tragedy itself must not be studied by the light of Restoration criticism. So long as any dramatic power remained in our tragic poets—and it is absent from none of the chief among them from Dryden to Rowe—the struggle between fashion (disguised as theory) and instinct (tending in the direction of the Elizabethan traditions) could never wholly determine itself in favour of the former.

Lord Orrery (1621–1679), in deference, as he declares, to the expressed tastes of his sovereign King Charles II. himself, was the first to set up the standard of *heroic plays.* This new species of tragedy (for such it professed to be) commended itself by its novel choice of themes, to a large extent supplied by recent French romance—the *romans de longue haleine* of the Scudérys and their contemporaries—and by French plays treating similar themes. It likewise borrowed from France that garb of rhyme which the English drama had so long abandoned, and which now reappeared in the heroic couplet. But the themes which to readers of novels might seem of their nature inexhaustible could not long suffice to satisfy the more capricious appetite of theatrical audiences; and the form, in the application it was sought to enforce for it, was doomed to remain an exotic. In conjunction with his brother-in-law Sir R. Howard (1626–1698),[2] and afterwards more confidently by himself,[3] Dryden (1631–1699) threw the incomparable vigour and brilliancy of his genius into the scale, which soon rose to the full height of fashionable popularity. At first he claimed for English tragedy the right to combine her native inheritance of freedom with these valuable foreign acquisitions.[4] Nor was he dismayed by the ridicule which the celebrated burlesque (by the duke of Buckingham and others) of *The Rehearsal* (1671) cast upon heroic plays, without discriminating between them and such other materials for ridicule as the contemporary drama supplied to its facetious authors, but returned to the defence of a species [5] which he was himself in the end to abandon. The desire for change proved stronger than the love of consistency—which in Dryden was never more than theoretical. After summoning tragedy to rival the freedom (without disdaining the machinery) of opera, he came to recognize in characterization the truest secret of the master-spirit of the Elizabethan drama,[6] and, after audaciously but not altogether unhappily essaying to rival Shakespeare on his own ground,[7] produced under the influence of the same views at least one work of striking merit.[8] But he was already growing weary of the stage itself as well as of the rhymed heroic drama; and though he put an end to the species to which he had given temporary vitality, he failed effectively to point the way to a more legitimate development of English tragedy. Among the other tragic poets of this period, N. Lee (1650–1690), in the outward form of his dramas, accommodated his practice to that of Dryden, with whom he occasionally co-operated as a dramatist, and like whom he allowed political partisanship to intrude upon the stage. His rhetorical genius was not devoid of genuine energy, nor is he to be regarded as a mere imitator. T. Otway (1651–1695), the most gifted tragic poet of the younger generation contemporary with Dryden, inherited something of the spirit of the Elizabethan drama; he possessed a real gift of tragic pathos and of expressive tenderness; but his genius had an alloy of impurity, and though he was often happy in his novel choice of themes, his efforts were as incomplete as his end was premature. T. Southerne (1660–1746) was likewise possessed of pathetic power; but his success was primarily due to his skill in the choice of "sensational" plots;[9] J. Crowne (d. *c.* 1703), Lord Lansdowne ("Granville the polite") (*c.* 1667–1735), Congreve, by virtue of a single long celebrated but not really remarkable tragedy,[10] and N. Rowe (1673–1718) may be further singled out from the list of the tragic dramatists of this period, many of whom were, like their comic contemporaries, mere translators or adapters from the French. The tragedies of Rowe, whose direct services to the study of Shakespeare are not to be forgotten, indicate with singular distinctness the transition from the fuller declamatory style of Dryden to the calmer and thinner manner of Addison. In tragedy (as to a more marked degree in comedy) the excesses (both of style and subject) of the past period of the English drama had produced an inevitable reaction; decorum was asserting its claims on the stage as in society; and French tragedy had set the example of sacrificing what passion—and what vigour—it retained in favour of qualities more acceptable to the "reformed" court of Louis XIV. Addison (1672–1719), in allowing his *Cato* to take its chance upon the stage, when a moment of political excitement (April 1713) ensured it an extraordinary success, to which no feature in it corresponds, except an unusual number of lines predestined to become familiar quotations, sealed the doom of English national tragedy. The "first reasonable English tragedy," as Voltaire called it, had been produced, and the oscillations of the tragic drama of the Restoration were at an end.

English comedy in this period displayed no similar desire to cut itself off from the native soil, though it freely borrowed the materials for its plots and many of its figures from Spanish, and afterwards more generally from French, originals. The spirit of the old romantic comedy had long since fled; the graceful artificialities of the pastoral drama, even the light texture of the mask, ill suited the demands of an age which made no secret to itself of the grossness of its sensuality. With a few unimportant exceptions, such poetic elements as admitted of being combined with the poetic drama were absorbed by the opera and the ballet. No new species of the comic drama formed itself, though towards the close of the period may be noticed the beginnings of modern English farce. Political and religious partisanship, generally in accordance with the dominant reaction against Puritanism, were allowed to find expression in the directest and coarsest forms upon the stage, and to hasten the necessity for a more systematic control than even the times before the Revolution had found requisite. At the same time the unblushing indecency which the Restoration had spread through court and capital had established its dominion over the comic stage, corrupting the manners, and with them the morals, of its dramatists, and forbidding them, at the risk of seeming Comedy dull. to be anything but improper. Much of this found its way even into the epilogues, which, together with the prologues, proved so important an adjunct of the Restoration drama. These influences determine the general character of what is with a more than chronological meaning termed the comedy of the Restoration. In construction, the national love of fulness and solidity of dramatic treatment induced its authors to alter what they borrowed from foreign sources, adding to complicated Spanish plots characters of native English directness, and supplementing single French plots by the addition of others. At the same time the higher efforts of French comedy of character, as well as the refinement of expression in the list of their models, notably in Molière, were alike seasoned to suit the coarser appetites and grosser palates of English patrons. The English comic writers often succeeded in strengthening the borrowed texture of their plays, but they never added comic humour without at the same time adding coarseness of their own. Such were the productions of Sir George Etherege (*c.* 1636–*c.* 1694), Sir Charles Sedley (*c.* 1639–*c.* 1728), and the other "gentlemen who wrote at ease;" nor was there any signal difference between their productions and those of a playwright-actor, such as J. Lacy (d. 1681), and a professional dramatist of undoubted ability, such as J. Crowne. Such, though often displaying the brilliancy of a genius which even where it sank could never wholly abandon its prerogative, were, it must be confessed, the comedies of Dryden himself. On the other hand, the lowest literary deeps of the Restoration drama were sounded by T. D'Urfey (1630–1723), while of its moral degradation the "divine Astræa," the "unspeakable" Mrs Aphra Behn (1642–1689) has an indefeasible title to be considered the most faithful representative. T. Shadwell (1640–1692), fated like the tragic poet Elkanah Settle (1648–1724), to be chiefly remembered as a victim of Dryden's satire, deserves more honourable mention. Like J. Wilson (d. 1690), whose plays seem to class him with the pre-Restoration dramatists, Shadwell had caught something not only of the art, but also of the spirit, of Ben Jonson; but in most of his works he was, like the rest of his earlier contemporaries, and like the brilliant group which succeeded them, content to take his moral tone from the reckless society for which, or in deference to the tastes of which, he wrote. The absence of a moral sense, which, together with a grossness of expression often defying exaggeration, characterizes our comic dramatists from the days of Dryden to those of Congreve, is the main cause of their failure to satisfy the demands which are legitimately to be made upon their art. They essayed to draw character as well as to paint manners, but they rarely proved equal to the former and higher task; and while choosing the means which most readily commended their plays to the favour of their immediate public, they achieved but little as interpreters of those essential distinctions which their art is capable of illustrating. Within these limits, though occasionally passing beyond them, and always with the same deference to the immoral tone which seemed to have become an indispensable adjunct of the comic style, even the greatest comic authors of this age moved. W. Wycherley (1640–1715) was a comic dramatist of real power, who drew his characters with vigour and distinctness, and constructed his plots and chose his language with natural ease. He lacks gaiety of spirit, and his wit is of a cynical turn. But while he ruthlessly uncloaks the vices of his age, his own moral tone is affected by their influence in as marked a degree as that of the most light-hearted of his contemporaries. The most brilliant of these was indisputably W. Congreve (1672–1728), who is not only one of the very wittiest of English writers, but equally excels in the graceful ease of his dialogue, and draws his charact[illegible] and constructs his plots with the same masterly skill. [illegible] chief fault as a dramatist is one of excess—the brillia[illegible] of the dialogue, whoever be the speaker, overpowers the [illegible]tinction between the "humours" of his personages. Tho[illegible] he is less brutal in expression than "manly" Wyche[illegible] and less coarse than the lively Sir J. Vanbrugh (*c.* 1[illegible] 1726), licentiousness in him as in them corrupt[illegible] spirit of his comic art; but of his best though not [illegible] successful play[1] it must be allowed that the issue of [illegible] main plot is on the side of virtue. G. Farquhar (1678–1707), whose morality is on a par with that of th[illegible] other members of this group, is inferior to them in brilliancy; but as pictures of manners in a wider sphere of life than that which contemporary comedy usually chose to illustrate, two of his plays deserve to be noticed, in which we already seem to be entering the atmosphere of the 18th century novel.[2]

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[1] *A Short View of Tragedy* (1693).
[2] *The Indian Queen.*
[3] *The Indian Emperor; Tyrannic Love; The Conquest of Granada.*
[4] *Essay of Dramatic Poesy.*
[5] *Essay of Heroic Plays.*
[6] *The Grounds of Criticism in Tragedy.*
[7] *All for Love* (*Antony and Cleopatra*).
[8] *Don Sebastian.*
[9] *Oroonoko; The Fatal Marriage.*
[10] *The Mourning Bride.*

The improvement which now begins to manifest itself in the moral tone and spirit of English comedy is partly due to the reaction against the reaction of the Restoration, partly to the punishment which the excesses of the comic stage had brought upon it in the invective of Jeremy Collier[3] (1698), of all the assaults the theatre in England has had to undergo the best-founded, and that which produced the most perceptible results. The comic poets, who had always been more or less conscious of their sins, and had at all events not defended them by the ingenious sophistries which it has pleased later literary criticism to suggest on their behalf, now began with uneasy merriment to allude in their prologues to the reformation which had come over the spirit of the town. Writers like Mrs Centlivre (*c.* 1678–1722) became anxious to reclaim their offenders with much emphasis in the fifth act; and Colley Cibber (1671–1757)—whose *Apology for his Life* furnishes a useful view of this and the subsequent period of the history of the stage, with which he was connected as author, manager, and actor (excelling in this capacity as representative of those fools with which he peopled the comic stage[4])—may be credited with the moral intention he claims to have kept in view throughout his career as a dramatist. Sir R. Steele (1671–1729), in accordance with his general tendencies as a writer, pursued a still more definite moral purpose in his comedies; but his genius perhaps lacked the sustained vigour necessary for a dramatist, and his humour naturally sought the aid of pathos. Accordingly, taking a hint from Colley Cibber, who so well understood the public taste, Steele, passing from partial[5] to more complete[6] experiment, became the founder of that *sentimental comedy* which exercised so depressing an influence upon the progress of our drama. Thus the two writers whose associated efforts so largely contributed to open a new and productive vein in our literature, both signally helped to hasten the decline of its dramatic branch. With *Cato* English tragedy committed suicide, though its pale ghost survived: with *The Conscious Lovers* English comedy sank into the tearful embrace of artificiality and weakness, from which it has never again altogether torn itself away.

It seems superfluous within the limits of a summary like the present to attempt to classify with any degree of minuteness the remaining phenomena in the history of our dramatic literature. During the 18th century its productions were still as a rule legitimately designed to meet the demands of the stage, from which its higher efforts afterwards to so large an extent became dissociated. But the demands of the stage and those of its patrons and of the public of the "Augustan" age, and of that which succeeded it, in general were fast bound by the trammels of a taste with which a revival of the poetic drama remained irreconcilable during a long period of our literature. There is every reason to conclude that the art of acting progressed in the same direction of artificiality, and stiffened into apparently immutable forms in such actors as Macklin and Quin. The genius of Garrick, whose theatrical career extended from 1741 to 1776, opened a new era in his art. His unparalleled success was due in the first instance to his incomparable natural gifts; but these were indisputably enhanced by a careful and continued literary training, and ennobled by a purpose which prompted him to essay the noblest, as he was capable of performing the most various, range of English theatrical characters. By devoting himself as actor and manager with special zeal to the production of Shakespeare, Garrick permanently popularized on the national stage the greatest creations of our drama, and indirectly helped to seal the doom of the surviving tendency to maintain in the most ambitious walks of our dramatic literature the nerveless traditions of the pseudo-classical school. A generation of celebrated actors and actresses, many of whom live for us in the drastic epigrams of Churchill's *Rosciad* (1761), were his helpmates or his rivals; but their fame has paled, while his is destined to endure as that of one of the typical masters of his art.

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[1] *The Double Dealer.*

[2] *The Recruiting Officer: The Beaux' Stratagem.*

[3] *A Short View of the Immorality and Profaneness of the English Stage.*

[4] *Sir Novelty Fashion (Lord Foppington)* in

[5] *The Lying Lover: The Tender Husband.*

[6] *The Conscious Lovers*

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The contrast between the tragedy of the 18th century and those plays of Shakespeare and one or two other Elizabethans which already before Garrick were known to the English stage, was indeed weakened by the mutilated form in which these generally, if not always, made their appearance there. Even so, however, there are perhaps few instances in theatrical history in which so strange a competition was so long sustained. In the hands of the tragic poets of the age of Pope, as well as of that of Johnson, tragedy had hopelessly stiffened into the forms of its accepted French models. Direct reproductions of these continued, as in the case of Ambrose Philips's (*c.* 1671–1749) and Charles Johnson's (1679–1748) translations from Racine, and Aaron Hill's (1685–1750) from Voltaire. Among other tragic dramatists of the earlier part of the century may be mentioned J. Hughes (1677–1720), who, after assisting Addison in his *Cato*, produced at least one praiseworthy tragedy of his own;[1] E. Fenton (1683–1730), a joint translator of "Pope's *Homer*" and the author of one extremely successful drama;[2] and L. Theobald (d. 1744), the first hero of the *Dunciad*, who, besides translations of Greek dramas, produced a few more or less original plays, one of which he was daring enough to father upon Shakespeare.[3] A more distinguished name is that of J. Thomson (1700–1748), whose unlucky *Sophonisba* and subsequent tragedies are, however, barely remembered by the side of his poems. The literary genius of E. Young (1681–1765), on the other hand, possessed vigour and variety enough to distinguish his tragedies from the ordinary level of Augustan plays; in one of them he seems to challenge comparison in the treatment of his theme with a very different rival;[4] but by his main characteristics as a dramatist he belongs to the school of his contemporaries. The endeavours of G. Lillo (1693–1739) to bring the lessons of tragedy home to his fellow-citizens were destined to exercise a powerful influence upon the early progress of the German drama, and not to remain without significance for the history of our own; but his pedestrian muse failed in the end to satisfy higher artistic demands than those met in his most popular play,[5] and broke down in the attempt to carry the terrors of *Macbeth* into the regions of domestic tragedy.[6] "Classical" tragedy in the generation of Johnson pursued the even tenor of its way, the dictator himself treading with solemn footfall in the accustomed path[7], and Mason (1725–1797) making the futile attempt to produce a close imitation of Greek models. The best-remembered tragedy of the century, Home's *Douglas* (1757), was the production of an author whose famous kinsman, David Hume, had advised him "to read Shakespeare, but to get Racine and Voltaire by heart." The indisputable merits of the play cannot blind us to the fact that *Douglas* is the child of *Merope*.

English
opera.

While thus no high creative talent arose to revive the poetic genius of English tragedy, comedy, which had to contend against the same rivals, naturally met the demands of the conflict with greater buoyancy. The history of the most formidable of those rivals forms no part of this sketch (see OPERA); but the points of contact between its progress and the history of our dramatic literature cannot be altogether left out of sight. H. Purcell's (1658–1695) endeavours to unite English music to the words of English poets were now a thing of the past; the isolated efforts of Addison[8] and others to recover the operatic stage for the native tongue had proved powerless. Italian texts, which had first made their entrance piecemeal, in the end asserted themselves in their entirety; and the German genius of Handel completed the triumphs of a form of art which no longer had any connection with the English drama, and which reached the height of its fashionable popularity about the time when Garrick began to adorn the national stage. In one form, however, the English opera was preserved as a pleasing species of the popular drama. The pastoral drama had (in 1725) produced an isolated aftergrowth in Allan Ramsay's *Gentle Shepherd*, which, with genuine freshness and humour, but without a trace of burlesque, transferred to the scenery of the Pentland Hills the lovely tale of Florizel and Perdita. The dramatic form of this poem is only an accident, but it doubtless suggested an experiment of a different kind to the most playful of London wits. Gay's "Newgate Pastoral" of *The Beggar's Opera* (1728), in which the amusing text of a burlesque farce was interspersed with songs set to popular airs, caught the fancy of the town by this novel combination, and became the ancestor of a series of agreeable productions, none of which, however, have ever rivalled it in celebrity. Among these the pieces of J. Bickerstaff[9] (*c.* 1735–*c.* 1788) and of C. Dibdin[10] (1745–1814) may be signalized. The opera in England as elsewhere thus absorbed what vitality remained to the pastoral drama, while to the ballet and the pantomime (whose glories in England began at Covent Garden in 1733, and to whose popularity even Garrick was obliged to defer) was left (in the 18th century at all events) the inheritance of the external attractions of the mask and the pageant.

Comedy;
Burlesque.

In the face of such various rivalries it is not strange that comedy, instead of adhering to the narrow path which Steele and others had marked out for her, should have permitted herself some vagaries of her own. Gay's example pointed the way to a fatally facile form of the comic art; and burlesque began to contribute its influence to the decline of comedy. In an age when party-government was severely straining the capabilities of its system, dramatic satire had not far to look for a source of effective seasonings. The audacity of H. Fielding (1707–1754), whose regular comedies (original or adapted) have secured no enduring remembrance, but whose love of parody was

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[1] *The Siege of Damascus.*

[2] *Mariamne.*

[3] *The Double Falsehood.*

[4] *The Revenge* (*Othello*).

[5] *George Barnwell.*

[6] *The Fatal Curiosity* (Act iii.).

[7] *Irene* (1749).

[8] *Rosamunda.*

[9] *Love in a Village*, &c.

[10] *The Waterman*, &c.

The Licensing Act.

afterwards to suggest to him the theme of the first of the novels which have made his name immortal, accordingly ventured in two extravaganzas[1] (so we should call them in these days) upon a larger admixture of political with literary and other satire. A third attempt[2] (which never reached the stage) furnished the offended minister, Sir Robert Walpole, with the desired occasion for placing a curb upon the licence of the theatre, such as had already been advocated by a representative of its old civic adversaries. The famous Act of 1737 asserted no new principle, but converted into legal power the customary authority hither exercised by the Lord Chamberlain (to whom it had descended from the Master of the Revels). The regular censorship which this Act established has not appreciably affected the literary progress of the English drama, and the objections which have been raised against it seem on candid consideration untenable. The liberty of the stage is a question differing in its conditions from that of the liberty of speech in general, or even from that of the liberty of the press; and occasional lapses of official judgment weigh lightly in the balance against the obvious advantages of a system which in a free country needs only the vigilance of public opinion to prevent its abuse. The policy of the restraint which the Act of 1737 put upon the number of playhouses is a different, but has long become an obsolete, question.

Comedy in the latter half of the 18th century.

Brought back into its accustomed grooves, English comedy seemed inclined to leave to farce the domain of healthy ridicule, and to coalesce with domestic tragedy in the attempt to make the stage a vehicle of home-spun didactic morality. Farce had now become a genuine English species, and has as such retained its vitality through all the subsequent fortunes of the stage; it was actively cultivated by Garrick as both actor and author, but the very best farce of this age is ascribed to clerical authorship.[3] S. Foote (1720–1761), whose comedies[4] and farces are distinguished both by wit and by variety of characters (though it was an absurd misapplication of a great name to call him the English Aristophanes), introduced into comic acting the abuse of personal mimicry, for the exhibition of which he ingeniously invented a series of entertainments, the parents of a long progeny of imitations. Meanwhile the domestic drama of the sentimental kind had achieved its greatest success in *The Gamester* of E. Moore (d. 1757); and sentimental comedy courted sympathetic applause in the works of A. Murphy (1727–1801), the single comedy of W. Whitehead[5] (1714–1785), and the earliest of H. Kelly[6] (1714–1785). It cannot be said that this species was extinguished, as it is sometimes assumed to have been, by O. Goldsmith (1728–1774); but his admirable character-comedy of *The Good-Natured Man*, and his delightfully brisk and fresh *She Stoops to Conquer*, after startling critical propriety from its self-conceit, taught comedy no longer to fear being true to herself. The most successful efforts of the elder G. Colman (1733–1794)[7] had in them something of the spirit of genuine comedy, besides a finish which, however playwrights may shut their eyes to the fact, is one of the qualities which ensure a long life to a play. And in the masterpieces of R. B. Sheridan (*c.* 1752–1816) some of the happiest features of the comedy of Congreve were revived, together with its too uniform brilliancy of dialogue, but without its indecency of tone. The varnish of the age is indeed upon the style, and the hollowness of its morality in much of the sentiment (even where that sentiment is meant for the audience) of *The Rivals* and *The School for Scandal*; but in tact of construction, in distinctness of characters, and in pungency of social satire, they are to be ranked among the glories of English comedy. Something in Sheridan's style, but quite without his brilliancy, is the most successful play[8] of the unfortunate General Burgoyne (d. 1792). R. Cumberland (1732–1811), who too consciously endeavoured to excel both in sentimental morality and in comic characterization, in which he was devoid of depth, closes the list of authors of higher pretensions who wrote for the theatre. Like him, Mrs Cowley[9] ("Anna Matilda") (1743–1809), T. Holcroft[10] (1744–1809), and G. Colman the younger[11] (1762–1836), all writers of popular comedies, as well as the prolific J. O'Keefe (1746–1833), who contributed to nearly every species of the comic drama, survived into our century. To an earlier date belong the favourite burlesques of O'Keefe's countryman K. O'Hara[12] (d. 1782), good examples of a species the further history of which may be left aside. In the hands of at least one living writer, J. R. Planché, it has proved capable of satisfying a more refined taste than his successors have habitually consulted.

The decline of dramatic composition of the higher drama, perceptible in the history of the English theatre about the beginning of the 19th century, is attributed by Scott to the wearing out of the French model that had been so long wrought upon; while, as he points out, the new impulse which was sought in the dramatic literature of Germany was derived from some of its worst, instead of from its noblest, productions—from Kotzebue rather than from Lessing, Schiller, and Goethe. But the change which was coming over English literature was in truth of a wider and deeper nature than it was possible for even one of its chief representatives to perceive. As that literature freed itself from the fetters so long worn by it as indispensable ornaments, and threw aside the veil which had so long obscured both the full glory of its past and the lofty capabilities of its future, it could not resort except tentatively to a form which like the dramatic is bound by a hundred bonds to the life of the age itself. Soon, the poems with which Scott and Byron, and the unrivalled prose fictions with which Scott both satisfied and stimulated the imaginative demands of the public, diverted the attention of the cultivated classes from dramatic literature, which was unable to escape, with the light foot of verse or prose fiction, into "the new, the romantic land." New themes, new ideas, new forms occupied a new generation of writers and readers; nor did the drama readily lend itself as a vessel into which to pour so many fermenting elements. In Byron (1788–1824) the impressions produced upon a mind not less open to impulses from without than subjective in its way of recasting them, called forth a series of dramatic attempts betraying a more or less wilful ignorance of the demands of dramatic compositions; his beautiful *Manfred*, partly suggested by Goethe's *Faust*, and his powerful *Cain*, have but the form of plays; his tragedies on Italian historical subjects show some resemblance in their political rhetoric to the contemporary works of Alfieri; his *Werner* is a hastily-dramatized sensation novel. To Coleridge (1772–1834), who gave to English literature a fine though inaccurate translation of Schiller's *Wallenstein*, the same poet's *Robbers* (to which Wordsworth's only dramatic attempt, the *Borderers*, is likewise indebted) had probably suggested the subject of his tragedy of *Osorio*, afterwards acted under the title of *Remorse*. For perior to this is his later drama of *Zapolya*, a genuine mage to Shakespeare, out of the themes of two of iose plays it is gracefully woven. Scott, who in his rlier days had translated Goethe's *Götz von Berlich- gen*, gained no reputation by his own dramatic mpositions. W. S. Landor (1775–1864), apart from ose *Imaginary Conversations* upon which he best ved to expend powers of observation and character- ation such as have been given to few dramatists, cast in formally dramatic mould studies of character of which e value is far from being confined to their wealth beauties of detail. Of these the magnificent, but in nstruction altogether undramatic, *Count Julian* is the ost noteworthy. Shelley's (1792-1822) *The Cenci*, on e other hand, is not only a poem of great beauty, but drama of true power, abnormally revolting in its theme, at singularly pure and delicate in treatment. A humbler iche in the temple of our dramatic literature belongs to me of the plays of C. R. Maturin[1] (1782–1824), Sir T. N. alfourd[2] (1795–1854), and Dean Milman[3] (1791–1868). ivorced, except for moments, from the stage, English amatic literature in its higher forms can in the present ntury no longer be regarded as a connected national owth, though it would be rash to deny that with the lated efforts of individual poets future developments y connect themselves. Among living poets Sir H. ylor has perhaps approached nearest to the objective rit and the fullness of style of the Elizabethan drama; H. Horne survives as a worthy representative of modern Romantic school; Matthew Arnold has dignity of form of his classic models, Longfellow the aceful facility of a mellow literary culture; while Browning's insight into the secrets of human character, d A. C. Swinburne's gift of passionate poetic speech, true dramatic qualities. By his *Hannibal* J. Nichol s likewise made a noteworthy contribution to the higher rature of our drama. The latest English dramatic poet Tennyson, whose homage to the national form of the his- ic drama may be hopefully interpreted as a promise the future possibly awaiting it. Far greater is the mber of those English writers of the present century o, while seeking to preserve a connection between the mands of the stage and their dramatic productions, re addressed themselves to the theatrical rather than literary public—since such a distinction must needs drawn. The respect paid by her contemporaries to the destly simple and judiciously concentrated efforts of s Joanna Baillie (1762–1851) entitles her to remem- nce in the annals of literature as well as those of the ge; but it would be going too far to make a similar ex- tion in favour of the plays of Sheridan Knowles '84–1862) or of the late Lord Lytton (1806–1873). At present day the theatre commands the services of many hors of talent, a few of whose most successful productions y peradventure be destined to survive the age which re birth to them. But here, if anywhere, the task of ection must be left to time.

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[1] *Pasquin; The Historical Register for* 1736.

[2] *The Golden Rump.*

[3] Townley, *High Life Below Stairs* (1759).

[4] *The Minor; Taste; The Author*, &c.

[5] *The School for Lovers.*

[6] *False Delicacy*

[7] *The Jealous Wife; The Clandestine Marriage.*

[8] *The Heiress.*

[9] *The Belle's Stratagem; A Bold Stroke for a Husband*, &c.

[10] *The Road to Ruin*, &c.

[11] *John Bull; The Heir at Law*, &c.

[12] *Midas; The Golden Pippin.*

The history of the English stage in the present century been one of gradual decline and decay, not (especially the present day) without prospects of recovery, of which praiseworthy hopefulness is ever willing to make the st. At the beginning of the century the greatest tragic ress of the English theatre, Mrs Siddons, had passed prime; and before its second decade had closed, not y she (1812), but her brother John Kemble (1817), the resentative of a grand style of acting upon which the sent generation would hardly dare to look, had with- wn from the boards. Mrs Siddons was soon followed into retirement by her successor Miss O'Neill (1819); while Kemble's brilliant later rival, Edmund Kean, an actor the intuitions of whose genius seem to have supplied, so far as intuition ever can supply, the absence of a steady self-culture, remained on the stage till his death in 1833. Young, Macready, and others handed down some of the traditions of the older school of acting to the very few who remain to suggest its semblance to the living generation. But even these—among whom a tribute of gratitude is specially due to Helen Faucit and S. Phelps—are now lost (or all but lost) as active members to the theatre, and they have left no school behind them. The comic stage has been fortunate in an ampler aftergrowth, from generation to generation, of the successors of the old actors who live for us in the reminiscences of Charles Lamb; nor are the links all snapped which bind the humours of the present to those of the past. It is least of all in any spirit of depreciation that the efforts of the actors of our day, in any branch of the art, should be discussed. But it is right to point out that these efforts are carried on under conditions of a partly novel character, to which the actors are forced to submit. No art stands in greater need of the help of training,—an advantage with which the modern English actor is virtually obliged to dispense. No art stands in greater need of the relief of change in the subjects of its exercise,—but the modern English actor is made to look forward, as to the height of success, to playing the same character for three hundred nights. No art stands in greater need of the guidance of criticism,—but the modern English actor is too often left to criticise himself. Finally, none stands in greater need of the protection of self-respect,—but there are few theatres in England which are not from time to time degraded in deference to tastes which in earlier days not Puritan censors only would have called by a simpler name.

The reaction against the theatre, which set in with the spread of the religious movement at the close of the last century, had the natural effect of lowering instead of raising its tone and manners, as well as those of the literature designed to supply its immediate demands. With the growth of that enlightenment which is inseparable from tolerance, this reaction seems to be giving place to a counter-reaction; while on the other hand, a larger section of the educated classes have begun to take an interest in the progress of the national drama, and the world of fashion is condescending to follow the impulse. Dramatic criticism, too—a branch of English literature to which from the days of Steele to those of Hazlitt so many writers of mark were ready to devote their efforts, but which had more recently often fallen into hands either unequal to the task or disdainful of it—seems here and there awakening to a sense of its higher duties. But all this will not permanently recover the stage for its higher tasks, or reunite to it a living dramatic literature, unless an object of serious moment for the future of the nation is pursued in a serious spirit, and unless it is thought worth while to devise means suited to this end. In a word, so long as there is no national theatre which, removed above the conditions of a commercial speculation, can cultivate the art to which it is dedicated for the sake of that art itself, the future of the English drama will be at the mercy of the likings of London, and of the adoption of those likings by the London which is not London, and by the "provinces," as in theatrical matters they are only too appropriately called. The time may come when it will be recognized that the progress and culture of a people depend upon its diversions as well as upon its occupations; and that the interests of a national art are not unworthy the solicitude of thoughtful statesmen.

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[1] *Bertram.* [2] *Ion* [3] *Fazio.*

The history of the GERMAN drama differs widely from that of our own, though a close contact is observable between them at an early point, and again at relatively recent points, in their annals. The dramatic literature of Germany, though in its beginnings intimately connected with the great national movement of the Reformation, soon devoted its efforts to a sterile imitation of foreign models; while the popular stage, persistently suiting itself to a robust but gross taste, likewise largely due to the influence of foreign examples, seemed destined to a hopeless decay. The literary and the acted drama were thus estranged from one another during a period of extraordinary length; nor was it till the middle of the 18th century that, with the opening of a more hopeful era for the life and literature of the nation, the reunion of dramatic literature and the stage began to accomplish itself. Before the end of the same century the progress of the German drama in its turn began to influence that of other nations, and by the widely comprehensive character of its literature, as well as by the activity of its stage, to invite a steadily increasing interest.

Towards the close of the Middle Ages, as has been seen, dramatic performances had in Germany as in England largely fallen into the hands of the civic guilds, and the composition of plays was more especially cultivated by the *master-singers* of Nuremberg and other towns. Thus, while the scholars of the German Renaissance, who so largely became the agents of the Reformation, eagerly dramatized, both in the Latin and the native tongue, the narratives of the Bible, and sought to suit the scholastic drama to the demands of the times (P. Rebhun,[1] a protegee of Luther, standing foremost among those religious dramatists), it was under the influence of the Reformation also, and of the impulse given by Luther and others to the use of High German as the popular literary tongue, that Hans Sachs, the immortal shoemaker of Nuremberg, seemed destined to become the father of the popular German drama. In his plays, "spiritual," secular," and *Fastnachtsspiele* alike, the interest indeed lies in the dialogue rather than in the action, nor do they display any attempt at development of character. In their subjects, whether derived from Scripture, or from popular legend and fiction,[2] there is no novelty, and in their treatment no originality. But the healthy vigour and fresh humour of this marvellously fertile author, and his innate sympathy with the views and sentiments of the burgher class to which he belonged, were elements of genuine promise—a promise which the event was signally to disappoint. Though the manner of Hans Sachs found a few followers, and is recognizable in the German popular drama even of the beginning of the 17th century, the literature of the Reformation, of which his works may claim to form part, was soon absorbed in labours of a very different kind. The stage, after admitting novelties introduced from Italy or (under Jesuit supervision) from Spain, was subjected to another and enduring influence. Among the foreign actors of various nations who flitted through the innumerable courts of the empire, or found a temporary home there, special prominence was acquired, towards the close of the 16th and in the early years of the 17th century, by the "English comedians," who appeared at Cassel, Wolfenbüttel, Berlin, Dresden, Cologne, &c. Through these players a number of early English dramas found their way into Germany, where they were performed in more or less imperfect versions, and called forth imitations by native authors. Duke Henry Julius of Brunswick-Luneburg[3] (1564-1613) and Jacob Ayrer (a citizen of Nuremberg, where he died, 1605) represent the endeavours of the early German drama to suit its still uncouth forms to themes suggested by English examples; and in their works, and in those of contemporary playwrights, reappears no small part of what we may conclude to have been the "English comedians'" *répertoire*.[4] (The converse influence of German themes brought home with them by the English actors, or set in motion by their strolling ubiquity, cannot have been equal in extent, though Shakespeare himself may have derived the idea of one of his plots[5] from such a source.) But though welcome to both princes and people, the exertions of these foreign comedians, and of the native imitators who soon arose in the earliest professional companies of actors known in Germany, instead of bringing about a union between the stage and literature, led to a directly opposite result. The popularity of these strollers was owing partly to the (very real) blood and other horrors with which their performances were deluged, partly to the buffoonery with which they seasoned, and the various tricks and feats with which they diversified them. The representatives of the English clowns had learnt much on their way from their brethren in the Netherlands, where in this period the art of grotesque acting greatly flourished. Nor were the aids of other arts neglected,—to this day in Germany professors of the "equestrian drama" are known by the popular appellation of "English riders." From these true descendants of the mimes, then, the professional actors in Germany inherited a variety of tricks and traditions; and soon the favourite figures of the popular comic stage became conventional, and were stereotyped by the use of masks. Among these, an acknowledged supremacy was acquired by the native *Hans Wurst* (Jack Pudding)—of whose name Luther disavowed the invention, and who is known already to Hans Sachs—the privileged buffoon, and for a long series of generations the real lord and master, of the German stage. If that stage, with its grossness and ribaldry, seemed likely to become permanently estranged from the tastes and sympathies of the educated classes, the fault was by no means entirely its own and that of its patron the populace. The times were evil times for a national effort of any kind; and poetic literature was in all its branches passing into the hands of scholars who were often pedants, and whose language was a jargon of learned affectations. Thus things continued, till the awful visitation of the Thirty Years' War cast a general blight upon the nation, and the traditions of the popular theatre were left to the guardianship of the marionettes (*Puppenspiele*)!

When, in the midst of that war, German poets once more began to essay the dramatic form, the national drama was left outside their range of vision. M. Opitz (1597-1639), who holds an honoured place in the history of the German language and literature, in this branch of his labours contented himself with translations of classical dramas and of Italian pastorals—among the latter one of Rinuccini's *Daphne*, with which the history of the opera in Germany begins. A. Gryphius (1616–1664), though as a comic dramatist lacking neither vigour nor variety, and acquainted with Shakespearian[6] as well as Latin and Italian examples, chiefly devoted himself to the imitation of Latin, earlier French, and Dutch tragedy, the rhetorical dialogue of which he effectively reproduced in the Alexandrine metre. Neither the turgid dramas of D. C. von Lohenstein (1665–1684), for whose *Cleopatra* the honour of having been the first German tragedy has been y claimed, nor even the healthier comedies of Chr. (1642–1708) were brought upon the stage; while igious plays of J. Klay (1616–1656) are mere recita- onnected with the Italian growth of the *oratorio.* rigid allegories commemorative of contemporary with which the learned from time to time supplied atre, and the pastoral dramas with which the idyllic f Nuremb g—"the shepherds of the Pegnitz"—after se of the war gratified the peaceful longings of their citizens, were alike mere scholastic efforts. These l continued in the universities and *gymnasia* to keep he love of both dramatic composition and dramatic entation, and to encourage the theatrical taste which many students into the professional companies. But r these dramatic exercises nor the *ludi Cæsarei* in the Jesuits at Vienna revived the pomp and ntry, and the mixture of classical and Christian dism, of the Italian Renaissance, had any influence the progress of the popular drama.

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[1] *Susanna* (*Geistl. Spiel*) (1536), &c.

[2] *Siegfried; Eulenspiegel*, &c.

[3] *Susanna; Vincentius Ladislaus*, &c.

[4] *Mahomet; Edward III.; Hamlet; Romeo and Juliet*, &c.

[5] *The Tempest* (Ayrer, *Comedia v. d. Schönen Sidea*).

[6] *Herr Peter Squenz* (*Pyramus and Thisbe*); *Horribilicribrifax* (Pistol).

e history of the German stage remains to about the d decennium of the 18th century one of the most choly, as it is in its way one of the most instructive, ers of theatrical history. Ignored by the world of , the actors in return deliberately sought to cipate their art from all dependence upon literary ial. Improvisation reigned supreme, not only in where *Hans Wurst*, with the aid of Italian examples, ceased to charm his public, but in the serious drama se (in which, however, he also played his part) se *Haupt- und Staatsactionen* (high-matter-of-state- s), the plots of which were taken from the old stores English comedians, from the religious drama and its a, and from the profane history of all times. The f this period is "Magister" J. Velthen, who at the head mpany of players for a time entered the service of the court, and by producing comedies of Molière and writers sought to restrain the licence which he had lf carried beyond all earlier precedent, but who had back into the old ways and the old life. His career its the climax of the efforts of the art of acting to alone; after his death (*c.* 1693) chaos ensues. The ng companies, which now included actresses, con- l to foster the popular love of the stage, and even its most degraded form to uphold its national cter against the rivalry of the opera, and that of the n *commedia dell'arte.* From the latter was borrowed quin, with whom *Hans Wurst* was blended, and who e a standing figure in every kind of popular play. stablished his rule more especially at Vienna, where about 1712 the first permanent German theatre was ained. But for the actors in general there was little nence, and amidst miseries of all sorts, and under rowing ban of clerical intolerance, the popular stage d destined to hopeless decay.

e first endeavours to reform what had thus apparently d beyond all reach of recovery were neither wholly nerally successful; but this does not diminish the r due to two names which should never be mentioned ut respect in connection with the history of the a. Friderica Caroline Neuber's (1690–1760) bio- y is the story of a long-continued effort which, not- tanding errors and weaknesses, and though, so far as ersonal fortunes were concerned, it ended in failure, almost be described as heroic. As directress of a any of actors which from 1727 had its headquarters ipsic (hence the new school of acting is called the ic school), she resolved to put an end to the form- s of the existing stage, to separate tragedy and y, and to extinguish Harlequin. In this ndeavour was supported by the Leipsic professor J. Chr. Gottsched (1672–1766), who induced her to establish French tragedy and comedy as the sole models of the regular drama. Literature and the stage thus for the first time joined hands, and no temporary mischance or personal misunderstanding can obscure the enduring significance of the union. Not only were the abuses of a century swept away from a representative theatre, but a large number of literary works, designed for the stage, were produced on it. It is true that they were but versions or imitations from the French (or in the case of Gottsched's *Dying Cato* from the French and English),[1] and that at the moment of the regeneration of the German drama new fetters were thus imposed upon it, and upon the art of acting at the same time. But the impulse had been given, and the beginning made. On the one hand men of letters began to subject their dramatic compositions to the test of performance; the tragedies and comedies of J. E. Schlegel (1718–1749), the artificial and sentimental comedies of Cha F. Gellert (1715–1769) and others, together with the vigorous popular comedies of the Danish dramatist Holberg, were brought into competition with translations from the French. On the other hand, the Leipsic school exercised a continuous effect upon the progress of the art of acting, and before long the Garrick of Germany, C. Eckhof (1720–1778), began a career, outwardly far humbler than that of the great English actor, but which made his art a fit subject for the critical study of scholars, and his profession one for the equal esteem of honourable men.

Eckhof.

Lessing.

Among the authors contributing to Mme. Neuber's Leipsic enterprise had been a young student destined to complete, after a very different fashion and with very different aims, the work which she and Gottsched had begun. The critical genius of G. E. Lessing (1729–1781) is peerless in its comprehensiveness, as in its keenness and depth; but if there was any branch of literature and art which by study and practice he made pre-eminently his own, it was that of the drama. As bearing upon the progress of the German theatre, his services to its literature, both critical and creative, can only be described as inestimable. The *Hamburgische Dramaturgie*, a series of criticisms of plays and (in its earlier numbers) of actors, was undertaken in furtherance of the attempt to establish at Hamburg the first national German theatre (1767–9). This alone would invest these papers with a high significance; for though the theatrical enterprise proved abortive, yet it established the principle upon which the future of the theatre in all countries depends, that for the dramatic art the immediate theatrical public is no sufficient court of appeal. But the direct effect of the *Dramaturgie* was to complete the task Lessing had in previous writings begun, and to overthrow the dominion of the arbitrary French rules and the French models established by Gottsched. Lessing vindicated its real laws to the drama, made clear the difference between the Greeks and their would-be representatives, and established the claims of Shakespeare as the modern master of both tragedy and comedy. His own dramatic productivity was cautious, tentative, progressive. His first step was, by his *Miss Sara Sampson* (1755), to oppose the realism of the English domestic drama to the artificiality of the accepted French models, in the forms of which Chr. F. Weisse (1726–1804) was seeking to treat the subjects of Shakespearian plays.[2] Then, in his *Minna von Barnhelm* (1767) he essayed a national comedy drawn from real life, and appealing to patriotic sentiments as well as to broad human sympathies, written in prose (like *Miss Sara Sampson*), but in form holding a judicious mean between French and English examples.

The note sounded by the criticisms of Lessing met with a

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[1] Deschamps and Addison.

[2] *Richard III.*; *Romeo and Juliet.*

Efforts of the theatre and of literature.

ready response, and the productivity displayed by the nascent dramatic literature of Germany is astonishing both in the efforts inspired by his teachings and in those which continued to controvert, or which aspired to transcend them. On the stage, Harlequin and his surroundings proved by no means easy to suppress, more especially at Vienna, the chosen home of frivolous amusement; but even here a reform was gradually effected, and, under the intelligent rule of the emperor Joseph II., a national stage grew into being. The mantle of Eckhof fell upon the shoulders of his eager younger rival, F. L. Schröder (1743–1816), who was the first to domesticate Shakespeare upon the German stage. In dramatic literature few of Lessing's earlier contemporaries produced any works of permanent value, unless the religious dramas of F. G. Klopstock (1724–1803)—a species in which he had been preceded by J. J. Bodmer (1698–1783)—and the patriotic *Bardietten* of the same author be excepted. S. Gessner (1730–1787), J. W. L. Gleim (1719–1803), and G. K. Pfeffel (1736–1809) composed pastoral plays. But a far more potent stimulus prompted the efforts of the younger generation. The translation of Shakespeare, begun in 1762 by C. M. Wieland (1733–1813), whose own plays possess no special significance, and completed in 1775 by Eschenburg, which furnished the text for many of Lessing's criticisms, helps to mark an epoch in German literature. Under the influence of Shakespeare, or of their conceptions of his genius, arose a youthful group of writers who, while worshipping their idol as the representative of nature, displayed but slight anxiety to harmonize their imitations of him with the demands of art. The notorious *Ugolino* of H. W. von Gerstenberg (1737–1823) seemed a premonitory sign that the coming flood might make a circular motion back to the extravagances and horrors of the old popular stage; and it was with a sense of this danger in prospect that Lessing in his third important drama, the prose tragedy *Emilia Galotti* (1772), set the example of a work of incomparable nicety in its adaptation of means to end. But successful as it proved, it could not stay the excesses of the *Sturm und Drang* period which now set in. Lessing's last drama, *Nathan the Wise* (1779), was not measured to the standard of the contemporary stage, but it was to exercise its influence in the progress of time,—not only through causing a reaction in tragedy from prose to blank verse (first essayed in Brawe's *Brutus*, 1770), but through ennobling and elevating by its moral and intellectual grandeur the branch of literature to which in form it belongs.

The Sturm und Drang.

Meanwhile the young geniuses of the *Sturm und Drang* had gone forth, as worshippers rather than followers of Shakespeare, to conquer new worlds. The name of this group of writers, more remarkable for their collective significance than for their individual achievements, was derived from a drama by one of the most prolific of their number, M. F. von Klinger[1] (1752–1801); other members of the fraternity were J. A. Leisewitz[2] (1752–1806), M. R. Lenz[3] (1750–1792), and F. Müller[4] the "painter" (1750–1825). The youthful genius of the greatest of German poets was itself under the influences of this period, when it produced the first of its masterpieces. But Goethe's *Götz von Berlichingen* (1773), both by the choice and treatment of its national theme, and by the incomparable freshness and originality of its style, holds a position of its own in German dramatic literature. Though its defiant irregularity of form prevented its complete success upon the stage, yet its influence is far from being represented by the series of mostly feeble imitations to which it gave rise. The *Ritterdramen* (plays of chivalry) had their day like similar fashions in drama or romance;
but the permanent effect of *Götz* was to have crus
an iron hand the last remnants of theatrical conven
(those of costume and scenery included), and to ha
guished with them the lingering respect for rules a
tions of dramatic composition which even Less
treated with consideration. Its highest significan
ever, lies in its having been the first great drama
of a great national poet, and having definitively a
the national drama with the poetic glories of the
literature.

Thus in the classical period of that literature, o
Goethe and Schiller were the ruling stars, the dram
full share of the loftiest of its achievements. O
the dramatic works of Goethe vary so widely in f
character, and connect themselves so intimately
different phases of the development of his own s
mined poetic genius, that it was impossible for any
to become the starting-points of any general growth
history of the German drama. His way of com
was, moreover, so peculiar to himself—conceptio
preceding execution by many years, part being a
part under the influence of new sentiments and i
views of art, flexibly followed by changes of for
the history of his dramas cannot be severed from hi
poetic and personal biography. His *Clavigo* and
which succeeded *Götz*, are domestic dramas in pro
neither by these, nor by the series of charming
and operas which he composed for the Weimar cou
any influence be exercised upon the progress of the
drama. In the first conception of his *Faust*, he ha
sought the suggestion of his theme partly in popula
partly in a domestic motive familiar to the autho
Sturm und Drang (the story of Gretchen); the la
tions to the *First Part*, and the *Second Part* gener
the results of metaphysical and critical studies and
tions belonging to wholly different spheres of tho
experience. The dramatic unity of the whole is
the most, external only; and the standard of jud
be applied to this wondrous poem is not one of
criticism. *Egmont*, originally designed as a co
to *Götz*, was not completed till many years
there are few dramas more effective in parts, but
of a historic play is lost in the elaboration of t
graceful of love episodes. In *Iphigenia* and
Goethe exhibited the perfection of form of w
classical period had enabled him to acquire the
but the sphere of the action of the former (perfect
it is as a dramatic action), and the nature of th
latter, are equally remote from the demands of the
stage. Schiller's genius, unlike Goethe's, was
and consistently suited to the claims of the theat
juvenile works, *The Robbers*, *Fiesco*, *Kabale* u
(*Intrigue and Love*), vibrating under the influen
age of social revolution, mingled in their prose
truthful expression of passion with no small el
extravagance. But with true insight into the de
his art, and with unequalled single-mindedness
devotion to it, Schiller gradually emancipated him
his earlier style; and with his earliest tragedy
Don Carlos, the first period of his dramatic a
ends, and the promise of the second announces it
works which belong to this—from the *Wallenstei*
to *Tell*—are the acknowledged master-pieces of th
poetic drama, treating historic themes reconstr
conscious dramatic workmanship, and clothing
logue in a noble vestment of rhetorical verse. I
these, *The Bride of Messina*, Schiller attempted a
of the chorus of Greek tragedy; but the endea
a splendid error, and destined to exercise no lasti

Schiller's later dramas gradually conquered t over which his juvenile works had triumphantly passed, but on which his *Don Carlos* had met with a cold welcome. For a long time, however, its favourites were authors of a very different order, who suited themselves to the demands of a public little concerned with the literary progress of the drama. After popular tastes had oscillated between the imitators of *Götz* and those of *Emilia Galotti*, they entered into a more settled phase as the establishment of standing theatres at the courts and in the large towns increased the demand for good "acting" plays. Famous actors, such as Schröder and A. W. Iffland (1759–1814), sought by translations or compositions of their own to meet the popular likings, which largely took the direction of that irrepressible favourite of theatrical audiences, the sentimental domestic drama. But the most successful purveyor of such wares was an author who, though not himself an actor, understood the theatre with professional instinct,—A. von Kotzebue (1761-1819). His productivity ranged from the domestic drama and comedy of all kinds to attempts to rival Schiller and Shakespeare in verse; and though his popularity (which ultimately proved his doom) brought upon him the bitterest attacks of the Romantic school and other literary authorities, his self-conceit is not astonishing, and it seems time to say that there is some exaggeration in the contempt which has been lavished upon him by posterity. Nor should it be forgotten that German literature had hitherto failed to furnish the comic stage with any successors to *Minna von Barnhelm*; for Goethe's efforts to dramatize characteristic events or figures of the Revolutionary age[1] must be dismissed as failures, not from a theatrical point of view only. The joint efforts of Goethe and Schiller for the Weimar stage, important in many respects for the history of the German drama, at the same time reveal the want of a national dramatic literature sufficient to supply the needs of a theatre endeavouring to satisfy the demands of art.

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[1] *Die Zwillinge* (*The Twins*); *Die Soldaten*, &c.

[2] *Der Hofmeister* (*The Governor*), &c.

[3] *Julius von Tarent.*

[4] *Genoveva*, &c.

Meanwhile the so-called Romantic school of German literature was likewise beginning to extend its labours to original dramatic composition. From the universality of sympathies proclaimed by this school, to whose leaders Germany owed its classical translation of Shakespeare,[2] and an introduction to the dramatic literatures of so many ages and nations,[3] a variety of new dramatic impulses might be expected; while much might be hoped for the future of the national drama (especially in its mixed and comic species) from the alliance between poetry and real life which they preached, and which some of them sought personally to exemplify. But in practice universality presented itself as peculiarity or even as eccentricity; and in the end the divorce between poetry and real life was announced as authoritatively as their union had been. Outside this school, the youthful talent of Th. Körner (1791-1813), whose early promise as a dramatist[4] might perhaps have ripened into a fulness enabling him not unworthily to occupy the seat left vacant by his father's friend Schiller, was extinguished by a patriotic death. The efforts of M. von Collin (1776–1823) in the direction of the historical drama remained isolated attempts. But of the leaders of the Romantic school, A. W. (1767–1845)[5] and F. von Schlegel[6] (1772–1829), contented themselves with frigid classicalities; and L. Tieck (1772–1855), in the strange alembic of his *Phantasus*, melted legend and fairy-tale, novel and drama,[7] poetry and satire, into a compound, enjoyable indeed, but hardly so in its entirety, or in many of its parts, to any but the literary mind. F. de la Motte-Fouqué (1777–1843) infused a spirit of poetry into the chivalry drama. Clemens Brentano (1777–1842) was a fantastic dramatist unsuited to the stage. Here a feeble outgrowth of the romanticists, the "destiny dramatists" Z. Werner[8] (1768–1823), A. Müllner[9] (1774–1829), and C. E. v. Houwald[10] (1778–1845), achieved a temporary *furore*; and it was with an attempt in the same direction[11] that the Austrian dramatist F. Grillparzer (1791–1871) began his long career. He is assuredly what he pronounced himself to be, the foremost of the later dramatic poets of Germany, unless that tribute be paid to the genius of H. von Kleist (1776–1811), who in his short life produced besides other works a romantic drama[12] and a rustic comedy[13] of genuine merit, and an historical tragedy of singular originality and power.[14] Grillparzer's long series of plays includes poetic dramas on classical themes[15] and historical subjects from Austrian history.[16] The Romantic school, which through Tieck had satirized the drama of the *bourgeoisie* and its offshoots, was in its turn satirized by A. Count von Platen-Hallermünde's (1796–1835) admirable imitations of Aristophanic comedy.[17] Among the objects of his banter were the popular play-wright E. Raupach, and K. Immermann (1796–1840), a true poet, who is, however, less generally remembered as a dramatist. F. Hebbel[18] (1813–1863) is justly ranked high among the foremost later dramatic poets of his country, few of whom equal him in intensity. Other names of literary mark are those of Chr. D. Grabbe (1801–1836), J. Mosen (1803–1867), O. Ludwig (1813–1865), and "F. Halm" (1806–1871), and, among living writers, K. Gutzkow, G. Freytag, and H. Laube. The last of these names recalls in one of their most noteworthy examples the long-continued and systematic efforts which have raised the modern German stage to the position at present occupied by it among the theatres of Europe. These efforts have not been confined to fostering the art of acting in a succession of eminent representatives, among whom the sons of L. Devrient in various ways acquired a reputation worthy of their name, and B. Dawison was accounted the equal of the most brilliant of the brotherhood, or to maintaining as intimate a relation as possible between the stage and literature. Happily contrasting with other countries by the number and variety of its centres of intellectual life—rivals in artistic effort even where political or social rivalry is out of the question—Germany has not only cherished its own national drama, but with a catholicity of taste, aided by the powers of a language admirably adapted for translation, has opened its theatre to the dramatic masterpieces of other nations also, and more especially of our own. The German theatre has its weak points, and has not maintained itself wholly free from vicious influences; but upon the whole its efforts are on a level with the demands of the national culture, and in harmony with the breadth and variety of the national intelligence. No other stage furnishes the same opportunities for the study of dramatic literature.

Later dramatist.

The German stag of the present day.

Dutch drama.

With this summary of the history of the German drama it is necessary to close this survey. To be even nominally complete, it would have had to take into account the fortunes of more than one other modern European drama. Among these the DUTCH is interesting both in its beginnings,

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[1] *Der Grosskophta* (Cagliostro); *Der Bürgergeneral.*

[2] A. W. Schlegel and Tieck's (1797–1833).

[3] A. W. S., *Lectures on Dramatic Art and Literature*, &c.

[4] *Zriny*, &c.

[5] *Ion.*

[6] *Alarcos.*

[7] *Kaiser Octavianus; Der Gestiefelte Kater* (*Puss in Boots*), &c.

[8] *Der 24 Februar.*

[9] *Die Schuld* (*Guilt*).

[10] *Das Bild* (*The Picture*).

[11] *Die Ahnfrau* (*The Ancestress*).

[12] *Das Käthchen* (*Kate*) *von Heilbronn.*

[13] *Der Zerbrochene Krug* (*The Broken Pitcher*).

[14] *Prinz Friedrich von Homburg.*

[15] *Sappho, Medea*, &c.

[16] *König Ottokar's Glück und Ende* (*Fortune and Fall*); *Der Bruderzwist* (*Fraternal Feud*) *in Habsburg.*

[17] *Die Zerbrochene Gabel* (*The Broken Fork*); *Der Romantische Œdipus.*

[18] *Die Nibelungen; Judith*, &c.

Scandinavian drama.

Holberg.

which resemble those of the German—the influence of the so-called chambers of the *rederykers* (rhetoricians), from the early years of the 15th century onwards, resembling that of the master-singers of contemporary Germany. The earliest of their efforts, which so effectively tempered the despotism of both church and state, seem to have been of a dramatic kind; and a manifold variety of allegories, moralities, and comic entertainments (*esbatementen* or comedies, *kluiten* and *factien* or farces) enhanced the attractions of those popular pageants in which the Netherlands surpassed all other countries of the North. The art of acting flourished in the Low Countries even during the troubles of the great revolt; but the birth of the regular drama was delayed till the advent of quieter times. Dutch dramatic literature begins, under the influence of the classical studies cherished in the seats of learning founded before and after the close of the war, with the classical tragedies of S. Koster (*c.* 1585–*c.* 1650). The romantic dramas and farces of Gerbrand Bredero and the tragedies of Hooft belong to the same period; but its foremost dramatic poet was J. van den Vondel (1587–1659), who from an imitation of classical models passed to more original forms of dramatic composition, including a patriotic play[1] and a dramatic treatment of part of what was to form the theme of *Paradise Lost*. But Vondel had no successor of equal mark. The older form of Dutch tragedy—in which the chorus still appeared—was, especially under the influence of the critic A. Pels, exchanged for a close imitation of the French models, Corneille and Racine; nor was the attempt to create a national comedy successful. Thus no national Dutch drama was permanently called into life. Still more decidedly the dramatic literature of the SCANDINAVIAN peoples springs from foreign growths; but Denmark, where the beginnings of the drama in the plays of the schoolmaster Chr. Hansen recall the mixture of religious and farcical elements in contemporary German efforts, at a later date produced a comic dramatist of thorough originality and of a wholly national cast. L. Holberg (1684–1754), one of the most noteworthy comic poets of modern literature, not only marks an epoch in the dramatic literature of his native land, but he contributed to overthrow the trivialities of the German stage in its worst period, which he satirized with merciless humour,[2] and set an example, never surpassed, of a series of comedies[3] deriving their types from popular life and ridiculing with
healthy directness those vices and follies
proper theme of the most widely effective
comic drama. Among his followers P. A.
1860) is specially noted. Under the
Romantic school, whose influence has
long-lived as in the Scandinavian north, A.
(1779–1850) began a new era of Danish
productivity, which belongs partly to his
to German literary history, turned from
themes; and other writers followed him in
to revive the figures of Northern
reaction recently observable in Danish
against the supremacy of the Romantic
expected to produce results in the drama,
perhaps of those already attested by the
living Norwegian dramatists, H. Ibsen
Björnson.

Lastly, the history of the RUSSIAN
earliest or religious form is stated to have
from Poland (early in the 12th century),
forms an outgrowth of Western civilization.
popular puppet-show called *vertep*, which
of the 17th century began to treat
themes, had helped to foster the
people; but the Russian regular drama
enough had its origin in the cadet corps at
a pupil of which, A. Sumarokoff (1718–177
as the founder of the modern Russian
tragic poet he seems to have imitated
though treating themes from the national
others the famous dramatic subject of the
He also translated *Hamlet*. As a comic
stated to have been less popular than as a
it is in comedy that he would seem to
noteworthy successors. Among these it is
pass by the empress Catharine II. (1729-
comedies seem to have been satirical
and foibles of her subjects, and who in
well as in a tragedy had the courage to
speare. Comedy aiming at social satire
flourish in Russia to the present day,
recently possessed) a representative of
Ostrovsky of Moscow. The church is
tected against the satire of the stage in
the Czar, but in all other directions *except*
licence appears to be allowed to the drama.

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[1] *Gysbrecht van Æmstel.*

[2] *Ulysses of Ithaca.*

[3] *The Politician-Tinman; Jean de France or Hans Frandsen; The Lying-In*, &c.

[4] *Aladdin; Correggio.*

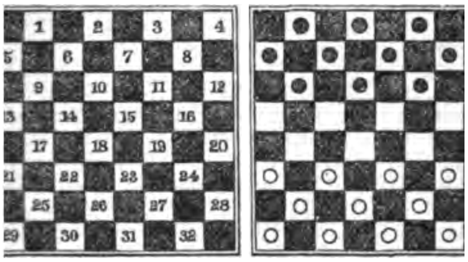
DRAMBURG, a town of Prussia, at the head of a circle in the government of Köslin, about fifty miles east of Stettin. It occupies both banks of the River Drage, a subtributary of the Oder, is inclosed by walls and defended by a fort, contains a hospital and various administrative offices, and carries on cotton and woollen weaving, tanning, brewing, and distilling. Population in 1875, 5625.

DRAMMEN, a town in the amt of Buskerud, in Norway, is situated at the northern end of the Drammen fiord, a western arm of Christiania fiord, at the mouth of the Dramselv. It consists of the three places Bragernäs or Bragnäs, Strömsö, and the port Tangen, the first on the north, and the other two on the south side of the river. The greater part of the town has been rebuilt since the conflagrations of 1866 and 1870. The principal industrial establishments are oil, cotton, and tobacco factories, breweries, tanneries, sawmills, and iron foundries. An active trade in wood, pitch, and iron is carried on. The population at the end of December 1875 was 18,838.

DRAUGHTS, a game of unknown
sider it to be a very old game, but
Pastimes) calls it a "modern invention."
tioned in the older editions of the *Académie*
in the *Compleat Gamester*, so, if an old
formerly an important one. As early as
published a treatise on draughts, at Paris,
was played in Europe at least a century
Romans played a similar game called
moving diagonally, capturing by leaping
ing superior power when they arrived at the
of squares. The board, however, consisted
squares. It is believed that πεσσοί among
a similar game with a central space "
barrier;" and representations of a kind of
are frequently found on the monuments of the
tians (Wilkinson).

Draughts is played by two persons.
diagram) is required, and twenty-four

d twelve black—which at starting are disposed on the ard as in the diagram. Either the white or black uares may be played on (the latter being now more ual). If the black squares are used the board must be



aced with a black square in the left hand corner; if the hite squares are used, it is placed as in diagram.

The game is played by moving a man, one square at a me, along the diagonal to the right or left. Thus a man laced on square 18 in diagram can move to 15 or 14. ach player moves alternately, the first move being decided y lot.

As soon as a man is moved on the square adjacent to an pponent's man, and there is an unoccupied square beyond, he unprotected man may be *captured* and removed from he board. Thus, if there is a white man on square 18, nd a black man on square 14, square 9 being vacant, and hite having to move, he jumps over 14 and remains on quare 9, and the man on 14 is taken up.

If two or more men are so placed that one square interences between each they may all be taken at one move. Thus if white having to move has a man on 29, and black men on 25, 18, and 10, the intermediate squares and square 6 being vacant, white could move from 29 to 6, and take the men on 25, 18, and 10. In making such a move with a man, all the steps must be forward, that is, in the direction away from the player, just as in making simple moves and captures.

It is compulsory to take if able. If a player has a man *en prise*, and makes a move that does not capture, his adversary may allow the move to stand without penalty, or he may have the move retracted and compel the player to take, or he may allow the move to stand and remove the man that neglected to capture from the board (called *huffing*). "Huff and move" go together, *i.e.*, the player who huffs then makes his move. The huff must be made before the move. If the adversary of the player who fails to capture allows the move to stand, without huffing, and the player who can capture moves again without taking, the adversary again has the options he had before. If a player can take one man in one place and more than one in another, he may take in which place he pleases, not being obliged to capture the larger number of men. But if he elects to take the larger number, he must take all of that lot that are *en prise*, or he may be huffed from where he stands when he has taken a portion of the men, or he may be compelled to take the remainder, or the incomplete move may be allowed to stand.

As soon as a man reaches one of the squares furthest from his side of the board, *e.g.*, when a white man (see diagram) reaches square 1, 2, 3, or 4, or a black man square 29, 30, 31, or 32, he is *crowned* by placing one of the captured men of his own colour on him, and becomes a *king*. A king has the additional power of moving and taking backwards, *i.e.*, toward his own side of the table, as well as forwards. But on becoming a king the move ends, notwithstanding that there may be an adverse man *en prise*. Thus if there are black men on squares 7 and 6, a white one on 9, and squares 2 and 11 are unoccupied, white having to move takes the man on square 6 and becomes a king; but he cannot take the man on square 7 at the same move. A king can be huffed for not taking, the same as a man, with the exception just pointed out.

The game proceeds until one of the players has all his men and kings taken, or has all those left on the board *blocked*, so that he has no more left. If it should so happen that neither of the players has sufficient advantage in force or position to enable him to win, the game is drawn. The player having the stronger force may be required to win in forty moves (*i.e.*, forty on each side), computed from the move on which notice was given; if he fail, the game is drawn.

The game of draughts has been exhausted, *i.e.*, the reply to every possible move is known by all proficients, and as there is no advantage in moving first, every game ought to end in a draw. Under these circumstances rules for playing are of but little use; the only way to become a player is to study the analyses laid down in works on the subject, and to know them by heart. For beginners, however, it may be stated that men should as a rule be played to the middle of the board rather than to the sides, as in the middle the man attacks two squares, at the side only one. It is good play to push for a king early in the game. Also, as soon as a player has any advantage in force, he should exchange whenever he can. When the forces are equal the position of *having the move* should be striven for. To have the move means to occupy such a position as to be able to secure the last move. For example, place kings of opposite colours at 19 and 12. If the king at 12 is next to move, the king at 19 has the move and must win; but if the king at 19 is next to move, the other king has the move and the game must be drawn. Having the move does not always win. Thus at the beginning of a game the second player has the move, but at this stage it is of no use to him. When a player is in a cramped position it is often disadvantageous to have the move.

In order to ascertain who has the move, divide the squares into two systems of four columns each, the columns of one system being those which commence with the numbers 29, 30, 31, and 32 (see diagram), and end with the numbers 5, 6, 7, and 8, the remainder being the columns of the other system. Add together all the men and kings which stand in either system, and if their sum is odd the next player has the move, if even the last player has the move. For example, white has men or kings at squares 26 and 32, black at 28 and 19. There are three pieces on one system and one on the other, both odd. If white is the next player he has the move. An exchange generally, but not always, changes the move; so, when about to exchange, the player should prefer an exchange that will keep the move, or, not having it, an exchange that will gain it. To discover whether an exchange will change the move add together all the capturing pieces in both systems, and if they are odd and the captured pieces are also odd, the move is not changed by an exchange; the same rule applies if they are both even; but if one is even and the other odd, an exchange changes the move.

The laws of draughts used in match play are Anderson's, but so few matches at draughts are played that there is scarcely any demand for them, and they are out of print. Omitting those which relate only to match play, the following is an abridgment of Anderson's laws.

1. In a series of games the players take the white and black men alternately. Black has the first move, whether the previous game was won or drawn. 2. A player whose turn it is to play touching a man must move it, except he gives notice of adjusting the man; if it cannot be moved, he loses the game. 3. If a man is moved over an angle of the square on which it is stationed, the move must be completed in that direction. 4. The move is completed as soon as the hand is withdrawn from the man played to another square.

5. If a player who has the option of huffing touches the man he is entitled to remove, he must huff. 6. A false move loses the game. 7. If a player capture one of his own men by error, the adversary may have it replaced or not. 8. When more than one man can be taken at one move, the player must not remove his hand from the capturing man until he has taken all he can; if he does so the move is completed, and he is liable to be huffed. 9. When a player pushes a man to king, his adversary is bound to crown it. 10. Each player must move within a specified time [the time is generally three, five, or six minutes by previous agreement, unless there is only one way of taking or one move on the board, when only two minutes are as a rule allowed]. 11. The player having the stronger force may have notice given him to win in forty moves; when two kings remain against one, in twenty moves. When the odds of the draw are given, and the situations may be rendered equal by repeating the same manœuvres, the player giving the odds may be required to win in twenty moves.

POLISH DRAUGHTS was formerly played on a board of a hundred squares with forty men; but it is now more frequently played with an ordinary draught-board and men, the men being placed at starting as at draughts. The men move and take as at draughts, except that in capturing they move either forwards or backwards like a draught king. A man arriving at a crowning square becomes a queen and has the move of a bishop at chess. In her capture she takes any unguarded man or queen in any diagonal she commands, leaping over the captured man or queen and remaining on any unoccupied square she chooses of the same diagonal, beyond the piece taken. But if there is another unguarded man she is bound to choose the diagonal on which it can be taken. For example, place a queen on square 29, and adverse men at squares 22, 16, 24, 14. The queen is bound to move from 29 to 11, 20, 27, and having made the captures to remain at 9 or 5, whichever she prefers.

The capturing queen or man must take all the adverse pieces that are *en prise*, or that become so by the uncovering of any square from which a piece has been removed during the capture, *e.g.*, white queen at square 7, black at squares 10, 15, 19, 22, and 27, the queen captures at 10, 22, 27, and 19, and the piece at 22 being now removed, she must go to 15, take the man at 18, and stay at 22, 25, or 29. In consequence of the intricacy of some of these moves it is the rule to remove every captured piece as it is taken.

If a man arrives at a crowning square when taking, and he can still continue to take, he must do so, and not stay on the crowning square as at draughts. Passing a crowning square in taking does not entitle him to be made a queen.

In capturing, the player must choose the direction by which he can take the greatest number of men or queens, or he may be huffed. Numerical power is the criterion, *e.g.*, three men must be taken in preference to two queens. If the numbers are equal and one force comprises more queens than the other, the player may take whichever lot he pleases.

A single queen against three queens can draw. If one player has a queen and man, and the other three queens, the best play is to sacrifice the man, as the draw is more certain with the queen alone.

When two men of one colour are played on a diagonal with one vacant square between them (*e.g.*, at squares 16 and 27), the position is called a *lunette*. If the adversary enters the *lunette* he must capture one of the pieces which compose it. Before entering a lunette it is advisable to calculate what the position will be after a capture, as the position is sometimes intentionally left as a trap.

William Payne, *Introduction to the Game of Draughts*, London, 1756; W. Painter, *Companion to the Draught Player*, 1767; Joshua Sturges, *Guide to the Game of Draughts*, London, 1800 (re-edited by Walker, 1835; reprinted with additions by Martin in Bohn's *Handbook of Games*, 1850); Henry Spayth, *The American Draught Player*. (H. J.)

DRAWING. Although the verb to draw has various meanings, the substantive *drawing* is confined by usage to that of design, and is treated as if it were a synonym of design. The word comes from the Latin *trahere*, or from a kindred Gothic word, so that traction and drawing are nearly related, and preserve still the same meaning when applied to the work of animals or machines, as we say that a traction engine draws so many tons. Another form of the same word is dray, the strong low vehicle used by brewers and carriers. It may be worth while to inquire what is the connection between the idea of a dray horse and that of a drawing-master.

The primitive idea, which is the common origin of both senses of the word to draw, is that of moving something in one's own direction. Thus, a horse draws a plough; but a carpenter does not draw his plane, he pushes it; and we should say that a locomotive drew a train when the locomotive was in front, but not when it was behind. The same idea is preserved in the fine arts. We do not usually say, or think, that a sculptor is drawing when he is using his chisel, although he may be expressing or defining forms, nor that an engraver is drawing when he is pushing the burin with the palm of the hand, although the result may be the rendering of a design. But we do say that an artist is drawing when he uses the lead pencil, and here we have a motion bearing some resemblance to that of the horse or engine. The fingers of the artist draw the pencil point along the paper. The analogy may be clearly seen in certain circumstances. When the North American Indians shift their camps they frequently tie a tent-pole on each side of the horse like a shaft, leaving the ends to drag along the ground, whilst their baggage is laid on cross pieces. Here we have a very close analogy with artistic drawing. The poles are drawn on the ground as a pencil is on paper, and they leave marks behind them corresponding to the lines of the pencil.

The same analogy may be observed between two of the senses in which the French verb *tirer* is frequently employed. This verb is not derived from *trahere*, but may be ultimately traced, like our own verb *to tear*, to the Ionic δείρω. It was formerly used by good writers in the two senses of our verb to draw. Thus Lafontaine says, "Six forts chevaux *tiraient* un coche;" and Caillières wrote, "Il n'y a pas longtemps que je me suis fait *tirer* par Rigaud," meaning that Rigaud had drawn or painted his portrait. At the present day the verb *tirer* has fallen into disuse amongst cultivated Frenchmen with regard to the drawing and painting, but it is still universally used for all kinds of design and even for photography by the common people. The cultivated use it still for printing, as for example "cette gravure sera tirée à cent exemplaires," but here rather in the sense of pulling than of drawing.

A verb much more nearly related to the English verb to *draw* is *traire*, which has *trait* for its past participle. It comes from *trahere*, and is so little altered as to be scarcely even a corruption of the original Latin form. *Traire* is now used exclusively for milking cows and other animals, and the analogy between this and artistic drawing is not obvious at first, nevertheless there is a certain analogy of motion, the hand passing down the teat draws the milk downwards. The word *trait* is much more familiar in connection with art as "les traits du visage," the natural markings of the face, and it is very often used in a figurative sense, as we [illegible] character." It is quite familiar in portrait[illegible] retrahere.

The an[illegible] which expressed mov[illegible] clearly the [illegible] ing was done in line (*delineare*) [illegible] re), though there are reasons for [illegible] words were often indiscriminately app[illegible] e modern Italians have

and *trarre*, they use *delineare* still in the sense
lrawing, and also *adombrare*.

k verb γράφειν is familiar to the English reader
e" and in many compounds, such as photo-
It is worth observing that the Greeks seem to
dered drawing and writing as essentially
ocess, since they used the same word for both.
to the early identity of the two arts when
s a kind of writing, and when such writing as
rned to practise was essentially what we should
g, though of a rude and simple kind. "The
hieroglyphics of Egypt," says Dr Wilson (*Pre-*
n, chap. xviii.), "is clearly traceable to the
m of picture-writing, the literal figuring of the
gned to be expressed. Through a natural series
ve stages this infantile art developed itself into
lphabet, the arbitrary symbols of sounds of the
a." Even in the present day picture writing is
ently resorted to by travellers as a means of
nselves intelligible. There is also a kind of art
iting in the modern sense and drawing at the
such as the work of the mediæval illuminators
nuscripts.

al processes by which man has gradually become
w, in our modern sense of the word, may
like the development of a chicken in the egg,
ng specimens at various stages of formation.
forts are remarkable for their highly abstract
ecause the undeveloped intellect has few and
, and takes what it perceives in nature without
rrassed by the rest. It seizes upon facts rather
ances, and the primitive artist is satisfied when
been clearly stated or conveyed by him. The
pearances, and the effort to render them, come
and the complete knowledge of appearances is
a very high state of civilization, implying most
tistic culture both in the artist and in the public
addresses himself. The work of the primitive
ffirmation of the realities that he knew without
onfusion. In all early Egyptian work you see
t the artist intended to draw, whereas the finest
wing is often so mysterious as to be most
hose who have not made a special study of the
The primitive artist knew that his work
hat of a writer, and as the sign-painter of the
takes care to make his letters plain in order
ay be read, so the early Egyptian draftsman
ght of any more delicate truth of appearance
hich sufficed to let people clearly understand
ures and symbols were intended for. There
ception of what artists call "effect," which
he greater part of modern drawing, until a very
period.

mention briefly two survivals of primitive art
lay, which have for their purpose a high degree
. These are coats-of-arms and trade-marks.
awing, when properly done, is executed on
inciples, and is a survival of the earliest uses
rt, being really a kind of writing intended to
ble by the illiterate when they saw it on shield
Modern trade-marks, of which the use has
nded of late years, are of the same class, and
signed with a simplicity of intention like that
tiquity.

rms of drawing are thus not all extinct even in
, and certain arts are practised among us which
modern mind to recover by effort and study
f that simplicity and decision which were
n earlier ages. Book-binding, illuminating,
g for pottery are often rightly practised in these days in an archaic spirit. In some of the best modern caricatures there are peculiarities which belong to early symbolic drawing, in which, as Dr Wilson says, "the figures are for the most part grotesque and monstrous from the very necessity of giving predominance to the special feature in which the symbol is embodied."

Delineation.

The first idea of drawing is always *delineation*, the marking out of the subject by lines, the notion of drawing without lines being of later development. In primitive work the outline is hard and firm, but interior markings are given also. When the outline was complete, the primitive artist would proceed at once in many cases to fill up the space inclosed by it with flat colour, but he did not understand light and shade and gradation. The historical development of drawing may always be seen in the practice of children when left to draw for their amusement. They begin, as the human race began, with firm outlines, representing men and animals, usually in profile. The next thing they do, if left to their own instincts, is to fill up the spaces so marked out with colours, the brightest they can get. This is genuine primitive art.

Difficulties of a definition.

Definition.

By referring to the earliest kind of drawing we perceive how drawing may exist without certain elements which in modern times are usually associated with it. We generally conceive of drawing in close association with perspective, and at least with some degree of light and shade, but it may exist independently of both. This may perhaps help us to a definition of drawing. Such a definition would need to be exceedingly comprehensive, or else it would certainly exclude some of the many arts into which drawing more or less visibly enters. A modern critic would be very likely to say that a figure was deficient in drawing if it was deficient in perspective, and yet the two are easily separable, as for example in the work of the mechanical draftsman; or drawing may be associated with a kind of perspective which is visually false, as isometric perspective. We might say that drawing was the imitation of form, but a moment's reflection would enable us to perceive that it may create forms without imitating, as it does in many fanciful conceptions of ornamental designers. It might be suggested that drawing was the representation on a flat surface of forms which are not flat, but the most variously curved surfaces, as in vases, are frequently drawn upon, and flat objects are sometimes represented on rounded surfaces. The Greeks were so logical in their use of γράφειν for both drawing and writing that it is not possible to construct a definition comprehensive enough to include all the varieties of drawing without including writing also. If we say that *drawing is a motion which leaves significant marks*, we are as precise as the numerous varieties of the art will permit us to be.

Conventionalism

The first step in the arts of design is a resolute and decided conventionalism. Drawing always begins with line, and there are no lines in nature. The natural world presents itself to the eye as an assemblage of variously-coloured patches or spaces, always full of gradation both in shade and colour, but in all this there is no such thing as a real line. Even the sea-horizon, which is commonly spoken of as a line, is not so in reality, it is only the ending of a coloured space. The conventionalism of the line being once admitted, it may be considered as neither good nor bad in itself, but a simple necessity. Beyond this, however, in the use of the line when it has once been adopted, there may be artistic merit or demerit.

All primitive line-drawing gives a version of natural truth which is idealized in one way or the other, and it is always conventional not only in the sense of using conventional means, but also in that of interpreting natural forms with conventional amplifications or omissions. The temper of a primitive civilization always led its artists to the expression of certain customary ways of seeing things which were transmitted traditionally by art, so that the artists in their turn became the means of imposing the authority of public sentiment upon their successors. The liberty of individual artists, even to draw what may seem such a simple thing as the outline of a human figure, is dependent upon the degree in which the civilization under which they live is or is not traditional.

To understand the effect of customary ways of seeing things on the use of pure line in drawing, the reader is recommended to study some specimens of early design as it was practised in China, in Japan, in Egypt, in Assyria, and in Greece. It is easy, in these days, to procure photographic reproductions of ancient design when the student does not live near a museum. He will perceive at once in the five countries four entirely different ways of seeing and designing the curvature of lines, although the Chinese and Japanese ways are nearer to each other than they are to the Egyptian or the Greek; whilst on the other hand, different as the two latter may be, they are nearer to each other than to the art of China or Japan.

Chinese and Japanese design.

A certain kind of curvature is dominant in Chinese art, along with the preference for certain easily recognizable forms. In Japanese drawings the curves are wilder, bolder, more unexpected, more audacious; and when the Japanese designer chose to make use of angles he was, from the same tendency to vivacity and exaggeration, disposed to prefer acute angles. In both Chinese and Japanese work, when at its best, there is often the most exquisite beauty and delicacy of line, especially in the contours of female faces; and there is frequently a masterly power in the interpretation of natural truth, or certain portions of natural truth, by means of the utmost simplicity.

Egyptian design.

In ancient Egypt the line was quieter and less "tormented" than in China or Japan, the curvature more restrained, and the artistic expression generally rather that of calm dignity than of vigorous action. Egyptian art was kept within the strictest limits by the most powerful conventionalism that ever existed, but the student of drawing will find much in it that is well worth his attention. The Egyptian draftsmen attained to a most noble use of line, combining a serious and disciplined reserve with much delicacy of modulation. The true grandeur of Egyptian work has only been apprehended of late years, because it was formerly supposed that its conventionalism was due to simple ignorance of nature and want of skill in art. It is of various degrees of excellence, and there were inferior artists in the early Egyptian schools, as in others; but we are often startled by magnificent power in conventionalizing natural material, and by a peculiar sense of beauty. There is in Egyptian design a singular combination of tranquil strength with refinement.

Assyrian design.

Assyrian design is very familiar to us through the ancient wall-sculptures, where the line is often rather engraved than carved, so that we can see quite plainly what were the qualities of drawing which the Assyrian artists valued. They, too, conventionalized nature, but sought for those curves and accents of line which express manly beauty rather than feminine. They drew, in their own way, admirably well, with great firmness and self-command, knowing always exactly what equivalents or representatives to give for the lines and markings of nature, in accordance with the spirit of their artistic system. Their art is much more strongly accentuated than the Egyptian, and we might even say that it is more picturesque while it is less tranquil. Assyrian design has more of the spirit of painting in it than Egyptian, and less of the spirit of sculpture. The Assyrian line tends to the expression of energy in action, the Egyptian to strength and beauty in repose.

Notwithstanding the high degree of p
attained in linear design by nations which
the artistic development of Greece, it must
inexplicable marvel that the Greek design
attained, apparently without effort and sim
of nature, to a degree of perfection in the u
had never been approached before and h
equalled since. The manly beauty of an A
a lion hunt, with his curly beard and his
and his arm mighty to bend the bow, is gr
with a purely barbaric grandeur; the half-f
of an Egyptian deity lives chiefly in the se
body is often frankly architectural, and has
the qualities of a column than those of th
But in Greece the curves of the line were fo
made to express the fulness and grace of life
perfection coming from the exquisite inn
refinement of the artists, and never to be
single model. How much knowledge and
expressed by a simple line may be seen in
of the best time, especially if there are bo
naked figures, of both sexes, in the composi

The leading principle of Greek design co
expression of form by pure, firm, and accurat
were distinguished by flat tints of red, bla
but there was no shading to indicate mod
local colour could be easily hinted at by ma
thicker than a simple outline, it was freque
was continually in Japanese art, but care
these broader black markings should neve
enough to alter the true character of t
essentially a work in simple line. Thus,
might be drawn with broad touches to make
was darker than her flesh, and the dark b
edges of her dress would be given in pure b
width. Nor was this the only device by w
degree of local colour was suggested to the
was not really imitated. The red did for
colour, and white for flesh-colour intended
than ordinary fairness. Great spaces
reserved for the background, by which a str
given to the figures. This is the regular pri
vase decoration, though the artists did not
themselves to it, but would also work in si
white, as in the Portland vase, or introduce
sparingly, like the turquoise of the mantle
the wings of Eros in the vase of Camiru
colour, however, did not in the least inte
unflinching system of Greek drawing, whi
strictest sense of the word, *delineation.* In
absolutely from many modern kinds of drawi
the line as much as the Greeks delighted
not intended as an expression either of prai
is simply a statement of fact.

The truth is that Greek line-drawing is
perfect condition of a very early form of
child's idea of drawing, carried out with the
taste of men who lived in the early youth
race and were not disturbed and distract
coveries and experiments of modern Europe
its other peculiarities may be mentioned
independence of anatomy. No anatomical
ever given simply as such. The figures are
women with th kins on, not *écorchés* i
room. There of the anatomical ten
art than in When the Assyrian
make you man's leg is very stro
every don as far as his knowle
but the nts himself with show
and ease of ng man's action. It

ıntation of the female form that the grace of the -drawing is most conspicuous and most unprece- There had been before some lithe feminine grace even in Egyptian art, but it is stiffness and ss themselves in comparison with the Greek.

ht progress of art-education in modern times be better assured than by following in the case ıdividual student that course of development nanity itself has followed. True and careful ımbination with the colouring of spaces in a few ıre the natural beginning. What a child does tile unsuccess for its amusement the beginner in should be taught to do carefully and well for tion. The accurate use of line is the first thing ed with the pencil point, and the equal laying tint is the first thing to be learned with the

so early a stage in art as the use of the simple nd ourselves face to face with one of the most peculiarities of the fine as distinguished from nical arts. It does not require much critical discover that accuracy is one thing in a line and other. The student ought to work at first for ut from beautiful works of art which are not in accurate copies of nature but copies idealized at ne degree by the taste and feeling of the artist. of art that are worth studying are ideal in one ther. We have spoken of the Greek line, which e most highly idealized of all artistic expressions. artists when they outlined an object always nplified the outline by omitting many minor f angle and curvature which a modern picturesque ld seek for because of their variety. But on does not explain all that the Greek mind did ture in design. Its sense of beauty and elegance quisite that it continually amplified what was the model, reduced what was superabundant, and what was awkward. All this could be done, one, with the simple line alone without any help oscuro, and it is one of the most remarkable he expressional power of the line that it even ıodelling in the blank spaces which are inclosed

ıstanding the excellence of Greek linear design e well that the student's attention should not be it too exclusively. For, in the first place, we nber that the vase-paintings which remain to us xecuted by the most eminent painters living at but were only done by clever workmen in the irit which the eminent painters had rendered and fashionable; whereas in modern art we can *ipsissimæ lineæ* of truly great men, both in their ınd in many cases more accessibly still in their Again, the Greek designers had certain ex- but not all excellencies, the remarkably s character of their work being, in fact, quite as to its absolute neglect of certain qualities of line ossession of other qualities. It is a narrow and nd of art, the singular perfection of it being eat measure to that narrowness. Modern art, trary, is infinitely vast and varied, full of imper- ounding in all conceivable kinds of error and t also rich beyond all that a Greek could pos- imagined in knowledge and sentiment of many

eck spirit passed through its first decadence in t, and was at last degraded past recognition at A new spirit of linear design arose in the countries during the Middle Ages, gradually hat we call the Gothic schools of architecture and ornament.

Mediæval drawing.

The mediæval artists began exactly like the Greeks by the natural primitive process of line and flat colouring of spaces, of which we have abundant examples in their illuminated manuscripts, and examples less abundant in the mural paintings which remain to us. Students who intend to qualify themselves for decorative work, or for carving, will do well to give earnest attention to mediæval designs of ornament which abound in the richest and most fanciful invention; but students of the figure have little to learn from the Middle Ages, for in those centuries the figure was very imperfectly understood. Sometimes we meet with a startling exception, with some instance of individual observation which strikes us because it looks like science; but the plain truth is that the mediæval artists of all classes were as inferior to the Greek in the knowledge of the human frame as they were superior to them in the capacity for inventing new and fanciful schemes of decoration. If the student wishes to learn the figure he may therefore pass at once from the period of decline in Greek art to the Renaissance, without concerning himself about the more or less successful attempts of the intervening ages, in which, indeed, may be found examples of quaintly rendered human character, but hardly any of well-studied human form. The best way is to go from antiquity to Hans Holbein the younger at once.

Holbein.

He had remarkable power and skill in the use of line, many of his best portraits being hardly anything more than a delicately true outline, with just enough shading to make us understand the modelling, but nothing of what is commonly understood by chiaroscuro. As Holbein was much more of a realist than the Greeks were, his lines have more variety of curvature than theirs, and the forms inclosed by them are more individual. All that is best in the peculiar spirit of northern drawing at that time is to be found in Holbein's art, which is full of close observation, of calm sobriety, and unflinching truthfulness. In the south of Europe the Renaissance led to that artistic development of which the modern schools of figure design have inherited the ideas and principles. A certain period in the life of Raphael marks the transition from the old spirit to the new, and his great success in the application of the new principles led to their authoritative establishment in the schools of Europe.

The Renaissance.

The Renaissance made drawing at the same time more scientific and more ideal. The artists studied anatomy more than it had ever been studied before, and they gave a degree of attention to the whole of the human body which a mediæval draftsman would have concentrated almost exclusively on the face. But they did not rest satisfied with copying the facts of nature and investigating the laws of construction and of action,—they took that farther step which the Greeks had taken before them, and drew the figure not merely as it appeared to their bodily eyes, but with that more perfect beauty which was suggested to the eye in the artist's mind. Raphael openly affirmed this principle by declaring that he drew men and women, not as they were, but as they ought to be, and the process of idealization may be actually seen in what he did by comparing his studies with his completed works.

Chiaroscuro.

We have hitherto spoken simply of the use of line, that being essentially drawing in the strict sense of delineation; but when the European mind had reached the period of the Renaissance a new study took its rise—chiaroscuro—which became so inextricably mingled with that of drawing that it is impossible to speak adequately of the one without giving some account of the other. The increased knowledge of the muscular structure of the body led the artists to pay more attention to modelling than had ever been paid to it before, so that good modelling got to be considered an essential part of drawing. It may be necessary, for the uninstructed in artistic matters to explain in this place that modelling in design is the art of shading in such a manner as to give everything its due degree of projection or relief, and the practical difficulty of it lies in the necessity for making the degree of projection in any object or part of an object exactly what it ought to be relatively to other projecting masses or details in the same drawing. The simple line-work of the early stages of art was therefore abandoned by the greatest artists of the Renaissance as a general means of study. Even when using the most rapid means of expression for themselves alone, they were accustomed to treat the outline with little respect, and always to indicate shading in some way, often by the very rudest means, as for example by a few hasty diagonal strokes of the pen. Leonardo da Vinci retained to the last a good deal of that care about the outline which characterizes the earlier stage of art, but even in his case it was accompanied by an equal degree of care in modelling. In the sketches and studies of Michelangelo the care and time given to the outline are always in exact proportion to the pains taken with the modelling, and this employment of the time at the artist's disposal is a clear proof that he considered modelling as much a part of drawing as the outline itself. When he had time to do the modelling thoroughly, as in his finished studies, he made the outlines very carefully also, but when the time at his disposal was limited he did not economize it by making, as an earlier artist would probably have done, a careful outline without modelling,—he still gave both together, but in a rougher and readier way. The student can find no better examples of this treatment than any three sketches and studies of Michelangelo which may have cost him respectively five minutes, half an hour, and three or fours hours of labour. The work in each instance is economized, not by rejection of one portion of his art, but by summarizing the whole, more or less, with the strictest reference to the time at his disposal. The studies of Raphael are done on the same principle.

The spirit of the Renaissance was caught from the study of antiquity, but it gave more latitude to original genius by allowing a freer play to personal qualities in art. This led to bold exaggerations, which became a part of artistic expression, and were to it what emphasis is to the orator. Michelangelo himself set the example of this, and it may be observed that, whereas when the works of the ancients seem to lose their spirit on reduction to a smaller scale, and require to be accentuated by the copyist who reduces them, those of Michelangelo bear reduction easily by reason of their own strong accents and exaggerations. Leonardo da Vinci, being of a calmer temper, put little exaggeration into his finished works, which are distinguished by great suavity and sobriety of manner; but he gave it free play in his caricatures, which served as an outlet for the more violent side of his genius.

A kind of exaggeration almost universal during and since the Renaissance has been a more than natural marking of the muscles, which is opposed to the spirit of the best Greek design, and was directly due to anatomical studies, especially to the habit of dissection. This has continued down to our own day in all the learned schools of Europe. For example, in the St Symphorien of Ingres the figures of the Roman lictors are drawn as if they were without skins, and every muscle is enormously exaggerated.

A better result of the scientific spirit of the Renaissance was the degree of care and attention which artists began to pay to the measurement of the human body, so as to determine its true proportions. Albert Durer made and recorded very numerous and careful measurements both of man and the horse, declaring that "no one could be a good workman without measuring," and that "it was the true foundation of all painting." Leonardo affirmed in words of equal plainness that "a young man ought to begin to learn perspective by measuring everything." This habit of measurement has been continued down to our own day by the more careful artists. Whenever an animal died in the Jardin des Plantes, at Paris, Barye the sculptor went at once to take all its measurements, and drew or modelled it besides; but he measured animals all his life. notwithstanding his great skill in drawing by the eye.

It is necessary to say something in this place of the rise of what we call picturesque drawing, which is now more prevalent than any other throughout Europe. We all know what we mean by the word "picturesque" as applied to real objects; for example, we all consider that a feudal castle or abbey, when it has become an ivied ruin, is a picturesque object, but that a Greek temple in perfect repair is not. Even amongst things in equally good repair the distinction is recognized, thus we say that the costume worn by Charles II. was more picturesque than that worn by William Pitt. We are less accustomed to recognize the fact that almost any object may be drawn in a manner which is picturesque or not picturesque, according to the temper of the artist. The temper which produces picturesque work is tolerant, observant, and playful; the temper which produces the other kind of work is always either simple or severely disdainful,—simple in Greece and in the purists of the Middle Ages, disdainful in the great men of the Renaissance and in all their strongest successors. The most perfect development of the picturesque spirit in drawing before our own century took place in Holland, the Dutch school working almost entirely in that spirit. The severe spirit has maintained itself chiefly as a sort of academic protest against the picturesque, which is never authoritatively taught in any academy of art. The academies direct students continually to Raphael, but never to Rembrandt. On the other hand, the kind of drawing usually taught to amateurs is picturesque, especially through the medium of water-colour. The strongest reaction against the picturesque has been that of the French "néo-Greca," who in study went back to the pure Greek line and flat space, the most earnest of them declaring that nothing more was needed to the perfection of art. The most perfect and studied picturesque in modern drawing will be found in the works of etchers and fusinists (artists who draw in charcoal). The picturesque is always easily recognizable by its love of accident and variety of line and character, and by its strong effects of light and shade. When in excess it violently exaggerates these accidents, varieties, and effects.

The kind of drawing which is best for landscape differs in some important respects from that which is best for the figure. To perceive the full truth of this, the reader has only to draw a landscape with the simplicity of the line in a Greek figure, when he will see that the more complicated character of landscape material requires a more varied interpretation. Good landscape draftsmen are seldom very accurate as to form, and it is not necessary that they should be; but they are always careful to preserve truth of character, and have great difficulties of their own to contend against, which are generally much underestimated. The inaccuracy of landscape design comes from the necessity for composition. When the figure painter composes, he can move his models about, and place them in different attitudes, and draw them faithfully after all; but when a landscape painter does the same thing, by an effort of imagination, with his mountains, trees, or towers, he unavoidably violates topographic accuracy. The habit of inaccuracy soon forms itself, for this reason, in all landscape draftsmen who compose; and all artists by profession are compelled to compose in order to make their works attractive in arrangement ance and saleable. Simple studies of landscape may, however, be made with perfect accuracy, and are so done occasionally for special purposes. The best examples of such accurate landscape design to which we are able to refer the reader are the engraved studies of Mr Ruskin. Fine examples of artistic landscape design, in which natural scenery is well interpreted but not literally copied, are infinitely more numerous. The *Liber Veritatis* of Claude, and the *Liber Studiorum* of Turner, abound in fine xamples of composed landscape, and a great number of llustrated works have been published during the present entury, in which the student may find endless instruction.

Landscape design is usually taught to amateurs by rawing masters, because it is thought to be easier than hat of the figure; but the choice of landscape for lementary instruction is unfortunate, because a beginner equires simpler and more definite material than is to be ound in landscape nature. It is wiser for all beginners in t to study for a long time the most simple and definite bjects which can easily be entirely detached from other bjects and thoroughly studied by themselves. This was e true early classic manner of drawing, and the student ho follows it in the present day will always be rewarded y an earlier insight into the qualities of form than can be tained by any other method. The truth of this is more lly recognized wherever drawing is taught seriously; but ose who teach water-colour to amateurs too often ncourage them in a confused way of looking at nature hich, at the best, only results in a feeble imitation of fth-rate water-colour landscapes, in which there is nothing orthy to be called drawing at all, nor any real rendering f form. It is of the utmost importance to amateurs that hey should not misapply the little time which they can ually give to practical art, and yet they often do misapply in many ways. A very common cause of loss of time, n their case, is false finish, and labour thrown away by the mployment of methods which take more time than other methods for an inferior result, as, for example, when painful en hatching is employed for shading where the chalk and tump, or charcoal, or the brush, would give a shade of far etter quality in a twentieth part of the time. All truly reat artists, though prodigal of labour when their purposes equired it, have economized it whenever the economy was not artistically an evil, and this is often best seen in their ketches, which give rapidity, not by hurrying the hand, but by using the most summary means of expression. This art of summary expression in drawing is of great use to figure-painters, but it is still more important in landscape, because the effects of nature pass so rapidly that they do not permit any slow method of interpretation. Many of the fine sketches by great men have been done, without hurry, in a few minutes. Tinted papers are often used to economize time, because they supply a middle tint on which lights can be noted in white, and darks in chalk, charcoal, or a wash of water-colour. Good examples of sketches and studies by the greatest artists are now quite easily accessible through the photographic processes, and by their help a student at a distance from the national collections may easily learn for himself how they used the pen by itself, or the pen for line with a wash for shadow, or the lead pencil point, or chalks (white and black) on grey paper, or anguine, getting a shade more quickly by one method, a line more precisely by another. Original drawings by great masters may be seen in all the capitals of Europe, in the public collections. Of late years drawings by modern artists have attracted more of the public attention than they did formerly, and "black-and-white" exhibitions have een successfully established in London, Paris, and New ork. Through the influence of the South Kensington useum and its affiliated schools of design the knowledge of drawing is now becoming much more general in Great Britain than it has ever been before. The preliminary difficulties of the art can scarcely be overcome without the assistance of a master, but in his absence the student may obtain useful help from books.

The student should thoroughly master and remember Burnet's *Essay on the Education of the Eye*, which is most concise, and contains nothing doubtful or disputable. Mr Harding's works, and Mr Ruskin's *Elements of Drawing*, are also useful books for amateurs, especially if taken together. There are also various little treatises on elementary technical practice, usually written by artists, and published by the colour-makers, from which good practical hints may be obtained as to the use of instruments and materials. It is not generally known in England that there is a magnificent national collection of drawings by the old masters in the British Museum, to which access may easily be obtained on compliance with a simple formality. The student is earnestly recommended to avail himself of these treasures, which are generally strangely neglected. A handbook to the Department of Prints and Drawings, with an introduction and notices of the various schools (Italian, German, Dutch and Flemish, Spanish, French, and English) has been lately compiled by Mr Fagan, of the Museum, and published by Messrs Bell & Sons. A selection of drawings by the Italian masters in the British Museum has been been lately published in autotype by Messrs Chatto & Windus, with notes by Mr Comyns Carr, which, it is to be hoped, will be followed by selections from other schools. It is much to be regretted that some portion, at least, of these national treasures should not be made readily accessible to the general public by framing them and exhibiting them under glass in a gallery, according to the plan adopted in the Louvre. Their very existence is not so much as suspected by the great majority even of cultivated Englishmen. (P. G. H.)

DRAYTON, MICHAEL (1563–1631), English poet, was born at Hartshill, near Atherston, in Warwickshire, in 1563. Even in childhood it was his great ambition to excel in writing verses. At the age of ten he was sent as page into some great family, and a little later he is supposed to have studied for some time at Oxford. Sir Henry Goodere became his patron, and introduced him to the countess of Bedford, and for several years he was supported by Sir Walter Aston. How the early part of his life was spent, however, we possess no means of ascertaining. It has been surmised that he served in the army abroad. In 1590 he seems to have come up to London, and to have settled there. In 1591 he produced his first book, *The Harmony of the Church*, a volume of spiritual poems, dedicated to Lady Devereux. The best piece in this is a version of the Song of Solomon, executed with considerable richness of expression. A singular and now incomprehensible fate befell the book; with the exception of forty copies seized by the archbishop of Canterbury, the whole edition was destroyed by public order. It is probable that he had come up to town laden with poetic writings, for he published a vast amount within the next few years. In 1593 appeared *Idea: The Shepherd's Garland*, a collection of pastorals, in which he celebrated his own love-sorrows under the poetic name of Rowland. The circumstances of this passion appear more distinctly in the cycle of 64 sonnets, published in 1594, under the title of *Idea's Mirror*, by which we learn that the lady lived by the river Anker, in Warwickshire. It appears that he failed to win his "Idea," and lived and died a bachelor. The same year, 1594, saw the publication of *Matilda*, an epical poem in rhyme royal, the first of his studies from English history. It was about this time, too, that he brought out *Endimion and Phœbe*, a volume which he never republished, but which contains some interesting autobiographical matter, and acknowledgments of literary help from Lodge, if not from Spenser and Daniel also. In his *Fig for Momus*, Lodge has reciprocated these friendly courtesies. In 1596 Drayton published his long and important poem of *Mortimeriados*, which deals with the Wars of the Roses, and is a very serious production in ottava rima. He afterwards enlarged and modified this poem, and republished it in 1603 under the title of *The Barons' Wars*. In 1596, also, appeared another historical poem, *The Legend of Robert, Duke of Normandy*, and a similar piece on *Piers Gaveston*. In 1597 appeared *England's Heroical Epistles*, a series of historical studies, in imitation of those of Ovid. These last poems, written in the heroic couplet, contain some of the finest passages in Drayton's writings. With the year 1597 the first half of the poet's literary life closes. He had become famous by this rapid production of volumes, and he rested on his oars. It would seem that he was much favoured at the court of Elizabeth, and he hoped that it would be the same with her successor. But when, in 1603, he addressed a poem of compliment to James I. on his accession, it was ridiculed, and his services rudely rejected. His bitterness of spirit found expression in a satire, *The Owl*, which he printed in 1604, although he had no talent in this kind of composition. Not much more entertaining was his scriptural narrative of *Moses in a Map of his Miracles*, a sort of epic in heroics printed the same year. In 1605 Drayton reprinted his most important works, that is to say, his historical poems and the *Idea*, in a single volume, which ran through eight editions during his lifetime. He also collected his smaller pieces, hitherto unedited, in a volume undated, but probably published in 1605, under the title of *Poems Lyric and Pastoral*; these consisted of odes, eclogues, and a fantastic satire, called *The Man in the Moon*. Some of the odes are extremely spirited. He then adopted the extraordinary resolution of celebrating all the points of topographical or antiquarian interest in the island of Great Britain, and on this laborious work he was engaged for many years. At last, in 1613, the first part of this vast work was published under the title of *Poly-Olbion*, eighteen books being produced, to which the learned Selden supplied notes. The success of this great work, which has since become so famous, was very small at first, and not until 1622 did Drayton succeed in finding a publisher willing to undertake the risk of bringing out twelve more books in a second part. This completed the survey of England, and the poet, who had hoped to "crown Scotland with flowers," and arrive at last at the Orcades, never crossed the Tweed. In 1627 he published another of his miscellaneous volumes, and this contains some of his most characteristic and exquisite writing. It consists of the following pieces:—*The Battle of Agincourt*, an historical poem in ottava rima, and *The Miseries of Queen Margaret*, written in the same verse and manner; *Nimphidia, the Court of Faery*, a most joyous and graceful little epic of fairyland; *The Quest of Cinthia* and *The Shepherd's Sirena*, two lyrical pastorals; and finally *The Moon Calf*, a sort of satire. Of these *Nimphidia* is perhaps the best thing Drayton ever wrote, except his famous ballad on the *Battle of Agincourt*; it is quite unique of its kind, and full of rare fantastic fancy. The last of Drayton's voluminous publications was *The Muses' Elizium* in 1630. He died in London on the 23d of December 1631, was buried in Westminster Abbey, and had a monument placed over him by the countess of Dorset, with memorial lines attributed to Ben Jonson. Of the particulars of Drayton's life we know almost nothing but what he himself tells us; he enjoyed the friendship of some of the best men of the age. He corresponded familiarly with Drummond; Jonson, Browne, Wither, and others were among his friends. In one of his poems, an "elegy" or epistle to Mr Henry Reynolds, he has left some valuable criticisms on poets whom he had known. He was even engaged in the labour of the dramatists; at least he had a share, with Munday, Chettle, and Wilson, in writing *Sir John Oldcastle*, which was printed in 1600. That he was a restless and discontented, as well as a worthy man, may be gathered from his own admissions.

The works of Drayton are bulky, and, in spite of the high place that he holds in critical esteem, it cannot be pretended that he is much read. For this his ponderous style is much to blame. The *Poly-Olbion*, the most famous but far from the most successful of his writings, is tedious and barren in the extreme. The metre in which it is composed, a couplet of Alexandrines, like the French classic measure, is wholly unsuited to our language, and becomes excessively wearisome to the reader, who forgets the learning and ingenuity of the poet in labouring through the harsh and overgrown lines. His historical poems, which he was constantly rewriting and improving, are much more interesting, and often rise to a true poetic eloquence. His pastorals are brilliant, but overladen with colour and sweet to insipidity. He is, with one or two magnificent exceptions, an indifferent sonneteer. The poet with whom it is most natural to compare him is Daniel; he is more rough and vigorous, more varied and more daring than the latter, but Daniel surpasses him in grace, delicacy, and judgment. In their elegies and epistles, however, the two writers frequently resemble each other. Drayton, however, approaches the very first poets of the Elizabethan era in his charming *Nimphidia*, a poem which inspired Herrick with his sweet fairy fancies, and which stands alone of its kind in our literature; while some of his odes and lyrics are inspired by noble feeling and high imagination.

In 1748 a folio edition of Drayton's complete works was published, under the editorial supervision of Oldys, and again in 1753 there appeared an issue in four volumes. But these were very unintelligently and inaccurately prepared. An attempt is now being made to edit Drayton in a more critical spirit. Three volumes of an edition (to be completed in six or eight volumes), collected by the Rev. R. Hooper, have already appeared, comprising the *Poly-Olbion* and the *Harmony of the Church*. (E. W. G.)

DREAM. Dreams are a variety of a large class of mental phenomena which may be roughly defined as states of mind which, though not the result of the action of external objects, resume the form of objective perceptions. To this class belong the fleeting images which occasionally present themselves during waking hours, and especially before sleep, the "visions" which occur in certain exalted emotional conditions, as in religious ecstasy, the hallucinations of the insane, the mental phenomena observable in certain artificially produced states (hypnotism), &c. These and other mental conditions resemble one another in many important respects, to be spoken of by and by. At the same time they are roughly marked off by certain special circumstances. Thus, dreaming may be distinguished from the other species of the class as depending on the most complete withdrawal of the mind from the external world. All products of the imagination which take the aspect of objective perceptions must, it is clear, involve a partial aberration of the intellectual processes. Yet in all cases except that of dreaming—including even somnambulism—the mind preserves certain limited relations to external objects. In dreams, on the contrary, the exclusion of the external world from consciousness is for the most part complete. Sleep has under normal circumstances the effect both of closing the avenues (sensory nerves) by which external impressions are conveyed to consciousness, and of cutting off from the mind that mechanism (the voluntary-motor nerves and muscles) through which it maintains and regulates its varying relations to the outer world. Dreams cover a great variety of mental states, from fleeting momentary fancies to extended series of imaginations. Again, dreams have certain constant or approximately constant features, while in other respects they manifest wide diversity. Among the most general characteristics is to be named the apparent objectivity of dream-experience. The presence of this objective element in dreams is clearly indicated in their familiar appellation "visions," which also points to the well-recognized fact that a large part of our dream-imagination simulates the form of *visual* perception.

The next general characteristic of dreams is that, though resembling waking experience in many respects, they seem never exactly to reproduce the order of this experience. Most of our dreams differ very widely from any events ever known o us in waking life, and even those which most closely resemble certain portions of this life introduce numerous changes in detail. These deviations involve one or two distinct elements. First of all, there is a great confusion of he order in time, space, &c., which holds among real objects nd events. Widely remote places and events are brought ogether, persons set in new relations to one another, and so n. Secondly, the objects and scenes are apt to assume a greatly exaggerated intensity. They take a firmer hold of us, so to speak, than our waking experience. We may when awake think of dreams as unsubstantial and unreal, but to he dreamer at the moment his imagined surroundings are more real, more impressive, than the actual ones which he perceives when awake. Dream-fancy exaggerates the various aspects of objects, makes what is large still larger, what is striking still more striking, what is beautiful still more beautiful, and so on.

Having touched on these approximately universal characteristics of dreams, we will now specify a few of the more variable features. For example, in a large number of our dreams we appear to be passive spectators of events which we are incapable, or rather do not think, of controlling in any way. In other dreams, again, we seem to be ively actors in the scene,—talking, moving, &c., as we are wont to do in waking life. In a class of dreams lying midway between these two extremes we appear to be mpelled to act, to be struggling to seize some offered good or to avert some threatening evil, yet to be unable to execute our wishes. Once more, dreams differ very much as to their degree of reasonableness. It is certain that in many cases the dreamer is easily imposed on, sees no contradictions, does not seek to understand the events which unfold themselves before his fancy, and so on. In some nstances, indeed, the mind of the dreamer loses even the sense of identity in objects, and metamorphizes persons in the most capricious manner; and this confusion of identity may embrace the dreamer himself, so that he imagines himself to be somebody else, or projects a part of himself, so to speak, into another personality, which thus becomes an *alter ego* and an object for the contemplation of the remaining self. Yet though it is true that many, probably a large proportion, of our dreams, are thus unintelligible to waking thought, there is a number of well authenticated dreams in which persons have proved themselves to be possessed not only of their ordinary, but even of an extraordinary, power of reflection. We refer to the well-known stories of the intellectual achievements of Condillac, Condorcet, Coleridge, &c., when dreaming. Once more, great differences are observable in dreams with respect to the feelings excited by the visionary experiences. Sometimes the circumstances in which we find ourselves affect us much as in waking life;—danger terrifies us, beauty delights us, and so on. At other times, however, we are not thus affected;—what would puzzle, confuse, or shock our minds in waking experience fails to do so in dream-life. Finally, there are certain exceptional features of dream-life, as a vague consciousness of dreaming, which assumes the form of a dream within a dream, and the repetition of the images of previous dreams with a recognition of the familiarity of the dream scenes. It need hardly be added that dreaming varies greatly, both in quantity and in quality, according o individual temperament, habits of thought, &c.

Theories of Dreaming.—From the slight sketch of the haracter of the dreaming process just given, it might be njectured that the human mind at all times would be rofoundly impressed with the fact of dreaming, and seek to arrive at some explanation of what on the surface is undoubtedly so mysterious and so wonderful a phenomenon. And as a matter of history we find that men have in all the known stages of their intellectual development endeavoured to account for the visions of the night. The various theories thus put forward fall into two main classes—the supernatural and the natural. By the former we mean all explanations which assume the action of forces unknown to our waking experience; by the latter those which make no such assumption, but seek to interpret dream-phenomena as products of forces familiar to waking perception. The supernatural hypothesis, again, falls into two divisions, according as the dream is regarded as the immediate effect of some reality corresponding to the actual world of our waking experience, or as it is conceived as a mediate result depending on the volition and command of some absent being. We thus have three main methods of explaining dreams:—(*a*) The naive objective explanation; (*b*) the religious explanation; (*c*) the scientific explanation.

(*a*) *The Dream as Immediate Objective Experience.*—According to recent researches the savage mind regards dreaming as no less real an objective experience than waking. The objects and scenes which flit before the dreaming fancy of the primitive man are real material existences, the sounds he seems to hear are real external sounds, the dream figures which stand before his imagination and converse with him are real persons. How then does he conceive the relation of this dream-world to the world of waking experience? This question has lately been answered by Mr E. B. Tylor and Mr Herbert Spencer. The belief in the objective reality of dreams requires the savage to conceive a double nature both for objects (animate and inanimate) external to himself and for himself. The vision of dead ancestors, of material objects long since lost or destroyed, easily suggests the idea of a duplicate of the original person of thing, a second self or soul. On the other hand, when the savage dreams that he goes forth to accustomed scenes, to hunt, to fight, and so on, he accounts for the dream by the supposition that his own second self or soul leaves the body and passes forth to the particular locality. Thus the dream-life shapes itself to our primitive philosopher as an intercourse of souls or duplicate selves, co-ordinate with, and of equal reality with, the experience of waking life. It appears to follow from the unfamiliarity of dream scenes, personages, &c., that the region visited during sleep will be projected by the savage mind quite outside the world of waking observation. Mr Spencer connects with this fact the earliest theories of another world or a spiritual state. (For a fuller account of the part played by dreams in primitive ideas consult E. B. Tylor, *Primitive Culture*, vol. i. chap. xi.; H. Spencer, *Principles of Sociology*, i. ch. x. *et seq.*)

(*b*) *The Dream as a Communication from a Supernatural Being.*—It is plain that even in the savage's conception of dreaming there is room for the thought of a divine announcement. When once the idea of superior beings, deities, demons, &c., is reached, it becomes natural to regard the visit of some departed soul as the despatch of a messenger to the dreamer. In this way the first mode of explanation passes insensibly into the second. In higher stages of religious thought the view of a dream as a divine revelation takes a less crude form. The immediate object present to the dreamer is no longer conceived as possessing the same degree of materiality. Something is still present, no doubt, and so the dream is in a sense objective; but the reality is less like a tangible material object, and is transformed more or less completely into something unsubstantial, spiritual, and phantasmal. On the other hand, the dream is objective in the sense of being a message or revelation from some actual divine personage. The essence of the dream, so to speak, lies in the fact that it conveys to the dreamer something which the divine personage wishes him to know, whether it be the will of this being in the shape of a command or a prohibition, or some fact as yet unknown (past or future), the knowledge of which will be of practical utility to the recipient. We may distinguish three stages in this conception of dreams:—(1) The deity sends a messenger or angel who is vaguely conceived as a spiritual being clothed in a thin material vestment; (2) the divine communicator, dispensing with the medium of a material appearance, lets his message be heard by the dreamer as the utterance of an external voice; (3) he discloses his purpose by causing to pass before the soul a vision which is not distinctly conceived as objective, but rather as something mysteriously imprinted on the mind.

The divine communication which thus makes use of the medium of a dream will, it is plain, vary considerably in the degree of its intelligibility. Sometimes the meaning of the message is obvious and unmistakable. The actions to be performed and the facts to be known are revealed plainly and directly. This will be the case for the most part with the first and second forms of dream-communication. At times, too, the divinely created vision may distinctly picture some coming event in the individual or national life. On the other hand, the communication may be disguised and only partially divulged by symbol, in which case there arises the necessity of an art of interpretation. Thus at times the oral utterance may assume the form of a dim oracular declaration which calls for careful attention and a certain skill in the application of verbal figures. It is, however, in the last form of dream-revelation that we find the greatest demands made on the interpreter's art. It follows from what has been said respecting the novelty of dream-combinations that many of the visual images which make up so large a bulk of our dreams cannot easily be fitted to any actual order of events. Hence, if such dreams are to be interpreted as having a bearing on actual events, they must be regarded as figurative or symbolic. Accordingly we find that the symbolic function of dreams has been fully recognized in all the theories of dreaming now dealt with. It seems to have been assumed that the normal mode of divine communication to man during sleep was that of such a figurative dream. And agreeably with this supposition the task of deciphering dream-symbols gradually grew into a skilled art, which became the prerogative of a certain class of experts,—as prophets, divinators, or magicians.

A very brief historical review of this religious theory of dreams must here suffice. Among the Oriental peoples this view of dreams was the prevailing one. We find, however, great differences in the mode of interpretation adopted. Among the ancient Hebrews, for example, we find all the three forms of dream-communication mentioned above. As to interpretation there seem to have been no definite rules, and the procedure followed resolves itself into an attempt to discover the most natural or least forced application of the persons, objects, and relations of the dream to some existing persons, social circumstances, and events. This mode of interpretation clearly left wide scope for individual skill. In the Persian scheme of interpretation, on the other hand, so far as we can judge of it from the compilations of a later age, the art of dream-interpretation, oneirocritics, or oneiromancy, was defined and fixed in a number of rules. Thus in the work known under the name of the *Sifat-i-Sirozah*, minute and elaborate prescriptions are given for interpreting various classes of dreams according to the particular day of the month on which they occur. A similar systematization of the rules of dream-interpretation is to be met with among the Arabs (see *L'Onirocrite Mussulman*, par Gabdurrhachaman, traduction de Pierre Vattier.) In

such cases, it is plain, the interpretation of dre
less of individual genius or inspiration, and be
mechanical process, involving only careful k
formulæ, and one which could be easily co
Such a state of things points to the transition c
from the stage of an esoteric mystery to th
municable science. Among the Greeks and
religious view of dreams is to be found in popu
as well as in philosophic writings. In Homer
distinctly said to be sent by the gods and god
the expression *θεῖος ὄνειρος*, and it is implied th
be intended to deceive the subject of
Agamemnon's dream, *Iliad*, book ii.). S
dramatists frequently speak of foreknowled
communicated by dreams (*e.g.*, Clytemnestra'
as to the fall of Troy in the *Agamemnon* of
ascribed to a dream). The popular view was c
to a certain extent by philosophers. Thus
room in his mystic scheme of knowledge for t
divine manifestation to the soul in sleep. In
(chaps. xlvi. and xlvii.) a prophetic character
assigned to the images of dreams. These di
tions (divinations) are not, however, given to
soul, but to the lower appetitive soul through
of the sensible images of rational truths which
on the liver, an organ contiguous with the b
the appetitive soul. These prophetic visions
only when the reasoning faculty is fetter
or alienated by disease and enthusiasm. In
divine artificer has given to the inferior region
a certain substitute for rational knowledge.
time the interpretation of the visions requires
and hence the business of receiving them and
ing them does not properly belong to the s
Even Aristotle treats the supposition of divin
in dreams very considerately when he writes, in
περὶ μαντικῆς τῆς ἐν τοῖς ὕπνοις, "that there
tion concerning some things in dreams is not
The Stoics, again, to judge from Cicero's acco
views in his *De Divinatione*, reasoned *a pri*
gods, if they love men and are omniscient a
powerful, will certainly disclose their purpose
sleep. Chrysippus is, on the same authori
have written a volume on the interpretatio
as divine portents. Cicero's brother Quint
defends the orthodox theory of dreams,
skilled interpretation of dreams which is a tru
even though, like all other arts in which men
ceed on conjecture and on artificial rules, it is
The current views of dreams of classic a
supposed to be to some extent embodied in the '
of Daldianus Artemidorus of Ephesus (writt
year 170). Here the interpretation of dreams
a body of elaborate rules. To dream of
element, as fire, air, &c., of a particular plant,
body, and so on, always signifies the same k
for the same kind of person. It is the over-lo
age, social condition, &c., of the dreamer w
view of Artemidorus, leads to the abuse of
pretation. He attempts to draw a distinct
ὄνειρος, a vision having a real bearing on
ἐνύπνιον, a mere dream having no actual signi
this does not, according to Liddell and Scott
with classical usage. The divine origin of dr
a doctrine of the Christian church. It ap
writings of the fathers, being defended partly
partly on classic, authority. Synesius of C
375) has left a treatise on dreams (*περὶ ἐν*
puts forward certain psychological hypotheses d
from Plato and Plotinus and ascribes to the

(which is intermediate between the soul and the animal part) the power of accompanying the soul in its flights to the celestial regions, and so of sharing in the contemplation of divine truths. Synesius exalts the rank of dreaming among the arts of divination, setting it far above other modes of prophecy as being most simple and sure, open to all, unencumbered with expensive and laborious preparations, and so on. He affirms that he has repeatedly found dreams of service in arranging his ideas, and in improving his style of composition. Mediæval and modern Christian theologians have continued to attribute dreams, or, more accurately, certain orders of dream, to the intermediate agency of the divine Being. The popular theory of dreams to be met with among the later European peoples bears the impress of that folk-lore which developed itself in the Middle Ages under influences partly Christian, partly pagan. Dreams were referred to a variety of supernatural agencies, including not only God and the devil, but also subordinate beings, as fairy, fiend (incubus), &c. Further, the art of interpreting dreams according to definite rules (oneiromancy) was developed to a very high point. (See Brand, *Popular Antiquities*, vol. iii. *Dictionary of Dreams*). In our own times certain restricted classes of dreams are customarily associated with the action of benevolent or malignant beings. On the other hand, people are now wont to interpret dreams as omens or signs without distinctly attributing them to any supernatural agent. This view of dreams forms the transition-point between the religious and the scientific theories.

(c) *The Dream as a Subjective Phenomenon Dependent on Natural Causes.*—While the theory of the divine or supernatural origin of dreams has thus held its ground so long, there has been gradually growing up from an early period of human history a more scientific conception of the phenomenon as dependent on natural laws (of mind and body). Psychologists and physiologists alike have approached the subject from their respective points of view, and sought to explain the phenomena of dreaming as natural events. The first germs of a scientific theory of dreams are to be found in antiquity. Thus Democritus, from whom the Epicureans derived their theory, held that dreams are the product of the simulacra or phantasms of corporeal objects which are constantly floating in the atmosphere, and which attack the soul during repose. Again, Plato speaks in the *Republic* of dreaming as illustrating the dominant mental impulses and habits of the individual (unchecked appetite, and temperance with intellectual pursuits), and thus connects it with the normal waking operations of feeling and thought. Aristotle in his short treatise on dreams (*περὶ ἐνυπνίων*) refers dreaming to the action of objects of outward sense which leave behind impressions on the soul and bodily frame. Dreaming is said to be the function of the sensitive part of the mind, but of this so far as phantastic; and a dream is defined as "the phantasm arising from the motion of sensible perceptions when it presents itself to him who is asleep." Aristotle further has some correct observations on the immediate bodily conditions of dreaming, and on the exaggeration of sensation in this condition of mind. Thus, he says, we fancy it thunders and lightens when a small sound is produced in our ears; we imagine that we are eating honey in consequence of a defluxion of the least quantity of phlegm. In the *De Divinatione* of Cicero we have almost an unique instance among classic writings of a complete rejection of the doctrine of the supernatural origin of dreams, and of a full and consistent adoption of the natural method of explaining the phenomena. Cicero's position stands in marked contrast to that of partial sceptics, as, for example, Pliny, who seems content to exclude from the supernatural method of explanation certain of the more obviously natural dreams, such as those occurring immediately after food and wine, or when one has just fallen asleep after waking (*Nat. Hist.*)

While philosophers were thus learning to regard dreams as natural processes, physicians, on the other side, had their attention called to dreaming in its relation to pathological bodily conditions. It seems probable, indeed, that men occupied in studying bodily diseases were among the first to suspect the true nature and origin of dreaming. Thus Hippocrates, while inclined to admit that some dreams may be divine, distinctly says that others arise from the action of the mind and the body. Hippocrates, too, appears to have been the first to supply a scientific basis for the premonitory character of certain kinds of dreams. There are dreams, he says, which announce beforehand the affections of the body. This idea has, as we shall see presently, been confirmed by modern pathological observations. It is easy to understand that this prognostic side of dreams was in the early stages of knowledge greatly exaggerated. This appears to be true of the speculations of Galen, who held that to dream one's thigh was turned into stone signified the approaching loss of this member. This belief in the premonitory character of dreams was only one side of a general doctrine of dreams according to which they arise from bodily disturbances, and so may serve as symptoms which the physician has to include in the complete diagnosis of a disease. This idea, which is recognized by modern physiologists as true within certain limits, led in the first crude stages of scientific investigation to exaggerated and fanciful conclusions. Thus a new system of dream-interpretation came into vogue according to which to dream of a certain thing always means a disturbance in one particular organ. In the doctrines of Oriental physicians (the Hindus and Chinese) dreams are thus referred to pathological states of the five organs—heart, lungs, kidneys, spleen, and liver. Thus to dream of war and fighting signifies a bad state of the lungs; of fire, smoke, &c., a bad state of the heart, and so on.

Modern Theory of Dreams.—Under this head we shall give an account of the principal results of modern investigations, psychological and physiological, on the nature and conditions of dreams. Respecting many points there is still considerable diversity of view. Certain questions of fact yet remain unanswered, the reason of this being the inaccessibility of dream-phenomena to accurate and adequate observation. Further, owing to the divided condition of psychological principles, the explanation of dreaming assumes very different forms with different writers. On the one hand there are those who conceive the mind as an independent spiritual substance, which employs the body as its instrument, but is not dependent on this. With these, dreams will naturally wear the aspect of products of some spiritual faculty or faculties which are not involved in the sleep of the body and the senses. At the other extreme are those who regard mental phenomena as an outcome of bodily changes, as a refined result of physical processes. By these, dreams will be regarded as given off, so to speak, by the various organs of the body during sleep. Midway between the spiritualist and materialist hypotheses is the scientific view in its narrower sense, namely, the doctrine that the mental and the bodily are perfectly dissimilar regions of phenomena, which are yet connected in such a way that bodily events appear as the conditions of mental events. In the following account of modern dream theory we shall confine ourselves for the most part to the last stand-point, though indicating here and there how the other theories of the relation of mind to body lead to divergent conclusions.

On the very threshold of our inquiry we are met by a much disputed question—What is the relation of dreaming to sleep? Is dreaming an indication of imperfect sleep which must cease as soon as the higher nervous centres reach a complete repose? Is it, on the other hand, something wholly spiritual and independent of sleep as a bodily condition? Here we have two different views arising from different theories of the relation of mind and body. These distinct views of the subject have commonly appeared as answers to the question of fact—Are we when asleep always dreaming? This question was first raised by philosophers in connection with certain conceptions of the soul and its activity. Descartes, who regarded thought as of the essence of personal existence, was naturally led to maintain that the mind is always thinking. "I am," he says, "I exist, that is certain; but for how long? as long as I think; for perhaps even it might happen that if I ceased wholly to think I should cease at the same time wholly to exist" (*Meditation* ii.). Among the Cartesians the proposition, the mind is always thinking, became a leading tenet. Locke argues against this supposition. He contends that in sleep men do not always think, or they would be conscious of it. If it is asserted that they dream but they forget it, he replies it is "hard to be conceived" that "the soul in a sleeping man should be this moment busy a-thinking, and the next moment in a waking man not remember nor be able to recollect one jot of all those thoughts." To suppose that in sleep the soul thinks apart from the body involves the absurdity of a double mind, and is further contradicted by the irrationality of dreams (*Essay*, book ii. ch. i.). Locke was answered by Leibnitz in the *Nouveaux Essais*, who upheld the Cartesian affirmation, and maintained that during sleep the mind has always some "little perceptions" or "confused sentiments," though, according to his doctrine of unconscious perceptions, these need not become objects of conscious attention. That we never sleep without dreaming is further maintained by Kant in his *Anthropologie*, by Jouffroy and others. In his *Lectures on Metaphysics*, Sir W. Hamilton argues fully for the same idea. He says that during sleep the mind "is never either inactive or wholly unconscious." He seeks to refute the argument of Locke, that we ought to remember our dreams, by calling attention to the fact that the somnambulist has no recollection of his dream, and that persons who betray in their expression and utterance the fact of dreaming retain no recollection of the state. He further holds that the continuity of dreaming is proved by the fact that whenever we are suddenly roused from sleep we find ourselves dreaming.

While metaphysicians have thus in the main affirmed the continuity of dreams, those who regard mental phenomena as invariably connected with bodily conditions have for the most part viewed dreaming as only an occasional accompaniment of sleep. By some, indeed, dreaming is viewed as confined to the transition state from sleeping to waking, though this view is now rejected by physiologists no less than by metaphysicians. It is true that the great rapidity of dream-thought has been proved, *e.g.*, by the experience of Lord Holland, who fell asleep when listening to somebody reading, had a long dream, and yet awoke in time to hear the conclusion of the sentence of which he remembered the beginning. And this takes off from the value of Hamilton's argument that we always find ourselves dreaming when wakened, for such dreaming may clearly be an incident of the transition state. Yet the other facts emphasized by Hamilton, as well as the results of Maury's experiments, to be spoken of presently, show that we may dream when soundly sleeping. On the other hand, we cannot, it is certain, directly prove that we are always dreaming during sleep. Many physiologists are disposed to regard dreaming as the accompaniment of some slight disturbance, whether arising from the lower organs or from an undue excitability of the brain and its nervous connections; and according to this view the continuity of dreaming would seem to be an improbable supposition. To the physiologist the idea of perfectly unconscious sleep presents no difficulties. The results of experiment show him that the lower bodily (vegetative) functions are independent of cerebral activity; and the phenomena of swooning, the effects of anæsthetics, &c., familiarize him with the temporary suspension of the conscious activity of the brain. Hence the view commonly adopted by physiologists seems to be that dreaming is only an occasional incident of sleep. (See the article on "Sleep and Dreams" by Dr Carpenter in Todd's *Ency. of Anat. and Physiol.*) At the same time certain physiologists, as Sir H. Holland (*Chapters on Ment. Physiol.*) and Sir Benj. Brodie (*Psychological Inquiries*), are disposed to think that dreaming is the rule and not the exception.

The question whether we are always dreaming during sleep leads up naturally to the inquiry into the causes or conditions of dreams. This question has been approached from different sides. On the one side, metaphysicians have sought to account for dreaming by some simple theory of a suspension of certain mental faculties. On the other side, writers have tried to explain dreaming as a result of simple bodily operations. We will just glance at one or two of these simple hypotheses. A common view among metaphysicians is that the nature of dreaming is amply explained by the absence or suspension of the will. The importance of the cessation of the will's action has been emphasized by Dugald Stewart (*Elements of the Phil. of the Human Mind*, vol. i. chap. v. sect. 5). Stewart does not mean that the will is wholly dormant in sleep, but that it loses its hold on the faculties. By this supposition he seeks to account not only for the incoherence but also for the apparent reality of dream-images. That the absence of the normal processes of volition, especially as involved in attention, constitutes one important factor in the explanation of dreaming seems to be admitted by all writers,—for example, Dr Darwin (*Zoonomia*), Sir Benj. Brodie, Dr Carpenter, and M. Alf. Maury (*Le Sommeil et les Rêves*). It is doubtful, however, whether this simple hypothesis explains all that Stewart refers to it. Maury objects to Stewart's theory that the will does not wholly lose its command of the bodily organs, &c., in dreams.

While great stress has thus been laid by some writers on this negative condition, the suspension of will, others have sought to construct a simple theory of dreaming by supposing the unimpeded action of some special mental faculty. Thus Cudworth (*Treatise concerning Eternal and Immutable Morality*) reasons, from the orderly coherence of dream-imaginations and the novelty of their combinations, that this state of mind arises from the action of "the phantastical power of the soul," and not from "any fortuitous dancings of the spirits." A very curious theory of dreaming as depending on a particular circumscribed faculty of the soul is to be found in Scherner's *Das Leben des Traumes*. Dreaming is a decentralization of the movement of life. In waking consciousness the central force, the ego spontaneity, is supreme,—in dreaming the activity of the ego becomes purely receptive. The central ego is now merely the point about which the peripheral life plays in perfect freedom. Thus the will (the spontaneous ego) is suspended, and thought loses its categories. On the other hand, the imagination now freed from the ego reaches its perfect unrestrained function. And this function is seen in the symbolic representation both of the bodily parts and of the mental stimuli which influence consciousness in sleep. A similar conception of the action of the creative fancy in dreaming is adopted by Dr Johannes Volkelt (*Die Traum-phantasie*.)

In addition to these simple metaphysical and psycho- gical theories of dreaming, there are to be found no less nple physiological hypotheses. Among these we may ke the opinion of Hobbes (*Leviathan*), that the imagina- ons of dreams all proceed from "the agitation of the inward rts of a man's body," the disturbance of which parts, ring to their connections with the brain, serves to keep e latter in motion. Another simple physiological pothesis for explaining dreams is offered by Schopenhauer. cording to this writer, the exciting causes of dreams are pressions received from the internal regions of the ganism through the sympathetic nervous system. These pressions are afterwards worked up by the mind into asi-realities by means of its "forms" of space, time, .

This simple and "geometric" method of explaining eams, though it may be valuable up to a certain point, ust necessarily fail to account for all the phenomena con- rned. As we have shown in our preliminary description dreams, their contents vary within very wide limits, and nnot therefore all be referred to one or two simple inciples whether mental faculties or bodily stimuli; also, is by no means safe to affirm of any mental function at it is universally absent in dreams, since the second ental processes, as Sir H. Holland and M. Maury point it, enter in very unequal degrees into different dreams.

A full and exhaustive theory of dreaming would seem to clude several distinct lines of inquiry. Among these ere are three which have already been well defined by cent writers on the subject. The first relates to the urces of dream-imaginations, or the stimulations which re the immediate causes of these. The second question as to do with the order or form of dream-combinations, nd seeks to determine the conditions of the peculiar rrangements, simultaneous and successive, which are bservable in dreams. The last problem is that of ccounting for the objective reality and generally for the tensity and impressiveness of dream-fancies.

In briefly opening up each of these lines of inquiry we hall seek to keep in mind the variable as well as the con- ant features of dreaming; also we shall proceed, as far possible, according to that double method of study, e psychological and the physiological (subjective and jective), which offers itself to those who accept the idea a perfect parallelism between mental and bodily events.

(A) *The Sources of Dream Materials.*—The numerous ages which make up the ever-renewed current of a dream pear sometimes to come from the internal depths of the ind itself. In other cases, as even the ancients recognized, ey depend on a stimulation of the brain arising from vary- g conditions of the bodily organs. According to the view at all mental events have their physical accompaniments, e first class of imaginations must also be referred to cer- n conditions of the brain and nervous system. These rious sources of dream-activity are roughly classified by rtley in his *Observations on Man*. Dream-images, he ls us, are deducible from three causes:—(1) impressions d ideas lately received; (2) present state of the body pecially the stomach and the brain); (3) association. e large part played by bodily states in our dream-life is ognized not only by physiologists, as Maury, but also by se who ascribe dreams in part to occult spiritual ulties, as Scherner. By help of the results of recent earches we are able to improve a little on Hartley's ssification. The exciting causes of dream-images fall o two main classes:—(I.) peripheral, and (II.) central mulations. The latter arise in the outlying parts of the rvous system, namely, the organs of sense, the muscular paratus, the internal bodily organs, together with the ternal portions of the nerves connected with these. Central stimulations are such as arise mainly, if not entirely, within the encephalic region. These again are either (α) direct, or (β) indirect. The first depend on the condition of the nerve-elements acted upon, and the unknown influences (possibly connected with the condition of the circulation) brought to bear on these at the moment. The indirect stimulations arise as a result of some preceding excitation in a connected region of the brain. The former underlie the apparently spontaneous imaginations of dreaming, as well as those which are the echo of a recent waking experience. The latter are the physical counterpart of images or ideas called up by association with preceding images or thoughts.

(I.) Among peripheral stimulations are to be noticed (α) those which arise from the action of external objects on the organs of sensation. Recent researches show that these may play an important part in dreams. Dr Beattie speaks of a man who could be made to dream about a subject by whispering into his ear. Experiments were made by M. Giron de Buzareingues (*Journal de Physiol.* tom. viii.) as to the effects of external impressions on dreaming. Thus, by leaving his knee uncovered during sleep, he dreamt he was travelling in a diligence (where knees are apt to get cold). The most elaborate experiments bearing on this point have been carried on by Alf. Maury, with the help of an assistant. The latter produces some external stimulation while the experimenter sleeps; he is then wakened up so as to record the dream immediately resulting. By this means important results were reached. When, for example, his lips were tickled, he dreamt that he was subjected to horrible tortures, that pitch plaster was applied to his face and then torn off. Sensations of hearing, smell, and taste were also followed by appropriate though greatly exaggerated images. Wundt (*Physiologische Psychologie*) thinks that cutaneous sensations, arising from the varying pressure and temperature of the bodily surface, are frequent excitants of dream-images. (β) Along with such objective sensations must be reckoned subjective sensations which arise in the absence of external stimuli, and which have as their physical basis certain actions in the peripheral as well as the central regions of the nerves. Of such are the visual images (*Schlummerbilder*) seen by J. Müller, Goethe, Purkinje, and others, when the body is disposed to sleep. These are called the dream-chaos by Gruithuisen, since they are supposed to form the raw material of dreams. Maury gives a full account of these phenomena, which he terms "hypnagogic hallucinations," and which appear to include not only visual images but also subjective sensations of sound, touch, &c. He attaches great importance to the action of these subjective sensations in dreams. The predominance of visual imagery in dreaming appears to be connected with the great activity of the organ of sight and its consequent excitability. It is to be added that one can only roughly distinguish these subjective sensations, which involve the peripheral regions of the nervous system, from images supposed to be confined to the central regions. (γ) The conditions of our muscles during sleep, which somehow convey impressions to the brain, affect consciousness, and so influence dreaming. To this source we must refer the active phenomena of dreams, as running, flying, resisting, struggling, &c. It is probable, as Wundt remarks, that the movements of the body during sleep, as those of breathing and the extensions and contractions of the limbs, give rise to dream fancies, and painful conditions of the muscles due to an awkward position of the limbs may also serve to excite images. (δ) Among the most frequent excitants of dreams are organic or systemic sensations connected with the varying states of the internal bodily organs. The prominence given to this source of dreaming in ancient and modern systems of medicine has already been referred to. States of the stomach, lungs, heart, secretory organs, teeth and gums, &c., are, as we all know, powerful provocatives of dreams. Owing to the close connection of dreams with these organic conditions they may serve as important elements in the diagnosis of bodily disease. Thus M. Macario (*Du Sommeil, des Rêves, et du Somnambulisme*) recognizes among the morbid class of dreams those which are "prodromic," or premonitory (*e.g.*, a dream of sanguinary conflict before hemorrhage), as well as those which are symptomatic of existing bodily and mental disorders.

(II.) We pass to internal or cerebral excitations. Under (α), the direct excitations, are to be included all dream-ideas which do not arise from bodily stimuli, or through association with preceding feelings and ideas. It seems fairly certain that many of our dream-images are thus occasioned by a kind of "automatic excitation" of the cerebral regions. The dreams which clearly arise from an after-effect in the brain of recent perceptions, especially those of the previous day, appear to illustrate this process. Also, many of the images which correspond to persons and scenes supposed to be long since forgotten may be due to some such local automatic cerebral "sub-excitation." Maury distinctly recognizes this factor in dream-stimulation. It appears from experiences recorded by him that by means of these automatic central excitations images may sometimes be called up of objects which have never been distinctly perceived, and which yet have left a trace of their action on the cerebral substance. (β) The indirect central stimulations include, no doubt, a large number of our dream-fancies. When once a starting-point is reached, whether through a peripheral or a central automatic (direct) excitation, the nervous connections which answer to mental associations provide a vast range of new cerebration. It is to be added that the very same causes which excite particular cerebral regions to automatic action must affect other and connected parts in a less degree, producing a powerful predisposition to activity. Hence it is to be supposed that links of association which are insufficient to restore an idea to consciousness in the waking state may suffice to do so in sleep.

(*B*) *The Order of Dream-Combinations.*—Dreams are commonly said to be incoherent, and this is no doubt frequently the case. On the other hand many dreams appear to simulate orderly arrangements of objects and successions of events. It must follow that on simple theory, such as that the mind has lost the forms of thought—as space, time, and causation (which, as we have seen, is contradicted by Schopenhauer)—will cover all the facts. The absence of volition and voluntary attention goes far to throw light on dream-combinations. In dreaming, as Maury observes, attention, instead of dominating the images which present themselves, is itself dominated by these. At the same time, as we shall see presently, the action of attention, though no longer controlled by the will and directed to some practical end, plays an important part in dream-construction. In order, if possible, to get at the laws of dream structure, we may roughly divide dreams into two classes:—(α) the disconnected and incoherent, and (β) the coherent.

(α) The want of coherence in disorderly dreams appears to arise from the play of association acting on all the heterogeneous and disconnected elements supplied by peripheral and central (direct) stimulation at the time, there being no volitional control (dominating attention) to interfere with the process. Supposing that these two primary sources are continually sending forth new and disconnected images to the dream consciousness, and that owing to the extreme excitability of the brain during sleep numerous
paths of association open themselves up in connection
every such image, we may see how it is that objects gr
themselves, and events succeed one another in s
a chaotic manner. It is not correct to say that we
dispense with the "forms" of space and time; objects
viewed in space, and events "intuited" in time, it is
that the particular positions of things in space and t
are overlooked. On the other hand, it is true that th
is in these loosely-threaded dreams, if not in all dream
suspension of the reasoning process by which objects
intuited in a causal relation. In these dreams, then,
mind is passive, and consciousness is made up of a flu
images and feelings which is not analyzed and rational
as it is in the normal processes of waking perception.

(β) Let us now consider the more coherent
of dreams. These, as we have seen, have by some
accounted for as the products of some occult power
soul, as the "phantastical power" of Cudworth and
symbolic plastic phantasy of Scherner. There is no do
that in many of the more elaborate and pictorial of
dreams a result is reached very similar to the products
the waking imagination. Can this operation be analyz
into simple processes? First of all, the images, howev
disconnected their corresponding objects may be, grou
themselves in a certain arrangement. This process would
be described by psychologists of the Kantian school as the
superposition on the dream-materials of certain mental
forms. On the other hand, it may perhaps be explained
as a result of association. When two orders of impression—
for example, the sight of the human form and the sound of
a human voice—have been habitually associated, there arises
what may be called a general associative disposition to connect some variety of one order of impression with any particular variety of the order which happens to present itself
to the mind; and so, when dreaming, the mind is disposed
to add to images of colour certain relations of space, position, magnitude, &c., to images of human beings some form
of the appropriate human actions, relations, &c. By th
means the intuitive clearness and completeness of
dream-imaginations may largely be accounted for. It
to be added that these general associative tendencies do
determine what particular relations or actions ar
be attributed to the images of sleep. These latter de
on the particular circumstances of the moment, a
example, the locality of the optic fibres involved, the v
excitability of the central regions, &c.

In this factor of our dream-constructions the mind
to be wholly passive. We have now to turn to a
influence, which involves to some extent the active
the mind, namely, the play of attention under the i
not of the will, but of certain vague emotional i
The chief of these are the feeling for unity, and th
of emotional harmony. First of all, there see
a tendency in the more orderly dreams to b
images into some intelligible connection o
of unity with the pre-existing ones. This
pulse, acting through the processes of expec
attention, becomes selective, leading to
of those members of the ever-renewed flux
which are fitted to enter into the dream-sc
sistent factors. In certain cases, indeed,
seems to rise to something like a conscio
exertion. We occasionally remember that
our dream to discover a consistency in the
confused scene presented to consciousness.
unity of dream-structure is largely determin
of emotional harmony. A large part, if
dream-fancies are attended with a feeling o
pain. Now, when a certain state of em
excited in the mind, there is a tendency t

ich conflict with this feeling, and to accept any which
monize with it. The emotion controls the movements
anticipation and of intellectual attention, so that suitable
as are at once recognized and detained. The unity of
most complex dreams appears to arise very largely from
s source. In dreams described by Scherner, Volkelt,
l Wundt the successions of imaginary events are clearly
ing together by a thread of emotion, as joy, terror,
l so on. The commonest example of such a dominating
otional tone in dreaming occurs when there is a
rent of pleasurable or painful feeling contributed by the
dition of some of the internal organs of the body. These
ily sensations become the basis of complex groups of
ges, each new scene being connected with some
logous shade of feeling, "bodily" or "mental."

C) *The Objective Reality and Intensity of Dream-*
aginations.—These are explained by Hartley by two
umstances,—first, the absence of any other reality to
ose to the ideas which offer themselves; and secondly,
greater vividness of the visible ideas which occur in
ams as measured by the corresponding waking ideas.
is last fact may, he thinks, be partly accounted for by
increased heat of the brain. As already remarked,
gald Stewart explains the reality of dreams through the
pension of the ordinary action of volition. In waking
, he says, we distinguish objective impressions from
as by finding that the former are independent of volition,
ile the latter are dependent on the same. Hence, in
aming, when the will no longer controls ideas, these are
staken for realities. The chief influences here concerned
pear to be included in Hartley's theory, though the cir-
mstances emphasized by Stewart may be a secondary
ment in the case. That the reality of dream-images
pends in large part on the absence of external impressions
s been recognized by most recent writers. Among others
Taine (*De l'Intelligence*) dwells on the function of
ternal sensation as a corrective to internal imaginations,
eping these below the illusory stage. External impres-
ns are distinguished from ideas in the waking state, in
rt at least, by their greater intensity. When this relation
no longer recognized by reason either of the ideas
quiring preternatural vividness or of the sensations
ing withdrawn, illusion follows. Waking hallucinations
pend on the first circumstance, dream-illusions on the
ond, perhaps also on the first as well. This leads us to
reflection that during sleep the ideas arising in
sciousness undergo an increase of absolute as well as of
ative vividness. That is to say, they are in themselves
re intense states of consciousness than waking ideas.
s seems to point, as Maury observes, to an increased ex-
bility of the nervous substance in sleep. This same
umstance, too, helps to account for the preternatural
ressiveness and the exaggeration which meet us in
m-life. If the brain is during sleep peculiarly excitable
rill follow that all sensational stimuli, external and
rnal alike, will produce an exaggerated result. Thus
intensity of sensations will be augmented, and their
me, and so the apparent magnitude of dream-images be
eased. Again, if in dreaming the stream of fancies be
apid one, if images simultaneously and successively
rd in on consciousness, we may understand how space
time may appear to swell to unusual proportions.
e more, the peculiar excitability of the brain will mani-
itself in an exaggeration of all feeling. Slight bodily
omforts, for example, will be transformed, as in Maury's
eriments, into huge sufferings, and so locally circum-
bed bodily sensations of pleasure may expand into pre-
atural forms of emotional delight.

Ve are now perhaps in a position to explain the
bolic function of dreams so much emphasized by Scherner. He considers that our dream-phantasy habitually represents the seat of bodily sensations under the symbol of a house and its parts, and the silent processes of thought as the audible conversation of living persons. The latter remark is probably correct, and its truth follows from a consideration of the close association between thought and audible speech. The former observation is surely an exaggerated statement, as has been shown by his friendly critic Volkelt. Yet though bodily sensations do not as a rule reveal themselves under the symbol of a building or mass of buildings, they undoubtedly do appear in consciousness disguised and transformed; and the reasons of this are plain. Even in the waking condition we have but a vague consciousness of the seat of the bodily sensations, and in sleep this can hardly be present at all. In addition to this, the exaggerating influences just referred to must tend to disguise the real nature of bodily sensations, and so to remove all consciousness of their locality. Hence bodily sensations do as a rule clothe themselves in a disguise appearing under the form of emotional experiences. And the particular pleasurable or painful images selected, which will vary with the individual's emotional nature and experience, will be apt to recur as a "symbolic expression" of this variety of bodily feeling. It will follow, too, from the predominance of visual ideas in dreams, that these emotional fancies will commonly take the shape of alluring or alarming visual perceptions.

Dreaming is a subject of great interest by reason of its points of contact with other mental conditions. Thus the common suspension of many of the higher processes of emotion, thought, and volition suggests an analogy between the dreaming state and the instinctive stage of mental growth as observable in children, primitive men, and the lower animals. This aspect of dreams has been treated by Maury.

Again, dreaming has many curious resemblances to the mental states of the insane. The differences which mark off dreaming from these states have already been given. The resemblances between them are no less important. In the illusory intensity of its internal images, in the rapidity of its flux of ideas, and in the wildness and incoherence of its combinations, the dream stands very close to the whole class of hallucinations and illusions of waking life. In truth, a systematic psychological treatment of dreams must connect them with other forms of illusion. This is done, for example, by Wundt, who refers all these groups of phenomena to an increased excitability of the sensory regions of the brain. Maury seems disposed to regard dreaming as the incipient stage of a pathological mental condition, of which somnambulism, insanity, &c., are more fully developed forms. Among other writers who have discussed dreams in relation to these other abnormal states of mind are Macario (*op. cit.*), Bierre de Boismont (*Les Hallucinations*), J Moreau (*Du Haschisch et d'Aliénation Mentale*), also Sir H. Holland, and Dr Carpenter (*Mental Physiology*).

A good deal of random and undigested information respecting dreams and dream-theories is to be found in Mr Frank Seafield's *Literature and Curiosities of Dreams*. A curious account of the ancients' views of dreams is to be met with in a work entitled *Histoire du Sonnambulism*, par Austin Gauthier. For the best statement of the modern theory of dreams, the student is referred to the works of Maury, Wundt, Carpenter, and Volkelt, already named. Dreams have been roughly classified according to the source of their images and the relative activity of association and imagination involved, by Scherner, Volkelt, and others. The view of the processes involved in the imaginative construction of dreams here adopted has been more fully developed by the present writer in an article in the *Cornhill Magazine* of November 1876. (J. S.)

DREDGE, THE NATURALIST'S, an implement constructed on the general plan of the common oyster-dredge, and used by naturalists for obtaining specimens of the animals living on the bottom of the sea at greater or less depths, for the purpose of determining their structure and zoological relations, and ascertaining their geographical distribution. The instrument usually employed in this and other northern countries for dredging oysters and clams is a light frame of iron about 5 feet long by a foot or so in width, with a scraper like a narrow hoe on one side, and a suspending apparatus of thin iron bars which meet in an iron ring for the attachment of the dredge-rope on the other. From the frame is suspended a bag about 2 feet in depth of iron chain netting, or of wide-meshed hempen-cord netting, or of a mixture of both. Naturalist dredgers at first used the oyster dredge, but it is scarcely suitable for scientific purposes. Having a scraper on one side only, it is liable in a current, in deep water, or in unskilled hands, to fall on its back and consequently to come up empty, the scraper not having come into play. Oyster dredgers are not allowed to take oysters below a certain size, and the commercial dredge is so contrived as to allow all small bodies to fall through, and, as many of these are of the highest interest to the naturalist, his object is thus in a great measure defeated.

The remedy for these defects is to have a scraper on each side, with the arms attached in such a way that one or other of the scrapers must reach the ground in whatever position the dredge may fall; and to have the dredge-bag deeper in proportion to the size of the frame, and of a material which is only sufficiently open to allow the water to pass freely through, with the openings so distributed as to leave a part of the bag close enough to bring up the finest mud.

The late Dr Robert Ball of Dublin devised the modification which has since been used almost universally by naturalists in this country and abroad under the name of "Ball's Dredge" (fig. 1). The dredges on this pattern, used in Britain for ten years after their first introduction, about the year 1838, were usually small and rather heavy—not more than 12 to 15 inches in length, by 4 or 4½ inches in width at the mouth. Two scrapers, the length of the dredge-frame, and 1½ to 2 inches wide, were set at an angle of about 110° to the plane of the dredge's mouth, so that when the dredge was gently hauled along it took hold of the ground and secured anything loose on its surface.

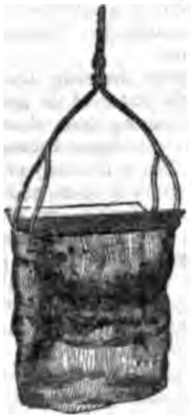


Fig. 1.—Ball's Naturalists' Dredge.

Latterly Ball's dredges of considerably larger size have been used. Perhaps the most convenient form for dredging from a row boat or a yawl is that represented in the figure. The frame is 18 inches long, and its width is 5 inches. The scrapers are 3 inches wide, and these are so set that the distance across between their scraping edges is 7½ inches. The ends of the frame connecting the scrapers are round bars of iron five-eighths of an inch in diameter, and from these bars two curved arms of round iron of the same thickness, dividing beneath into two branches, which are attached to the ends of the cross-bars by eyes allowing the arms to fold down over the dredge-mouth, meet in two heavy eyes at a point 18 inches above the centre of the frame. The total weight of the dredge frame and arms is 20 ℔; it ought to be of the best Lowmoor or Swedish wrought iron.

The thick inner edges of the scrapers are perforated by round holes at distances of about an inch, and through these strong iron rings about an inch in diameter are
passed, and two or three similar rings run on the s
which form the ends of the dredge-frame. A light i
bent to the form of the dredge opening, usual
through these rings, and to this rod and to the r
mouth of the dredge-bag is securely attached by st
or strong copper wire. The dredge-bag for a d
this size should be about 2 feet deep; and prob
most suitable material is hand-made netting of ver
twine, the meshes half an inch to the side, the inte
contracting to a third of an inch across when the
thoroughly soaked. So open a network would let
the smaller things through, and to avoid this, an
same time to give free egress to the water, the b
the bag, to the height of about 6 inches, is lin
"bread-bag," a light open kind of canvas. It may
that in such a dredge many valuable small objects
washed through the meshes of the upper part of the
along with the mud and thus lost; but, on the oth
if the bag be very close it is apt to get filled up wi
at once, and to collect nothing more.

For work round the coasts of Europe, at depths
able from a row-boat or yawl, probably the best
line is bolt-rope of the best Russian hemp, not le
1½ inches in circumference, containing eighteen to
yarns in three strands. Each yarn should bear
hundred weight, so that the breaking strain of suc
ought to be about a ton. Of course it is never vol
exposed to such a strain, but in shallow water the
is often caught among rocks or coral, and the rop
be strong enough in such a case to bring up the bo
if there were some little way on. It is always wel
dredging, to ascertain the approximate depth with
before casting the dredge; and the lead ought alwa
accompanied by a registering thermometer, for t
sequent haul of the dredge will gain greatly in val
observation in geographical distribution, if it be acco
by an accurate note of the bottom-temperature
depths under 100 fathoms the amount of rope
should be at least double the depth; under 30
where one usually works more rapidly, it should
nearly three times; this gives a good deal of slac
the dredge if the boat be moving very slowly, an
the lip of the dredge well down. When there is a
of a current, from whatever cause, it is usually co
to attach a weight, varying from 14 ℔ to half a
weight, to the rope 3 or 4 fathoms in front of the
This prevents in some degree the lifting of the m
the dredge; if the weight be attached nearer the d
is apt to injure delicate objects passing in.

In dredging in sand or mud, the dredge-rope may
be passed through the double eye formed by the
the two arms of the dredge-frame; but in rocky or u
ground it is better to fasten the rope to the eye of
the arms only, and to tie the two eyes together wit
or four turns of rope-yarn. This stop breaks muc
readily than the dredge-rope, so that if the dre
caught it is the first thing to give way under the str
in doing so it often alters the position of the dred
to allow of its extrication.

The dredge is slipped gently over the side, eith
the bow or from the stern—in a small boat more
the latter—while there is a little way on, and the d
which the rope takes indicates roughly whether the
is going down properly. When it reaches the gr
begins to scrape, an experienced hand upon the r
usually detect at once a tremor given to the dredge
scraper passing over the irregularities of the botto
due amount of rope is then paid out, and the rope
to a bench or rollock-pin. The boat should mo
slowly, probably not faster than a mile an hour.

water or with a very slight current the dredge of course anchors the boat, and oars or sails are necessary; but if the boat be moving at all it is all that is required. It is perhaps most pleasant to dredge with a close-reefed sail before a light wind, with weights, against a very slight tide or current; but these are conditions which cannot be commanded. The dredge may remain down from a quarter of an hour to twenty minutes, by which time, if things go well, it ought to be fairly filled. In dredging from a small boat the simplest plan is for two or three men to haul in, hand over hand, and coil in the bottom of the boat. For a large yaul or yacht, and for depths over 50 fathoms, a winch is a great assistance. The rope takes a couple of turns round the winch, which is worked by two men, while a third hand takes it from the winch and coils it down.

The dredge comes up variously freighted according to the locality, and the next step is to examine its contents and to store the objects of search for future use. In a regularly organized dredging expedition a frame or platform is often erected with a ledge round it to receive the contents of the dredge, but it does well enough to capsize it on an old piece of tarpauling. There are two ways of emptying the dredge; we may either turn it up and pour out its contents by the mouth, or we may have a contrivance by which the bottom of the bag is made to unlace. The first plan is the simpler and the one more usually adopted; the second has the advantage of letting the mass slide out more smoothly and easily, but the lacing introduces rather a damaging complication, as it is apt to loosen or give way. Any objects visible on the surface of the heap are now carefully removed, and placed for identification in jars or tubs of sea-water, of which there should be a number secured in some form of bottle basket, standing ready. The heap should not be much disturbed, for the delicate objects contained in it have already been unavoidably subjected to a good deal of rough usage, and the less friction among the stones the better.

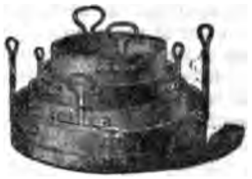


Fig. 2.—Set of Sieves.

Close to the place where the dredge is emptied there ought to be a tub about 2 feet in diameter and 20 inches deep, provided with a set of sieves so arranged that the lowest sieve fits freely within the bottom of the tub, and the three remaining sieves fit freely within one another. (fig. 2.) Each sieve has a pair of iron handles through which the hand can pass easily, and the handles of the largest sieve are made long, so that the whole nest can be lifted without stooping or putting the arms into the water. The upper smallest sieve is usually deeper than the others; it is made of a strong open net of brass wire, the meshes half an inch to a side. The second sieve is finer, the meshes a quarter of an inch to a side; the third is finer still; and the fourth is so close as only to allow the passage of mud or fine sand. The sieves are put into the tub, and the tub filled up to the middle of the top sieve with sea-water. The top sieve is then filled with the contents of the dredge, and the set of sieves are gently moved up and down by the handles of the bottom sieve in the water. It is of great importance not to give a rotatory motion to the sieves in this part of the process, for this is very ruinous to fragile organisms; the sieves should be gently churned up and down, whether singly or together. The result is that the rougher stones and gravel and the larger organisms are washed and retained in the upper sieve; the fine mud or sand passes through the whole of the sieves and subsides to the bottom of the tub; while the three lower sieves contain, in graduated series, the objects of intermediate size. The sieves are examined carefully in succession, and the organisms which they contain are gently removed with a pair of brass or bone forceps into the jars of sea-water, where their movement and their natural colours may be observed, or placed at once in bottles of strong or weak spirit of wine or dried, according to the object for which they have been collected.

The scientific value of a dredging depends mainly upon two things,—the care with which the objects procured are preserved and labelled for future identification and reference, and the accuracy with which all the circumstances of the dredging—the position, the depth, the nature of the ground, the date, the bottom-temperature, &c.—are recorded. Every specimen, whether dry or in spirit, should be labelled at once with the number under which this particular dredging is entered in the dredger's note-book.

Up to the middle of last century the little that was known of the inhabitants of the sea beyond low-water mark seems to have been gathered almost entirely from the objects found thrown on the beach after storms, and from chance captures on lead-lines, or by fishermen on their long lines, and in trawls and oyster and clam dredges. The naturalist's dredge does not appear to have been used for investigating systematically the fauna of the bottom of the sea until it was employed by Otho Frederick Müller in the researches which afforded material for the publication, in 1779, of his admirable *Descriptions and History of the rarer and less known Animals of Denmark and Norway.* In the preface to the first volume Müller gives a quaint description and figure of a dredge (fig. 3) not very unlike that used by Hall and Forbes, only the mouth of the dredge was square, a form which, unless used with great caution, gives fatal facilities for "washing out" in the process of hauling in.

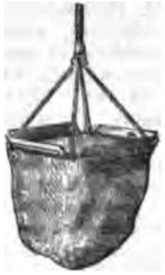


Fig. 3.—Otho Frederick Müller's Dredge (1770).

At the Birmingham meeting of the British Association in 1839 an important committee was appointed "for researches with the dredge with a view to the investigation of the marine zoology of Great Britain, the illustration of the geographical distribution of marine animals, and the more accurate determination of the fossils of the Pliocene period." Of this committee Edward Forbes was the ruling spirit, and under the genial influence of his contagious enthusiasm great progress was made during the next decade in the knowledge of the fauna of the British seas, and many wonderfully pleasant days were spent by the original committee and by many others who from year to year were "added to their number." Every annual report of the British Association contains communications from the English, the Scottish, or the Irish branches of the committee; and in 1850 Edward Forbes submitted its first general report on British marine zoology. This report, as might have been anticipated from the eminent qualifications of the reporter, was of the highest value; and, taken along with his remarkable memoirs previously published, "On the Distribution of the Mollusca and Radiata of Ægean Sea," and "On the Zoological Relations of the existing Fauna and Flora of the British Isles," may be said to mark an era in the progress of human thought.

The dredging operations of the British Association committee were carried on generally under the idea that at the 100-fathom line, by which amateur work in small boats was practically limited, the zero of animal life was approached—a notion which was destined to be gradually undermined, and finally overthrown. From time to time, however, there were not wanting men of great skill and experience to maintain, with Sir James Clark Ross, that "from however great a depth we may be enabled to bring up mud and stones of the bed of the ocean we shall find them teeming with animal life." Samples of the sea-bottom, procured with great difficulty and in small quantity from the first deep soundings in the Atlantic, chiefly by the use of Brooke's sounding machine, an instrument which by a neat contrivance disengaged its weights when it reached the bottom, and thus allowed a tube, so arranged as to get filled with a sample of the bottom, to be recovered by the sounding line, were eagerly examined by miscroscopists; and the singular fact was established that these samples consisted over a large part of the bed of the Atlantic of the entire or broken shells of certain Foraminifera. Dr Wallich, the naturalist to the "Bull-dog" sounding expedition under Sir Leopold M'Clintock, reported that star-fishes, with their stomachs full of the deep-sea Foraminifera, had come up from a depth of 1200 fathoms on a sounding line; and doubts began to be entertained whether the bottom of the sea was in truth a desert, or whether it might not present a new zoological region open to investigation and discovery, and peopled by a peculiar fauna suited to its special conditions.

In the year 1868, while the question was still undecided, two testing investigations were undertaken independently. In America Count L. F. Pourtales, one of the officers employed in the United States Coast Survey under Professor Pierce, commenced a series of deep dredgings across the Gulf Stream off the coast of Florida, which were continued in the following year, and were productive of most valuable results; and in Great Britain the Admiralty, on the representation of the Royal Society, placed the "Lightning," a small gun vessel, at the disposal of a small committee to sound and dredge in the North Atlantic between Shetland and the Faröe Islands.

In the "Lightning," with the help of a "donkey-engine" for winding in, dredging was carried on with comparative ease at a depth of 600 fathoms, and at that depth animal life was found to be still abundant. The results of the "Lightning's" dredgings were regarded of so great importance to science that the Royal Society pressed upon the Admiralty the advantage of continuing the researches, and accordingly, during the years 1869 and 1870, the gun-boat "Porcupine" was put under the orders of a committee consisting of Dr Carpenter, F.R.S., Dr Gwyn Jeffreys, F.R.S., and Professor Wyville Thomson, F.R.S., one or other of whom superintended the scientific work of a series of dredging trips in the North Atlantic to the north and west of the British Islands, which occupied two summers.

In the "Porcupine," in the summer of 1869, dredging was carried down successfully to a depth of 2435 fathoms, upwards of two miles and a half, in the Bay of Biscay, and the dredge brought up well-developed representatives of all the classes of marine invertebrates. During the cruises of the "Porcupine" the fauna of the deep water off the western coasts of Great Britain and of Spain and Portugal was tolerably well ascertained, and it was found to differ greatly from the fauna of shallow water in the same region, to possess very special characters, and to show a very marked relation to the faunæ of the earlier Tertiary and the later Cretaceous periods.

In the winter of 1872, as a sequel to the preliminary cruises of the "Lightning" and "Porcupine," by far the most considerable expedition in which systematic dredging had ever been made a special object left Great Britain. H.M.S. "Challenger," a corvette of 2306 tons, with auxiliary steam working to 1234 horse-power, was despatched to investigate the physical and biological conditions of the great ocean basins.

The "Challenger" was provided with a most complete and liberal organization for the purpose; she had powerful deck engines for hauling in the dredge, workrooms, laboratories, and libraries for investigating the results on the spot, and a staff of competent naturalists to undertake such investigations and to superintend the packing and preservation of the specimens reserved for future study.

In these deep-sea dredgings it was frequently found that, while few objects of interest were brought up within the dredge, many echinoderms, corals, and sponges came to the surface sticking to the outside of the dredge, and even to the first few fathoms of the dredge-line. This suggested many expedients, and finally a long transverse iron bar was attached to the bottom of the dredge-bag, and large bunches of teazed-out hemp were fastened to the free ends of the bar (fig. 4). The "hempen-tangles" are now regarded as an essential part of the dredge, nearly as important as the dredge-bag, and often much more conspicuous in its results. This addition to Ball's dredge is not, however, generally available in dredging from a boat or in shallow water; the tangles are apt to catch on rocks or coral, and a turn of the drum of the donkey-engine is required to free them.

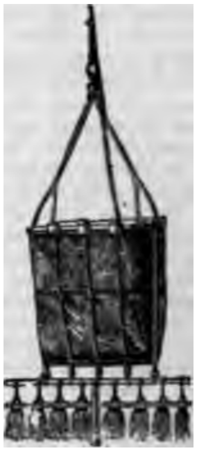


FIG. 4.—Deep-sea Dredge, with Tangle-bar.

Ball's dredge was still employed, with some slight modifications, the result of further experience. Fig. 4 represents the form of dredge which was found most suitable for great depths. The dredge-frame of hammered iron is 4 feet 6 inches long and 1 foot 3 inches broad; the scrapers are 3 inches wide, and are connected at the ends by bars of 1¼ inches round iron. The arms are of inch round iron, and slightly curved; they are bolted together to a stout iron bar which ends above in a swivel and ring. Two bars of square iron of some strength are attached by eyes to the round cross-bars at the ends of the dredge-frame, and have the other ends lashed to the iron bar which bears the tangles. These rods keep the dredge-bag at its full length, and prevent it or the tangles from folding over the mouth of the dredge. The dredge-bag is 4 feet 6 inches in length; the lower half is of twine netting so close as to retain everything except the finest mud, which indeed only partially washes through, and the upper half is of twine netting with the meshes an inch to the side. The bag is guarded by three loops of bolt-rope attached to the frame of the dredge, to the bottom of the bag, and finally to the tangle-bar. The canvas pads represented in the figure on the dredge-frame are only to protect the seizings of the loops. The dredge is suspended by an iron chain, which forms the first few fathoms of the dredge-line. The chain is not, however, directly fastened to the ring at the end of the arms, but is made fast to one of the end bars of the dredge-frame, and it is stopped to the ring by a single strand of bolt-rope. If the dredge get caught the stop carries away, the direction of the strain on the dredge is altered, and it probably relieves itself and comes up end upwards. In deep water a 28 ℔ deep-sea lead is usually hung from the centre of the tangle-bar with four tangles on each side.

Dredging was carried on in the "Challenger" from the main yard-arm. A strong pendant was attached by a hook to the cap of the main-mast, and by a tackle to the yard-arm a compound arrangement of 55 to 70 of Hodge's patent accumulators was hung to the pendant, and beneath it a block through which the dredge-rope passed. The donkey-engines for hauling in the dredging and sounding gear were placed at the foot of the main-mast on the port side. They consisted of a pair of direct-acting, high-pressure, horizontal engines, in combination of 18 horse-power nominal. Instead of a connecting rod to each, a guide was fixed to the end of the piston-rod with a brass block working up and down the slot of the guide. The crank-axles ran through the centre of the blocks, and the movable block, obtaining a backward and forward motion from the piston-rod, acted on the crank as a connecting-rod would do. This style of engine is commonly used for pumping, the pump-rods being attached to the guide on the opposite side from the piston-rod. At one end of the crank a small toothed wheel was attached, which drove one thrice the multiple on a horizontal shaft extending nearly across the deck, and about 3 feet 6 inches above it. At each end of this shaft a large and a small drum were fixed, the larger having three sheaves cast upon it of different sizes, the lesser being a common barrel only. To these drums the line was led, two or three turns being taken round the drum selected. In hauling in, the dredge-rope was taken to a gin-block secured to a spar on the forecastle, then aft to the drum of the donkey-engines on the port side, then to a leading-block on the port side of the quarter-deck, and across the deck to a leading-block on the starboard side corresponding in diameter with the drum used on the port side, and from this it was finally taken by the hands and coiled. The strain is of course greatest at the yard-arm and the first leading-block, and by this arrangement it is gradually diminished as the line passes round the series of blocks and sheaves.

A change made latterly in the handling of the dredge had certain advantages. Instead of attaching the weights directly to the dredge-rope, and sending them down with the dredge, a "toggle," a small spindle-shaped piece of hard wood, was attached transversely to the rope at the required distance, 200 to 300 fathoms in advance of the dredge. A "messenger," consisting of a figure of eight of rope, with two large thimbles in the loops, had one of the thimbles slipped over the chain before the dredge was hung, and the other thimble made fast to a lizard. When the dredge was well down and had taken its direction from the drift of the ship, the weights, usually six 28-℔ deep-sea leads in three canvas covers, were attached to the other thimble of the traveller, which was then cut adrift from the lizard and allowed to spin down the line until it was brought up by the toggle. By this plan the dredge took a somewhat longer time to go down; but after it was adopted not a single case occurred of the fouling of the dredge in the dredge-rope, a misadventure which had occurred more than once before, and which was attributed to the weights getting ahead of the dredge in going down, and pulling it down upon them entangled in the double part of the line.

The great risk in dredging in very deep water is that of the dredge running down nearly vertically and sinking at once into the soft mud, and remaining imbedded until hauling in commences. During the earlier part of the voyage of the "Challenger" this accident seemed too often to defeat, at all events partially, the object of the operation; and, after various suggestions for modifying the dredge, it was proposed to try some form of the trawl in order to insure, so far as possible, the capture of any of the larger marine animals which might be present, and thus to gain a better general idea of the nature of the fauna. A 15-feet beam-trawl was sent down off Cape St Vincent to a depth of 600 fathoms; the experiment looked hazardous, but the trawl came up in due time all right, and contained, along with many of the larger Invertebrata, several fishes. The trawl seemed to answer so well that it was tried again a little farther south in 1090 fathoms, and again it was perfectly successful, and during the remainder of the voyage it was employed almost as frequently, and in nearly as deep water, as Ball's dredge. The deepest successful haul of the trawl was in the Pacific in 3125 fathoms, and the deepest haul of Ball's dredge was in the Atlantic at 3150 fathoms.

During the voyage of the "Challenger" a course of about 70,000 nautical miles was traversed in three years and a half, and 362 observing stations were established at intervals as nearly uniform as circumstances would permit; and at the greater number of these dredging or some modification of the process was successfully performed—52 times at depths greater than 2000 fathoms, and thrice at depths beyond 3000 fathoms. So fully convinced were the "Challenger" officers that they could dredge at any depths, that it was only want of time and daylight which prevented their doing so at their deepest sounding, 4575 fathoms. The Atlantic was crossed five times, and an erratic route through the Pacific gave a good idea of the conditions of the abysses of that ocean, while in the South Indian Ocean dredging and trawling were carried down close to the Antarctic ice-barrier.

The expedition was successful, and the results were of the most interesting nature. Animal life was found to exist at all depths, although probably in diminishing abundance as the depth becomes extreme; and in all parts of the world at depths beyond 400 or 500 fathoms the fauna had much the same general character. The species usually differed in widely separated areas, but the great majority of forms, if not identical, were so nearly allied that they might be regarded as representative and genetically related. Although all marine invertebrate classes were represented, echinoderms in their different orders, sponges, and Crustacea preponderated, while corals and Mollusca were comparatively scarce. In the first two groups named many forms occurred allied to families which had been previously regarded as extinct or nearly so; thus among the echinoderms, stalked crinoids were by no means rare, and many species of regular Echinidea related to the Chalk genus *Echinothuria*, and many irregular species allied to *Ananchytes* and *Dysaster* occurred. The sponges were mainly represented by the *Hexactinellidæ*, the beautiful order to which the glass-rope sponge of Japan and the marvellous "Venus's Flower Basket" of the Philippines belong, the order to which the *Ventriculites* of the Chalk must also be referred.

Dredging at these great depths is a difficult and critical operation, and, although by its means some idea of the nature and distribution of the abyssal fauna of the ocean has already been attained, it will be long before the blanks are filled up; for of the area of 140,000,000 square miles forming the "abyssal province" the actual amount hitherto traversed by the naturalist's dredge may still be readily reckoned by the square yard. (C. W. T.)

DREDGING. Dredging is the name given by engineers to the process of excavating materials under water, raising them to the surface, and depositing them in barges. It is a process which has been useful from very early times in works of marine and hydraulic engineering, and it has of late years, by improved appliances, been brought to high perfection.

Bag and Spoon Dredge.—The first employment of machinery to effect this object is, like the discovery of the canal lock, claimed alike for Holland and Italy, in both of which countries dredging is believed to have been practised before it was introduced into Britain. The Dutch at a very early period used what is termed the "bag and spoon" dredge for cleaning their canals. It was simply a ring of iron, about 2 feet in diameter, flattened and steeled for about one-third of its circumference, having a bag of strong leather attached to it by leathern thongs. The ring and bag were fixed to a pole, which, on being used, was lowered to the bottom from the side of a barge moored in the canal or river. A rope made fast to the iron ring was then wound up by a windlass placed at the other end of the barge, and the spoon was thus dragged along the bottom, and was guided in its progress by a man who held the pole. When the spoon reached the end of the barge where the windlass was placed, the winding was still continued, and the suspending rope being nearly perpendicular, the bag was raised to the surface, bringing with it the stuff excavated while it was being drawn along the bottom. The windlass being still wrought, the whole was raised to the gunwale of the barge, and the bag, being emptied, was again hauled back to the opposite end of the barge, and lowered for another supply. This system is slow, and only adapted to a limited depth of water and a soft bottom. But it has been generally employed in canals, and is much used in the Thames. The writer had occasion to use it at the Fossdyke Canal, in Lincolnshire, where 135,000 tons were raised in the manner described.

Dredging by Bucket between two Lighters.—Another plan, practised at an early period in rivers of considerable breadth, was to moor two large barges, one on each side; between them was slung an iron dredging bucket, which was attached to both barges by chains wound round the barrels of a crab winch worked by six men in one barge, and round a simple windlass, worked by two men in the other. The bucket, being lowered at the side of the barge carrying the windlass, was drawn across the bottom of the river by the crab winch on the other barge; and, having been raised and emptied, it was hauled across by the opposite windlass for a repetition of the process. This plan was in use in the Tay till 1833.

Steam Dredges.—In all large operations these and other primitive appliances have now, as is well known, been superseded by the steam dredge, which was first employed, it is believed, in deepening the Wear at Sunderland about the year 1796. The Sunderland machine was made for Mr Grimshaw by Boulton and Watt. Receiving improvements from Mr Hughes, Mr Rennie, Mr Jessop, and others, the steam dredge, as now generally constructed, is a most powerful machine in skilful hands, excavating and raising materials from depths of 15 to upwards of 30 feet of water according to the size of the machinery, at a cost not very different from, and in some cases even less than, that at which the same work could be performed on dry land.

As to the kind of work that may be accomplished by dredging, it may be stated that almost all materials, excepting solid rock or very large boulders, may now be dredged with ease. Loose gravel is probably the most favourable material to work in; but a powerful dredge will readily break up and raise indurated beds of gravel, clay, and boulders, and even find its way through the surface of soft rock, though it will not penetrate very far into it. In such cases it is usual to alternate on the bucket-frame a bucket for raising the stuff, with a rake or pronged instrument for disturbing the bottom. The writer in his own experience has raised boulders weighing upwards of a ton with a powerful dredge of the ordinary construction, and removed disintegrated or rotten rock at least to a limited depth, and he believes that in many cases the surfaces of submerged rocks may, by means of such appliances, be to some extent broken up and removed, so as to obtain in certain situations a considerable increase of depth, without recourse to cofferdams, which involve great expense.

The construction of large river steam dredges is now carried on by many engineering firms. The main feature of the machine is the bucket-ladder, which is lowered through an ark formed in the vessel till it reaches the bottom. Along this ladder a series of buckets traverse which cut into the bottom at the lower extremity of the ladder and return loaded with the excavated material, which is discharged at the top of the bucket-ladder into a lighter or barge prepared for its reception. The machines are sometimes made with single and sometimes with double ladders, sometimes discharging at the stern of the vessel and sometimes at both sides, but it is obviously impossible to give illustrative drawings of the different forms of dredgers in sufficient detail to be practically useful. It may be stated that a first-class dredging machine to work in 30 feet water, and discharge over either side, of 60 horse-power complete, costs at present prices about £16,000 to £18,000. The steam hoppers employed to receive and remove the dredgings carry about 500 tons of excavations; they are 70 horse-power, and steam at about 9 miles per hour. The hopper barges are made with opening hinged bottoms, which can be opened when the place of deposit is reached, and the dredgings easily and quickly discharged. These steam barges cost about £8000. Large dredges, such as those constructed by Messrs Wingate of Glasgow for the Tyne and other places, will excavate at the rate of 460 tons per hour when working on favourable ground.

Hopper Dredge.—Some improvements that have been suggested on the dredging plant hitherto used deserve notice. Among these may be mentioned that of Messrs Simons & Company, Renfrew, who have patented and constructed what they have called a hopper-dredge, combining in itself the advantages of a dredge for raising the material and a screw hopper vessel for conveying it to the place of discharge, both which services are performed by the same engines and the same crew. Messrs Simons have constructed seven hopper dredges on this plan, varying from 200 to 1000 tons of "hopper capacity."

Silt Dredge.—Another of the recently suggested improvements is that by Mr C. Randolph, who, in 1870, proposed that, instead of the ordinary dredging buckets, pipes should be lowered until they come into contact with the sand or mud at the bottom. The tops of these pipes were to be in communication with powerful centrifugal pumps, so that the velocity of the in-flowing water through the pipes could be made so great as to carry with it a large percentage of the sand or mud from the bottom; and when the solid matter, and the water in which it is suspended, were raised to the desired height, they would flow freely to any required place for deposit of the suspended material. It is not known that this plan has been carried into practical operation.

Dredging at Amsterdam and Suez Canals.—Another arrangement is that of raising the material by buckets in the ordinary way, and thereafter receiving it in a vessel and floating it off by pipes to the place of deposit. This, of course, can only be done where the place of deposit is close to the spot whence the material is dredged. Two plans have been proposed for effecting this. One of these has been used in the Amsterdam Canal, where the stuff is discharged from the buckets into a vertical cylinder, and is there mingled with water by a revolving Woodford-pump and sent off under pressure to the place of deposit in a semi-fluid state. At the Amsterdam Canal this was done by pipes made of timber, and hooped with iron like barrels. These wooden cylinders were made in lengths of about 15 feet, connected with leather joints, and floated on the surface of the water, conveying the stuff to the requisite distance, like the hose of a fire engine, under a head of pressure, it is believed, of 4 or 5 feet, and depositing it over the banks of the canal. A somewhat similar process was employed on the Suez Canal,—not, however, by using pumps, but simply by running the stuff to the banks on steeply inclined shoots, which were supplied with water when the material raised did not contain sufficient water to cause it to run freely. It is obvious, however, that these arrangements can only be applied in situations where the material to be excavated is of a very soft nature, and where the place of deposit is close at hand. In keeping clear the Suez Canal such appliances may be very useful, as the soft deposit of the canal has only to be raised and projected over the banks on either side.

American Dredges.—Dredging in Canada and the United States is done by what are called *Dipper* and *Clam-shell* dredges, the bucket dredge being seldom used.

The *dipper dredge* consists of a barge, with a derrick-crane reaching over the stern, suspending a large wrought-iron bucket which brings up the dredged material. To the bucket is attached a pole 6 inches by 4 inches in cross section, by which means it is guided while being drawn along the bottom; it is then raised, and its bottom being made to drop open, the contents fall into the barge moored alongside of the dredge. The bottom of the bucket is kept closed by a catch, which, by means of a rope, can be withdrawn at the proper moment. The *clam-shell* is a box made of two similar pieces of wrought iron hinged together at one end; by a simple arrangement of the gearing the clam, mouth open, drops down and sinks into the bottom, and the first effect of heaving up is to close it, thus imprisoning a quantity of material which is raised and deposited as in the case of the dipper. Both kinds of dredges are worked by a steam-engine, and rough as they appear to be, they are extensively employed in deepening and widening river channels, making or deepening canals, and other such works.

This is not the place to discuss the merits of different apparatus, which perhaps can only be settled by the actual performance of different arrangements when fully tested by practice. Having thus briefly noticed them, a few practical observations on dredging, as more immediately applicable to British rivers, have still to be mentioned.

Longitudinal and Cross Dredging.—In river dredging two systems are pursued. One plan consists in excavating a series of longitudinal furrows parallel to the axis of the stream, the other in dredging cross furrows from side to side of the river. It is found that inequalities are left between the longitudinal furrows when that system is practised, which do not occur, to the same extent, in side or *cross dredging;* and the writer invariably finds cross dredging to leave the most uniform bottom. To explain the difference between the two systems of dredging it may be stated that in either case the dredge is moored from the head and stern by chains about 250 fathoms in length. These chains in improved dredges are wound round windlasses worked by the engine, so that the vessel can be moved ahead or astern by simply throwing them into or out of gear. In longitudinal dredging the vessel is worked forward by the head chain, while the buckets are at the same time performing the excavation, so that a longitudinal trench is made in the bottom of the river. When the dredge has proceeded a certain length, it is stopped and permitted to drop down and commence a new longitudinal furrow, parallel to the first one. In cross-dredging, on the other hand, the vessel is supplied with two additional moorings, one on each side; and these chains are, like the head and stern chains, wound round barrels wrought by the engine. In commencing to work by cross dredging we may suppose the vessel to be at one side of the channel to be excavated. The bucket frame is set in motion, but, instead of the dredge being drawn forward by the head chain, she is drawn to the opposite side of the river by the side chain, and, having reached the extent of her work in that direction, she is then drawn a few feet forward by the head chain, and, the bucket frame being still in motion, the vessel is hauled across by the opposite chains to the side whence she started. By means of this transverse motion of the dredge a series of cross furrows is made; she takes out the whole excavation from side to side as she goes on, and leaves no protuberances such as are found to exist between the furrows of longitudinal dredging, even where it is executed with great care. The two systems will be best explained by reference to fig. 1, where A and B are the head and stern moorings, and C and D the side moorings; the arc *ef* represents the course of the vessel in cross dredging; while in longitudinal dredging, as already explained, she is drawn forward towards A, and again dropped down to commence a new longitudinal furrow.

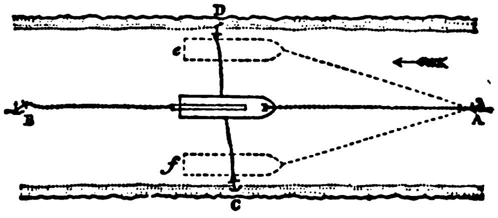


FIG. 1.

Blasting combined with Dredging.—In some cases, however, the bottom is found to be too hard to be dredged until it has been to some extent loosened and broken up. Thus at Newry, Mr Rennie, after blasting the bottom in a depth of from 6 to 8 feet at low water, removed the material by dredging at an expense of from 4s. to 5s. per cubic yard. The same process was adopted by Messrs Stevenson at the bar of the Erne at Ballyshannon, where, in a situation exposed to a heavy sea, large quantities of boulder stones were blasted, and afterwards raised by a dredger worked by hand at a cost of 10s. 6d per cubic yard.

Sir William Cubitt also largely employed blasting in connection with dredging on the Severn, of which an instructive account is given in the *Minutes of Proceedings of the Institution of Civil Engineers*, from which the following particulars are taken :—

> "It appears that a succession of marl beds, varying from 100 yards to half a mile in length, were found in the channel of the Severn, which proved two hard for being dredged, the whole quantity that could be raised being only 50 or 60 tons per day, while the machinery of the dredgers employed was constantly giving way. Attempts were first made to drive iron rods into the marl bed, and to break it up; a second attempt was made to loosen it by dragging across its surface an instrument like a strong plough. But these plans proving unsuccessful, it was determined to blast the whole surface to be operated on. The marl was very dense, its weight being 146 lb per cubic foot;[1] and it was determined to drill perpendicular bores, 6 feet apart, to the depth of 2 feet below the level of the bottom to be dredged out. The bores were made in the following manner, from floating rafts moored in the river. Pipes of $\frac{3}{16}$th inch wrought iron, $8\frac{1}{2}$ inches diameter, were driven a few inches into the marl. Through these pipes holes were bored, first with a $1\frac{1}{4}$ inch jumper, and then with an auger. The holes were bored 2 feet below the proposed bottom of the dredging, as it was expected that each shot would dislocate or break in pieces a mass of marl of a conical form, of which the bore-hole would be the centre and its bottom the apex; so that the adjoining shots would leave between them a pyramidal piece of marl where the powder would have produced little or no effect. By carrying the shot holes lower than the intended dredging, the apex only of this pyramid was left to be removed; and in practice this was found

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[1] Clay weighs about 109 lb, and sandstone about 155 lb per cubic foot.

to form but a small impediment. Fig. 2 is a section of the bore-holes, and fig. 3 a plan in which the inner dotted circles represent the diameters of the broken spaces at the level of the bottom

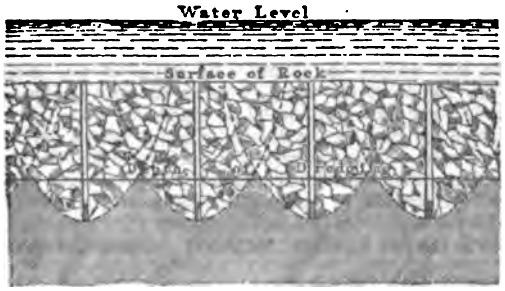

FIG. 2.

of dredging. The cartridges were formed, in the ordinary way, with canvas, and fired with Bickford's fuse. The weights of powder used for bore-holes of 4 feet, 4 feet 6 inches, and 5 feet were respectively 2 ℔, 3 ℔, and 4 ℔. The effect of the shot was generally to lift the pipes—which were secured by ropes to the

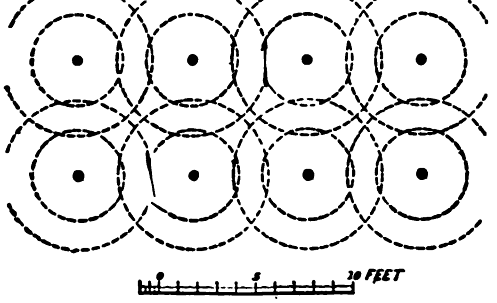

FIG. 3.

rafts—a few inches. Mr Edwards says that not one in a hundred shots missed fire, and these shots were generally saved by the following singular expedient:—The pointed end of an iron bar, ⅜ inch diameter, was made red hot, and, being put quickly through the water, and driven through the tamping as rapidly as possible, was, in nine cases out of ten, sufficiently hot to ignite the gunpowder and fire the shot.

The cost of each shot is calculated as follows:—

Use of material	£0	1	0
Labour	0	3	3
Pitched bag for charge	0	0	3
3 ℔ of powder at 5½d.	0	1	4½
15 ft. of patent fuse at ⁶⁄₁₀ of a penny	0	0	9
Pitch, tallow, twine, coals, &c.	0	0	4½
Cost per shot	£0	7	0

Each shot loosened and prepared for dredging about four cubic yards, so that the cost of blasting was 1s. 9d. per yard. The cost of dredging the material, after it had been thus prepared, was 2s. 3d., making the whole charge for removing the marl 4s. per cubic yard."

One of the most recent successful combinations of blasting and dredging was that completed in 1875 by Mr John Fowler of Stockton at the river Tees, to whom the writer is indebted for the following particulars. The chief novelty was in the barge upon which the machinery was fixed. It was 58 feet by 28 feet by 4 feet, and had eight legs which were let down when the barge was in position. The legs were then fixed to the barge, so that on the tide falling it became a fixed platform from which the drilling was done. The holes were bored and charged, and when the tide rose the legs were heaved up and the barge removed, after which the shots were discharged. There were 24 boring tubes on the barge, and that was the limit which
could at any time be done in one tide. The surfa
which the blasting was done measured 500 yards in
by 200 yards in breadth, a small part of that surfac
uncovered at low water. The depth obtained
channel was 14 feet at low-water, the average depth
blasted being about 4 feet 6 inches. The holes, whi
bored with the diamond drill, varied in depth from
feet, the distance between them being 10 feet. D
in tin canisters fired by patent fuse was used as
plosive, the charges being 2 ℔ and under. The
Oolite shale of variable hardness, and the averag
occupied in drilling 5-feet holes was twelve minute

The dredger raised the blasted rock,—the cost fo
ing, lifting, and discharging at sea being about
cubic yard, including interest on dredging and oth
employed. The dredger sometimes worked a face of
material of from 7 to 8 feet. The quantity blas
110,000 cubic yards, and the contract for blasting
be lifted by the dredger was 3s. 1d. per cubic yard.

Dredging in Exposed Situations.—In some case
ing has to be conducted in exposed situations such
deepening of the "flats" at Londonderry and the
Carlingford. Messrs Stevenson found that dredgin
Foyle could not be conducted when the height of th
exceeded 2½ feet; and Mr Barton at Dundalk so
firms this, as he estimates a swell of 2 feet as the
to work in.

Dredging on the River Clyde.—An important po
nected with this subject is the cost at which dredgi
be done when conducted on a large scale. This, of
must depend on the character of the stuff to be rai
other circumstances; but the following information,
communicated by Mr James Deas, the engineer
Trustees of the Clyde Navigation cannot fail to
interesting and useful.

Mr Deas says truly that the Clyde Trustees empl
bably the largest dredging fleet of any trust in the ki
in maintaining and still deepening and widening t
to meet the ever-increasing demands of the shippin

In the year 1871, for example, 904,104 cubic y
about 1,130,000 tons, were dredged from the river, o
689,560 cubic yards were carried to sea by steam
barges, and 214,544 cubic yards deposited on
means of punts. Of this 904,104 cubic yards,
cubic yards were deposit from the higher reaches
river and its tributaries, and from the city sewe
558,895 cubic yards new material. The total
dredging and depositing was £35,448, or about 9·4
per cubic yard.

Owing to the difference in power of the d
machines employed, and the character of the
lifted, the cost of dredging varies much. In 18
most powerful machine, working 2420 hours, lifted
cubic yards of silt and sand at a cost of 2·60 pe
yard; and this was deposited in Loch Long, 2
from Glasgow, by steam hopper barges, at 5·46 pe
yard. On the other hand, another dredger, workin
hours, lifted only 26,720 cubic yards of hard gra
boulder clay, at the cost of 20·8 pence per cubi
which was deposited on the alveus of the river at
of 17·46 pence per cubic yard; another, working
hours, lifted 122,664 cubic yards of silt, sand, and
deposit, at the cost of 5·67 pence per cubic yard, wh
deposited on land at the cost of 16·40 pence pe
yard; and another, working 2233 hours, lifted
cubic yards of till, gravel, and sand, at the cost
pence per cubic yard, which was deposited on the
of the river at the cost of 9·83 pence per cubic yar

The total quantity dredged from the river duri
twenty-seven years prior to 1872 amounts to 13,

cubic yards, or upwards of 17,000,000 tons. The dredging plant of the Clyde Trust comprises—

6 steam dredges,
14 steam hopper barges,
1 steam-tug,
3 diving-bells,
270 punts, and numerous small boats.

The expenditure for wages of crews, coal, and stores amounted in the year 1871 to fully £14,000, and for repairs £10,775. The value of the dredging plant employed is about £140,000.

Mr Deas has also kindly furnished the following tables, from which the reader will see the gradual increase that has been made on the size of the dredging machines to meet the increased depth of water and growing necessity of increased accommodation for the larger class of vessels which now frequent the river :—

General Dimensions of Dredgers employed on the Clyde in 1872.

No.	Year built.	Length.		Breadth.		Depth.		H.P.	Greatest depth can dredge in.	Single or double bucket ladder.	Remarks.
		Ft.	In.	Ft.	In.	Ft.	In.		Ft.		
1	1851	99	9	32	4	10	0	40	22½	Double	Punt-loading Machine.
5	1841	95	6	22	6	10	4	24	18	Single	Do. Do.
6	1855	121	0	33	6	10	0	40	25	Double	Hopper Barge Do.
7	1860	108	6	23	6	9	0	25	25	Single	Punt Do.
8	1865	161	0	29	0	10	0	75	28	Do.	Hopper Barge Do.
9	1871	161	0	29	0	10	0	75	30	Do.	Do. Do.

The following are the details as regards the dredgers and barges employed on the Clyde:—

No. 8 *Dredger.*

Length, 161 ft.
Breadth moulded, 29 ft.
Depth, 10 feet.
Engine, 75 horse power. Cylinder, 48 in. diameter. Stroke, 8 ft.
One bucket ladder, 90 ft. 9 in. between centres.
Size of buckets, 3 ft. 8 in. × 2 ft. 5 in. × 1 ft. 11 in.
When working in sand, can lift 190 cubic yards per hour.
Greatest depth can dredge in, 28 feet.
Working draught, 6 to 7 feet.
Wages per day of 10 hours as under :—

Master	7s.	0d.
Mate	3	9
Engineer	6	8
Fireman	3	8
Assistant do. and cook	3	4
Bow crabman	3	4
Stern crabman	3	4
Deck hands (3), each	3	2
„ „ one at	3	0
Watchman	3	0
Coals	65 cwt.	
Tallow	2 lb.	
Oil (Lard)	16 gills.	
Waste	1½ lb	

Steam Hopper Barge.

Length, 145 ft.
Breadth moulded, 25 ft.
Depth, 11 ft. 9 in.
Engines, 40 horse power.
Draught light (average), 5 ft. 6 in.
Draught loaded, 11 ft.
Speed, 8 to 9 miles per hour.
Capacity of hopper, 320 cubic yards, or say 400 tons
Average distance run, loaded, 20 miles.
Wages per day as under :—

Master	7s.	0d.
Mate	4	6
Engineer	5	10
Fireman	5	6
Deck hands (3), each	3	4
Coals per day of 10 hours	70 cwts.	
Tallow „ „	5 lb.	
Oil „ „	20 gills.	
Waste „ „	2 lb.	

Quantity and cost of dredging done by No. 8 Dredger during year ending 30th June 1871 :—

Wages	£678	0	0
Coals	371	18	3
Stores	182	7	1
	£1232	5	4
Repairs	1669	6	11
	£2901	12	3
Interest and depreciation—cost of dredger, £17,653, at 10 per cent	1765	6	0
	£4,666	18	3

Time worked during year, 2419¾ engine hours.
Sand, silt, till, and gravel lifted, 430,240 cubic yards.

$$\frac{430{,}240}{2419\tfrac{3}{4}\text{ hours}}=177\cdot 80 \text{ cubic yards lifted per hour.}$$

$$\frac{\pounds 4666,\ 18s.\ 3d.}{430{,}240 \text{ cubic yards}}=2\cdot 60 \text{ pence cost per cubic yard lifted.}$$

Quantity and cost of conveying and discharging the total dredgings lifted by Nos. 6 and 8 Dredgers during the year ending 30th June 1871 :—

Wages, coals, and stores	£6,917	0	5
Repairs	3,255	7	9
	£10,172	8	2
Interest and depreciation—cost of 10 hopper barges, £51,510, at 10 per cent	5,151	0	0
	£15,323	8	2

$$\left.\frac{\pounds 15{,}323,\ 8s.\ 2d.}{\text{673,240 cubic yards, total dredgings conveyed.}}\right\}=5\cdot 46 \text{ pence cost per cubic yard.}$$

Note.—Four hopper barges are required to keep one dredger in constant work.

Abstract of the Quantity and Cost per Cubic yard of Dredging and Depositing during the year ending 30*th June* 1871.

Dredger, etc.	Nature of stuff, and where dredged generally.	Total cubic yards lifted.	Cubic yards lifted per engine-hour.	Pence per cubic yard.					
				Dredging.	Conveying and depositing by barges.	Towing punts to discharging ground.	Discharging dredgings from punts.	Punts, boats, &c., used.	Total Cost.
No. 1 Dredger	Sand, silt, and sewage from Glasgow harbour.	122,664	66·96	5·67	...	2·88	10·00 [1]	3·52	22·07
No. 5 Dredger	Hard till, gravel, and sand, from Erskine Ferry, &c.	65,160	29·18	5·89	...	1·76	5·42 [2]	2·65	15·72
No. 6 Dredger	Sand, clay, and mud, from Pt. Glasgow, &c.	243,000	83·19	3·36	5·46	...	...	...	8·82
No. 7 Dredger	Hard till and clay from Erskine Ferry, Elderslie, &c.	26,720	10·26	20·81	...	2·34	5·42 [2]	9·70	38·27
No. 8 Dredger	Sand, silt, till, and gravel, from Glasgow and Bowling harbours, &c.	430,240	177·80	2·60	5·46	...	..	...	8·06
10 Hopper barges	...	...	...	...	average 5·46				
Tug steamer	...	...	...	...	...	average 2·83			

Nos. 1, 5, and 7 are punt-loading machines. Nos. 6 and 8 are hopper barge machines.

Reference is made to the following works :—*Ency. of Civil Engineering*, by Edward Cressy, London, 1847; "The Dredging Machine," Weale's *Quarterly Papers*, i., London 1843; *The Improvement of the Port of London*, by R. Dodd, Engineer, 1798; "Account of Blasting on the Severn," by George Edwards, C.E., *Minutes of Proceedings of the Institution of Civil Engineers*, vol. iv. p. 361; "the River Clyde," by James Deas, C.E., *Minutes of Proceedings of the Institution of Civil Engineers*, vol. xxxvi. p. 124; *Principles and Practice of Canal and River Engineering*, by David Stevenson, 2d ed., A. & C. Black, Edinb. 1872, p. 126. (D. S.)

DRELINCOURT, CHARLES (1595–1669), an eminent minister of the French Calvinistic church, was born at Sedan on the 10th July 1595. He studied first at the university of his native town, and afterwards at Saumur under the celebrated Professor Mark Duncan. In June 1618 he undertook the charge of the French Protestant church at Langres, where his ministrations were highly appreciated. The church, however, failed to receive the necessary royal sanction, and early in 1620 Drelincourt removed to Paris, where he was ordained minister of the church at Charenton. He was a popular and eloquent preacher, distinguished especially by his power of practically applying the words of Scripture. He was the author of a large number of works in devotional and polemical theology, several of which had great influence, and attained a very extensive circulation. His *Catechism* and his *Consolations against the Fear of Death* (*Consolations contre les frayeurs de la mort*) became well known in England by means of translations, which were very frequently reprinted. It has been said that Defoe wrote his fiction of Mrs Veal, who came from the other world to recommend the perusal of Drelincourt on death, for the express purpose of promoting the sale of an English translation of the work. His controversial works were very numerous. Directed entirely against Roman Catholicism, they did much to strengthen and consolidate the Protestant party in France. Drelincourt died on the 3d November 1669. In 1625 he had married the only daughter of a wealthy merchant, by whom he had a family of sixteen. Several of his sons were distinguished as theologians or physicians. The third, Charles, was professor of physic at the university of Leyden, and physician to the prince of Orange; the sixth, Peter, was ordained a priest in the Church of England, and became dean of Armagh.

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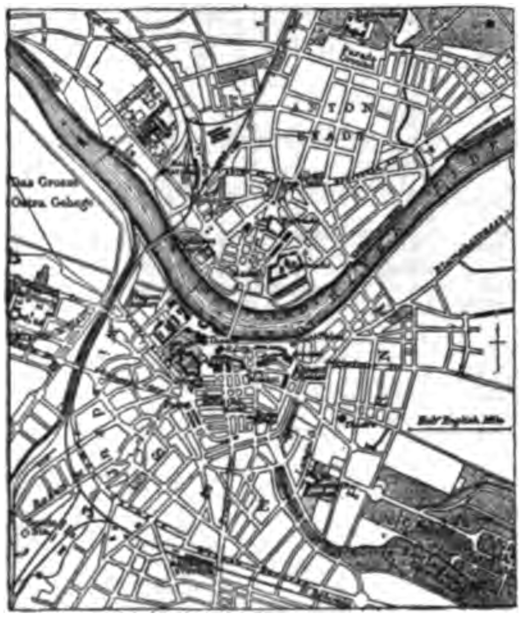
[1] Contractor's price for discharging at Blythswood Park, *including slip docks, and waggoning a distance of about ¾ mile.*

[2] Discharging by Trustees' men on river banks near Erskine Ferry, *by beaching punts and wheeling.*

DRESDEN, the capital of the kingdom of Saxony, is situated in a beautiful and richly cultivated valley on both sides of the Elbe, at an altitude of 402 feet above the level of the Baltic, 72 miles E.S.E. of Leipsic, and 116 miles S.E. of Berlin, in 51° 3' N. lat. and 13° 44' E. long. It is approached on almost every side through avenues of trees, and the distance is bounded by gentle eminences covered with plantations and vineyards. On the left bank of the Elbe are the Altstadt, with three suburbs, and Friedrichstadt (separated from the Altstadt by the Weisseritz, a small affluent of the Elbe); on the right the Neustadt and Antonstadt. Two fine bridges connect the Altstadt and Neustadt,—one of them, the old bridge, erected 1727–31, being 1420 feet long, and having 16 arches. The other, built 1846–52, unites the railways on the right and left banks. The streets of the Altstadt are narrow and somewhat gloomy; those of the Neustadt wider and more regular. In 1875 there were 196,378 inhabitants, of whom 138,306 were on the left bank, 58,072 on the right. The vast majority of the population belong to the Lutheran Church.



Plan of Dresden.

On account of its delightful situation, and the many objects of interest it contains, Dresden is often called "the German Florence," a name first applied to it by Herder. The most imposing of the churches is the church of Our Lady, built 1726–45, with a cupola 311 feet high. The Roman Catholic church, built 1737–56, contains a magnificent organ by Silbermann, a number of statues by Mattielli, and pictures by Raphael Mengs, Sylvestre, and other artists. The church of St Sophia, begun in the 14th century, completed in the 16th, and restored in 1864–69, the Cross Church, the Russian church, and the synagogue are also noteworthy buildings. The Royal Palace, rebuilt in 1534 by Duke George, surmounted by a tower 387 feet high, the highest in Dresden, is externally unattractive, but the interior is splendidly decorated. In the palace chapel are pictures by Rembrandt, Nicolas Poussin, Guido Reni, and Annibale Caracci. The Prince's Palace, built in 1715, has a fine chapel, in which are various works of Torelli; it has also a library of 20,000 volumes. The Zwinger, begun in 1711, and built in the Rococo style, forms an inclosure within which is a statue of King Frederick Augustus I. It was intended to be the vestibule to a palace, but now contains a number of collections of great value. Until 1846 it was open at the north side; but this space has since been occupied by the Museum, a beautiful building in the Renaissance style, the exterior of which is adorned by statues of Michelangelo, Raphael, Giotto, Dante, Goethe, and other artists and poets, by Rietschel and Hähnel. The Brühl Palace was built in 1737 by Count Brühl, the minister of Augustus II. Near it is the Brühl Terrace, approached by a grand flight of steps, on which are groups, by Schilling, representing Morning, Evening, Day, and Night. The terrace commands a charming view of the Elbe and the surrounding country, and is a favourite promenade. The Japanese Palace, in the Neustadt, built in 1715 as a summer residence for Augustus II., receives its name from certain Oriental figures with which it is decorated; it is also sometimes called the Augusteum. Connected with it is a public garden, from which, as from the Brühl Terrace, fine views are obtained. Among the remaining buildings [illegible] note may be named the guard-house, the arsenal, and the court theatre, an edifice in the Renaissance style, built since 1871 to replace the theatre burnt in 1869. In the Neustadt there is an equestrian statue of Augustus the Strong, erected in 1737. The public monuments [illegible] Dresden also include the Maurice Monument, a relief dedicated by the elector Augustus to the memory of his brother; a statue of Weber, the musical composer, by Rietschel; statues of King Frederick Augustus II. and Theodor Körner, by Hähnel; and the Rietschel monument on the Brühl Terrace, by Schilling.

The chief pleasure-ground of Dresden is the Grosser Garten, in which there are a summer theatre, the Rietschel Museum, and a château containing the Museum [illegible] Antiquities. The latter is composed chiefly of objects removed from the churches in consequence of the Reformation. Near the château is the zoological garden, formed [illegible] 1860, and excellently arranged. A little to the south [illegible] Dresden, on the left bank of the Elbe, is the village [illegible] Räcknitz, in which is Moreau's monument, erected on the spot where he was fatally wounded in 1813. The mountains of Saxon Switzerland are seen from this neighbourhood. On the right bank, the slopes of which are covered with villas, there are several popular places of public resort.

Dresden owes a large part of its fame to its extensive artistic, literary, and scientific collections. Of these the most valuable is its splendid picture gallery, founded by Augustus I. and increased by his successors at great cost. It is in the Museum, and contains about 2500 pictures, being especially rich in specimens of the Italian, Dutch, and Flemish schools. Among the Italian masters represented are Raphael, Titian, Correggio, Leonardo da Vinci, Paolo Veronese, Andrea del Sarto, Giulio Romano, Annibale Caracci, Guido Reni, and Carlo Dolci. Of the Flemish and Dutch schools there are paintings by Rubens, Vandyck, Rembrandt, and Ruysdael, Wouvermann, Dów, Teniers, Ostade, Potter, &c. The French school is represented, among others, by Poussin and Claude. The gem of the collection is Raphael's Madonna di San Sisto, for which a room is set apart. There is also a special room for the Madonna of the younger Holbein. Other paintings with which the name of the gallery is generally associated are Coreggio's La Notte and Mary Magdalene; Titian's Tribute Money and Venus; The Adoration and The Marriage in Cana, by Paolo Veronese; Andrea del Sarto's Abraham's Sacrifice; Rembrandt's Portrait of Himself with his Wife sitting on his Knee; The Judgment of Paris and The Boar Hunt, by Rubens; Vandyck's Charles I., his Queen, and their Children. In separate compartments there are a number of crayon portraits, most of them by Rosalba Carriera, and views of Dresden by Canaletto and other artists. Besides the picture gallery the Museum includes a magnificent collection of engravings and drawings. There are upwards of 350,000 specimens, arranged in twelve classes, so as to mark the great epochs in the history of art. A collection of casts, likewise in the Museum, is designed to display the progress of plastic art from the timeof the Egyptians and Assyrians to modern ages. This collection was begun by Raphael Mengs, who secured casts of the most valuable antiques in Italy, some of which no longer exist.

The Japanese Palace contains a public library of more than 300,000 volumes, with about 3000 MSS. and 20,000 maps. This library is especially rich in the ancient classics, and in works bearing on literary history and the history of Germany, Poland, and France. In the Japanese Palace there are also a valuable cabinet of coins and a collection of ancient works of art. A collection of porcelain, formerly in the Japanese Palace, but since 1876 in the "Museum Johanneum" (which once contained the picture gallery), is made up of specimens of Chinese, Japanese, East Indian, Sèvres, and Meissen manufacture, carefully arranged in chronological order. There is in the same building an excellent Historical Museum, in which there are many interesting relics of past times, besides objects which cast light on the history of races and of manners. In the Green Vault of the Royal Palace, so called from the character of its original decorations, there is an unequalled collection of precious stones, pearls, and works of art in gold, silver, amber, and ivory. The objects, which are about 3000 in number, are arranged in eight rooms. They include the regalia of Augustus II. as king of Poland; the electoral sword of Saxony; a group by Dinglinger, in gold and enamel, representing the court of the Grand Mogul Aurungzebe, and consisting of 132 figures upon a plate of silver 4 feet 4 inches square; the largest onyx known, 6⅞ inches by 2¼ inches; a pearl representing the dwarf of Charles II. of Spain; and a green brilliant weighing 40 carats. Besides the Green Vault the Royal Palace has a gallery of arms, consisting of more than 2000 weapons of artistic or historical value. In the Zwinger are the Zoological and Mineralogical Museums, and a collection of instruments used in mathematical and physical science.

The two chief art institutions in Dresden are the Royal Academy of Arts, founded in 1764, and the Royal Choir. The Art Union, founded in 1828, which has a permanent exhibition in the Brühl Terrace, is a private body; and there are a good many other private art societies more or less distinguished. Dresden is also the seat of a number of well-known scientific associations. The educational institutions of the town are both numerous and of a high order, including a technical college with a staff (in 1876) of 39 professors and teachers, three gymnasia, two real schools of the first class, and many schools of different ranks for popular education. The Catholics and Jews have schools of their own; and there are two seminaries for the education of teachers. Dresden has several important hospitals, asylums, and other charitable institutions.

Among the chief branches of industry are manufactures in gold and silver, turnery, straw plait, scientific and musical instruments, paper-hangings, artificial flowers, and painters' canvas. There are several large breweries; a considerable corn trade is carried on; and there is an extensive traffic in books and objects of art. A number of steam-ship companies provide for the navigation of the Elbe.

Dresden, which is known to have existed in 1206, is of Slavonic origin. It became the capital of Henry the Illustrious, margrave of Meissen, in 1270, but belonged for some time after his death, first to Wenceslas of Bohemia, and next to the margrave of Brandenburg. Early in the fourteenth century it was restored to the margrave of Meissen. On the division of the territory in 1485, it fell to the Albertine line, which has since held it. Having been burned almost to the ground in 1491, it was rebuilt; and in the 16th century the fortifications were begun and gradually extended. John George II., in the 17th century, formed the Grosser Garten, and otherwise greatly improved the town; but it was in the first half of the 18th century, under Augustus I. and Augustus II., who were kings of Poland as well as electors of Saxony, that Dresden assumed something like its present appearance. The Neustadt, which had been burned down in the 17th century, was founded anew by Augustus I.; he also founded Friedrichstadt. The town suffered severely during the Seven Years' War, being bombarded in 1760. Some damage was also inflicted on it in 1813, when Napoleon made it the centre of his operations; one of the buttresses and two arches of the old bridge were then blown up. The dismantling of the fortifications had been begun by the French in 1810, and was gradually completed after 1817, the space occupied by them being appropriated to gardens and promenades. Many buildings were completed or founded by King Anton, from whom Antonstadt derives its name. Dresden again suffered severely during the revolution of 1849, but all traces of the disturbances which then took place were soon effaced. In 1866 it was occupied by the Prussians, who did not finally evacuate it until the spring of the following year. Since that time numerous improvements have been carried out, and between 1871 and 1875 the population increased at the rate of rather more than 11 per cent. (J. Sl.)

DREUX (*Durocassis*, *Drocæ*), a town of France in the department of Eure-et-Loir, on the Blaise, 21 miles north of Chartres. Noteworthy structures are the Gothic church of St Pierre; the town-house, partly in the Gothic and partly in the Renaissance style, built in the 16th century; and the remains of a castle of the 12th century, situated on the hill overlooking the town, within the inclosure of which is a chapel commenced in 1816 by the dowager duchess of Orleans, and completed and adorned at great cost by Louis Philippe. The chief industries of Dreux are dyeing and silk-weaving, and the manufacture of jewellery, serges, hosiery, candles, hats, and leather. In 1872 the population of the commune was 7418, of the town 6666.

Dreux was governed by counts in the Middle Ages. In 1188 it was taken and burnt by the English; and in 1562 Coligni and the prince of Condé were defeated in its vicinity by Montmorency. In 1593 Henry IV. captured the town after a fortnight's siege. Dreux was occupied by the Germans on October 9th, 1870, was subsequently evacuated, and was again taken, on November 17th, by General Von Treskow.

DREW, Samuel (1765–1833), theologian, was born in the parish of St Austell, in Cornwall, March 3, 1765. His father was a poor farm-labourer, and could not afford to send him to school long enough even to learn to read and write. At the age of seven he lost his mother, a woman of superior mind and religious character; and he was then sent to work with the tinners. At ten he was apprenticed to a shoemaker, and at twenty he settled in the town of St Austell, first as manager for a shoemaker; and about three years later he began business on his own account. He had already gained a reputation in his narrow circle as a keen debater and a jovial companion. He was first aroused to serious thought by the preaching of Adam Clarke; and the impression thus produced was deepened by the death of his elder brother. He now joined the Methodists, was soon employed as a class leader and local preacher, and continued to preach till a few months before his death. His opportunities of gaining knowledge were very scanty, but he strenuously set himself to make the most of them. It is stated that an accidental introduction to Locke's great essay determined the ultimate direction of his studies. In 1798 the first part of Paine's *Age of Reason* was put into his hands; and in the following year he made his first appearance as an author by publishing his *Remarks* on that work. The book was favourably received, and was republished in 1820. Drew had begun to meditate a greater attempt before he wrote his *Remarks on Paine;* and the fruits of his laborious investigation were given to the world in the *Essay on the Immateriality and Immortality of the Soul*, in 1802. This work made him widely known, and for some time it held a high place in the judgment of the religious world as a powerful and conclusive argument on its subject. A fifth edition appeared in 1831. Drew continued to work at his trade till 1805, when he entered into an engagement which enabled him to devote himself entirely to literature. In 1809 he published his *Essay on the Identity and General Resurrection of the Human Body*, perhaps the most original of his works, which reached a second edition in 1822. In 1819 Drew removed to Liverpool, on being appointed editor of the *Imperial Magazine*, then newly established, and in 1821 to London, the business being then transferred to the capital. Here he filled the post of editor till his death, and had also the supervision of all works issued from the Caxton press. He was an unsuccessful competitor for a prize offered in 1811 for an essay on the existence and attributes of God. The work which he then wrote, and which in his own judgment was his best, was published in 1820, under the title of *An Attempt to demonstrate from Reason and Revelation the Necessary Existence, Essential Perfections, and Superintending Providence of an Eternal Being, who is the Creator, the Supporter, and the Governor of all Things* (2 vols. 8vo). This procured him the degree of M.A. from the university of Aberdeen. Among Drew's lesser writings are a *Life of Dr Thomas Coke* (1817), a *History of Cornwall* (1824), and a work on the divinity of Christ (1813). He died at Helston, in Cornwall, March 29, 1833. A memoir of his life by his eldest son appeared in 1834.

DREYSE, JOHANN NICHOLAS VON (1787–1867), inventor of the needle-gun, was the son of a locksmith, and was born at Sommerda the 20th November 1787. He served his apprenticeship in the shop of his father, and from 1806 to 1809 followed his calling at Altenburg and Dresden. From 1809 to 1814 he was in Paris, where he succeeded in finding employment in the gun-factory of the Swiss officer Pauli, patronized by Napoleon I. Afterwards he returned to Sommerda, where, in partnership with Kronbiegel, he established a factory for the making of articles in iron by machine tools. In 1824 he patented a new percussion action for the gun, and continued thereafter to busy himself with experiments to improve in every way possible the process of shooting. In 1827 he invented the needle-gun, but without the advantage of breech loading; and in 1836, having been encouraged in his endeavours by the Prussian Government, he invented his first complete needle-gun. A gunnery was opened by him in 1841, which ultimately supplied weapons for the troops of all the German states, and before his death employed about 1500 persons. In 1864 he and his family had the rank of nobility conferred on them. He died 9th December 1867.

DRIFFIELD (or GREAT DRIFFIELD, to distinguish it from the neighbouring hamlet of Little Driffield), a market-town of England, in the east riding of Yorkshire, 23 miles to the east of York, and 196 miles from London by road. The town—consisting of one principal street, from which some smaller ones diverge—is agreeably situated at the foot of the Wolds, and is connected with the port of Hull by a navigable canal. It stands in the centre of a fertile agricultural district. An important corn and cattle market is held in the town every Thursday, and there are four large stock-fairs annually at Little Driffield. Besides the parish church, a fine old edifice in different styles, the principal public buildings in Great Driffield are the places of worship for Independents, Methodists, and Baptists, the corn exchange, the dispensary, the mechanics' institute, and the station of the Hull and Scarborough railway. Carpets, cotton, and chemical manure are manufactured in the town; and in the neighbourhood are numerous flour-mills and mills for bone-crushing. Population in 1871, 8364.

DROGHEDA, a seaport, market-town, and municipal and parliamentary borough of Ireland, in the province of Leinster, about 4 miles from the mouth of the Boyne, and 31½ miles north of Dublin by rail. Though situated on the borders of Louth and Meath, it belongs to neither, as the town and surrounding district constitute a county of a city, with an area of 9 square miles, or 5780 acres. It occupies both banks of the river; but the northern division is the larger of the two, and has received greater attention in modern times. The ancient fortifications, still extant in the beginning of the century, have almost completely disappeared; but of the four gateways, one named after St Lawrence remains comparatively perfect, and there are considerable ruins of another. Great improvements have been effected in the town since 1840, under the encouragement bestowed by Benjamin Whitworth, M.P., who built a town-hall at his own expense in 1865, and furnished half the funds necessary for the construction of the water-works which now supply 800,000 gals. daily. Among the public buildings are a mansion-house or mayoralty, with a suite of assembly rooms attached; the "Tholsel," a square building with a cupola; a corn-market, the old linen-hall, an infirmary, a workhouse, and a prison; five Protestant churches, five Roman Catholic chapels, three friaries, and four nunneries. St Peter's Chapel formerly served as the cathedral of the Roman Catholic archbishopric of Armagh; and in the abbey of the Dominican nuns there is still preserved the head of Oliver Plunkett, the archbishop who was executed at Tyburn in 1681 on an unfounded charge of treason. There was at one time an archiepiscopal palace in the town, built by Archbishop Hampton about 1620; and the Dominicans, the Franciscans, the Augustinians, the Carmelites, and the knights of St John had monastic establishments. Of the Dominican buildings there still exists the stately Magdalen tower; the Franciscan friary is a striking ruin; and there are traces more or less distinct of the Augustinian priory, the priory of St Lawrence, and the hospital of St Mary. At the head of the educational institutions is a classical school endowed by Erasmus Smith; and among the public charities are an almshouse for twenty-four aged widows, and a foundation providing houses and annuities for thirty-six clergymen's widows. There is also a blue-coat school, founded about

1727 for the education of freemen's sons. The present building was erected by T. P. Cairnes in 1870. The industrial establishments comprise a large cotton factory, erected by Mr Whitworth in 1864, four extensive saw-mills, three flax-mills, six flour-mills, eight tanneries, five salt-works, four soap works, two extensive breweries, two newspaper offices, chemical manure works, and a large engineering factory for the making of steam-engines, iron-bridges, &c. A brisk trade is carried on, especially with Liverpool (which is distant 133 miles due east), and with Glasgow. The harbour has been greatly improved by the commissioners, and vessels of 400 tons can discharge at the quays. In 1873, 707, with a burden of 115,673 tons, entered the port; and the harbour receipts in 1871 were £3627. The tide reaches 2½ miles above the town to Oldbridge; and barges of 50 tons burden can proceed 19 miles inland to Navan. The river is crossed by a bridge for ordinary traffic, and by a splendid railway viaduct. Assizes, quarter sessions, and petty sessions are held in the town; the parliamentary borough returns one member to Parliament; and the municipal borough is governed by a mayor, 6 aldermen, and 18 councillors. The population of the municipal borough (area, 454 acres) was 17,365 in 1831, 16,845 in 1851, 14,740 in 1861, and 13,510 in 1871. The whole population, with the exception of about 1100, are Roman Catholics. The inhabitants of the parliamentary burgh, which has an area of 5785 acres, numbers 16,165.

In the earliest notices the town of Drogheda is called Inver-Colpa or the Port of Colpa; the present name signifies "The Bridge over the Ford." In 1152 the place is mentioned as the seat of a synod convened by the papal legate, Cardinal Paparo; in 1224 it was chosen by Lucas de Netterville, archbishop of Armagh, for the foundation of a Dominican friary; and in 1228 the two divisions of the town received separate incorporation from Henry III. But there grew up a strong feeling of hostility between Drogheda *versus Uriel*,[*] and Drogheda *versus Midiam*, in consequence of trading vessels landing their cargoes in the latter or southern town, to avoid the pontage duty levied in the former or northern town. At length, after much blood had been shed in the dispute, Philip Bennett, a monk residing in the town, succeeded by his eloquence, on the festival of Corpus Christi, 1412, in persuading the authorities of the two corporations to send to Henry IV. for a new charter sanctioning their combination.

Drogheda has always been considered by the English a place of much importance. In the reign of Edward III. it was classed along with Dublin, Waterford, and Kilkenny, as one of the four staple towns of Ireland. Richard II. received in its Dominican monastery the submissions of O'Neal, O'Donnell, and other chieftains of Ulster and Leinster. The right of coining money was bestowed on the town, and parliaments were several times held within its walls. In the reign of Edward IV. the mayor received a sword of state, and an annuity of £20, in recognition of the services rendered by the inhabitants at Malpus Bridge against O'Reilly; the still greater honour of having a university with the same privileges as that of Oxford remained a mere paper distinction, owing to the poverty of the town and the unsettled state of the country; and an attempt made by the corporation in modern times to resuscitate their rights proved unsuccessful. In 1495 Poyning's laws were enacted by a parliament held in the town. In the civil wars of 1641 the place was besieged by O'Neal and the Northern Irish forces; but it was gallantly defended by Sir Henry Tichbourne, and after a long blockade was relieved by the Marquis of Ormond. The same nobleman relieved it a second time, when it was invested by the Parliamentary army under Colonel Jones. In 1649 it was captured by Cromwell, after a short though spirited defence; and nearly every individual within its walls, without distinction of age or sex, was put to the sword. Thirty only escaped, who were afterwards transported as slaves to Barbados. In 1690 it was garrisoned by King James's army; but after the decisive battle of the Boyne,—the site of which, about 2½ miles to the west, is marked by an obelisk 150 high,—it surrendered to the conqueror without a struggle, in consequence of a threat that quarter would not be granted if the town were taken by storm. Its subsequent history is purely of local interest.

DROHOBYCZ, a town of Austria, in the Galician circle of Sambor, on the Tysminika, a right-hand affluent of the Dniester, at the junction of a branch line from Boryslaff with the main Galician railway. It possesses a castle, a beautiful Roman Catholic church, a synagogue, and a German high school; and its inhabitants, who number upwards of 12,000, deal in cattle, grain, earthenware, leather, and salt,—the last being obtained from the local brine-wells.

DROITWICH, a municipal and a parliamentary borough of England, in Worcestershire, on the Salwarpe, a left-hand tributary of the Severn, about seven miles by rail N.N.E. of Worcester. With the exception of its modern extensions, the town is built in a straggling and irregular fashion; but it numbers among its public edifices a court-chamber and market-house, two churches—St Andrew's and St Peter's—several chapels, and a hospital established by Lord Keeper Coventry, the revenues of which maintain about forty men and women, and educate about 100 young persons of both sexes. The principal occupation is the manufacture of the salt obtained from the brine springs, or *wyches*, to which the town probably owes both its name and its origin; and the annual quantity obtained is about 116,000 tons. These springs were known to the Romans, who had a station on the spot, as was shown by the remains of a villa, with some interesting and valuable relics, discovered during the formation of the Oxford and Wolverhampton railway. In Domesday-book mention is made of a tax levied on the salt, which must consequently have been manufactured in the 11th century. A charter was bestowed on Droitwich by King John. The population of the municipal borough, with its area of 1849 acres, was 3504 in 1871; that of the parliamentary borough, with its area of 27,577 acres, was 9510.

DRÔME, a department in the south-east of France, formed of parts of Dauphiné and Provence, is bounded W. by the Rhone, which separates it from Ardèche, N. and N.E. by Isère, E. by Hautes-Alpes, S.E. by Basses-Alpes, and S. by Vaucluse, and lies between 44° 8' and 45° 20' 25" N. lat. and 4° 41' and 5° 55' E. long. To the east it is covered by spurs of the maritime Alps, one of the largest of which forms part of its eastern boundary, and throws off ridges, mostly wooded, that run east and west with tolerable regularity. These ridges divide the department in its whole extent into three great valleys, having a general slope westwards to the Rhone, namely, that of the Isère in the north, that of the Drôme, which occupies the central portion of the province, and that of the Aygues, in the south. The Rhone and Isère are both navigable. The former receives the whole of the drainage of the department. The soil consists of clays and argillaceous sand with rolled pebbles. Irrigation canals are numerous, and are skilfully managed. The climate, except in the valleys bordering the Rhone, is rather cold, but on the whole bracing and healthy. Snow is visible on the mountain-tops during the greater part of the year. The principal forest-trees are the pine, beech, and oak. In the valleys flourish the olive, chestnut, vine, almond, mulberry, nut, and other fruit trees, and wheat and madder are grown. Black truffles are abundant. Besides agriculture the principal industries are the rearing of silk-worms and sheep, and the manufacture of wines, the best of which are the red and white Ermitage, of woollen, cotton, and dyed linen goods, spun and woven silk, paper, oil, ropes, earthenware, and leather. The wool and wood trades are considerable. The mineral products include iron, copper, lead, lignite, marble, granite, black and red potter's clay, millstones, chalk, and cement-stone. Drôme is divided into the arrondissements of Valence, Die, Montélimart, and Nyons, comprising 29 cantons and 366 communes. The capital is Valence. Of the total area of 652,155 hectares (1,610,823 acres) about 514,227 acres are arable, 415,866 under wood, 329,961 heath, 58,430 vineyards, and 49,203 meadow. The population in 1872 was 320,417.

DROMEDARY. See CAMEL, vol. v. p. 737.

DROPSY (contracted from the old word *hydropisy*, from the Greek ὕδρωψ—ὕδωρ, water, and ὤψ, the appearance) signifies a collection of simple serous fluid in all or any of the cavities of the body, or in the meshes of its tissues. Dropsy of the subcutaneous connective tissue is termed *œdema* when it is localized and limited in extent; when more diffuse it is termed *anasarca;* the term *œdema* is also applied to dropsies of some of the internal organs, notably to that of the lungs. *Hydrocephalus* signifies an accumulation of fluid within the ventricles of the brain or in the arachnoid cavity; *hydrothorax*, a collection of fluid in one or both pleural cavities; *hydropericardium*, in the pericardium; *ascites*, in the peritoneum; and, when *anasarca* is conjoined with the accumulation of fluid in one or more of the serous cavities, the dropsy is said to be general.

Dropsy is essentially a symptom and not a specific disease, and ought not to be confounded with inflammatory exudations of a serous character. The transudation is a mere filtrate from the blood produced by increased intravascular pressure, of local or general origin, and occurring through the walls of the capillaries or smaller venules. Its specific gravity varies from 1·008 to 1·014; it is alkaline, occasionally neutral, very rarely feebly acid; it is not the liquor sanguinis, but merely water holding in solution a varying proportion of the constituents of the blood serum, chiefly the saline constituents, and of these notably the chloride of sodium, occasionally urea, sometimes cholestrine, always more or less albumen, and a proportionate amount of fibrogenous matter. It may be colourless, greenish or reddish from the presence of blood pigment, or yellowish from the presence of bile pigment; transparent, or opalescent, or milky from the presence of fatty matter derived from the chyle. The membrane from which the dropsical fluid escapes is healthy, or at least not inflamed, and only somewhat sodden by long contact with the fluid—the morbid condition on which the transudation depends lying elsewhere. The occurrence of dropsy is favoured by a watery condition of the blood due to imperfect nutrition, the pre-occurrence of acute disease, or the long continuance of exhausting discharges, as of albumen in Bright's disease, &c. This watery condition of the blood not only predisposes to dropsy, but also lends active aid in producing it by enfeebling the heart and thus disturbing the relations of the intravascular pressure. The active agents in the production of dropsy are whatever increases the intravenous blood pressure locally or generally. Obstruction to the centripetal venous current by thrombosis of the veins, by the pressure of hyperplasic connective tissue, as in hepatic cirrhosis, by the pressure of tumours either pathological, as aneurisms, cancerous or tubercular masses, or physiological, as a gravid uterus or a mass of fæces, or by the mere weight of the body in certain positions, as the sedentary, are efficient causes in the production of local dropsies. These are also more rarely brought about by thrombosis, or compression of the lymphatics, or of the thoracic duct, and this partly directly and partly indirectly by acting on the venous blood stream. The active agents in the production of general dropsy are diseases of the heart, the lungs, and the kidneys. The natural tendency of all diseases of the heart is to transfer the blood pressure from the arteries to the veins, and, so soon as this has reached a sufficient degree, dropsy in the form of local *œdema* commences to appear at whatever may be the most depending part of the body—the instep and ankle in the upright position, the lower part of the back or the lungs if the patient be in bed—and this tends gradually to increase till all the cavities of the body are invaded by the serous accumulation. The diseases of the lungs which produce dropsy are those which obstruct the passage of the blood through them, such as emphysema and bronchitis, and thus act precisely like disease of the heart in transferring the blood pressure from the arteries to the veins, inducing dropsy in exactly a similar manner. The diseases of the kidney which give rise to dropsy are those in which there is more or less obstruction to the secretion of the watery and saline constituents of the urine, accompanied by a more or less free escape of albumen; these are the acute congestive form of nephritis following scarlet fever, the inflammatory or intratubular form of chronic Bright's disease, and the final stage of amyloid degeneration. In the two former the dropsy is often very considerable, and in the absence of cardiac disease will be found to appear first about the loose cellular tissue surrounding the eyes, where the vessels, turgid with watery blood, have less efficient support. Dropsy, though often a terminal and always a serious symptom, is yet one which much can be done to ameliorate and in many cases to remove, and this is particularly the case in many local dropsies and in those of cardiac origin. Lung, kidney, and hepatic dropsies are less amenable to treatment; yet one case of ascites is on record in which a perfect recovery took place after the woman had been tapped 133 times, and nearly 400 gallons of fluid removed. Diuretics and purgatives are the remedies chiefly employed; but in certain cases diaphoretics and especially the use of a hot air bath are very effectual, and in a large number paracentesis or tapping is either indispensable, or at all events much expedites the cure.

It may be well to mention that there are certain affections which may be termed *spurious dropsies*, such as *ovarian dropsy*, which is only a cystic disease of the ovary; *hydrometria*, dropsy of the uterus, due to inflammatory occlusion of the os uteri; *hydronephrosis*, dropsy of the kidney, due to obstruction of the ureter, and subsequent distention of these organs by serous accumulations; other hollow organs may also be similarly affected. (G. W. B.)

DROSTE-HÜLSHOFF, ANNETTE ELIZABETH, BARONESS OF (1798–1848), a German poetess, was born on the estate of Hülshoff, near Munster, and belonged to the elder branch of the Catholic Westphalian family which about the same time had its reputation increased by the juridical labours of Clemens Augustus von Droste-Hülshoff. She received an education of a more scientific character than usually fell at that time to the lot of her sex; and the delicate state of her health obliged her to lead a very quiet and secluded life, which in its turn fostered the natural sensibility of her temperament, and increased her devotion to literature and study. With the exception of a short time spent at Cologne and Bonn about 1825, she mainly resided at her mother's country seat of Rischhaus, near Munster; but in 1841 she went to the castle of Eppishausen, in Thuringia, and in 1844 became a guest at the house of her brother-in-law Von Lassberg, on the borders of the Lake of Constance. She had just purchased an estate in that neighbourhood when she died in May 1848. Besides a volume of *Gedichte* published during her lifetime (Stuttgart, 1844), we have also from her pen *Das geistliche Jahr, nebst einem Anhang religiöser Gedichte*, Stuttgart, 1852; and *Letzte Gaben*, Hanover, 1860. The popularity of the first work is shown by a third edition in 1873. The characteristics of the author are great perfection of form, delicacy of feeling, and vivid realization of external nature. A number of her poems have been rendered into English by Medwin. See Schücking, *Annette von Droste-Hülshoff, Ein Lebensbild*, 1871

DROUAIS, JEAN GERMAIN (1763–1788), a French historical painter, was born at Paris on the 25th November 1763. His father, Henri Drouais, and his grandfather, Hubert Drouais, were well-known portrait painters; and it was from his father that he received his first artistic instruction. He was afterwards intrusted to the care of Brenet, an excellent teacher, though his own pictures did not take high rank. In 1780 David, who had just returned from Rome, opened a school of painting in Paris, and Drouais was one of his earliest and most promising pupils. He adopted the classical style of his master, and gave his whole time to study,—painting during the day, and spending a great part of every night in designing. For weeks together it is said that he never left his studio. In 1783 he was admitted to compete for the great prize of painting offered by the Academy, the subject being the Widow of Nain. After inspecting the works of his fellow-competitors, however, he lost hope and destroyed his own canvas, but was consoled by the assurance of his master David that had he not done so he would have won the prize. Next year he was triumphantly successful, the picture of the Woman of Canaan at the Feet of Christ, with which he gained the prize, being judged by competent critics to be worthy of comparison with the works of Poussin. He was carried shoulder high by his fellow-students through the streets to his mother's house, and a place was afterwards found for his picture in the Louvre. His success making him only the more eager to perfect himself in his art, he accompanied David to Rome, where he worked even more assiduously than in Paris. He was most strongly influenced by the remains of ancient art and by the works of Raphael. Goethe, who was at Rome at the time it was finished, has recorded the deep impression made by his picture of Marius at Minturno, which he characterizes as in some respects superior to the work of David, his master. The last picture which he completed was his Philoctetus on the Island of Lemnos. He died of fever on the 15th July 1788. A monument to his memory was erected by his fellow-students in the church of Santa Maria in the Via Lata.

DROUET, Jean Baptiste (1763–1824), one of the Terrorists of the first French Revolution, chiefly noted for the part he played in the arrest of Louis XVI. at Varennes, was born at Sainte-Menehould in 1763. He served for seven years in the army, and afterwards assisted his father, who was post-master of his native town. The carriages conveying the royal family on their flight to the frontier stopped at his door on the evening of June 21, 1791; and the passengers, travelling under assumed names, were recognized by Drouet, who immediately took steps which led to their arrest and detection on reaching Varennes. For this service the Assembly awarded him 30,000 francs, but he appears to have declined the reward. In September 1792 he was elected deputy to the Convention, and took his place with the most violent party. He voted the death of the king without appeal, showed implacable hostility to the Girondins, and proposed the slaughter of all English residents in France. Sent as commissioner to the army of the north, he was captured at the siege of Maubeuge and imprisoned at Spielberg till the close of 1795. He then became a member of the Council of Five Hundred, and was named secretary. Drouet was implicated in the conspiracy of Babeuf, and was imprisoned; but he made his escape into Switzerland, and thence to Teneriffe. There he took part in the successful resistance to the attempt of Nelson on the island, in 1797. The first empire found in him a docile sub-prefect of Sainte-Menehould. After the second Restoration he was compelled to quit France. Returning secretly he settled at Macon, under a false name and a guise of piety, and preserved his incognito till his death, which took place in that town April 11, 1824.

DROUET D'ERLON, Jean Baptiste (1765–1844), count, marshal of France, and governor of Algeria, was born at Rheims, July 29, 1765. He entered the army in 1782, was discharged after five years' service, re-entered it in 1792, and two years later became aide-de-camp to General Lefèvre. He served at the sieges of Valenciennes, Quesnoy, and Condé, and under Hoche at the blockade of Ehrenbreitstein. As general of brigade (1799) he fought at Zurich, at the bridge of Schaffhausen, and at the taking of Constance. In August 1800 he was promoted general of division. He distinguished himself at Ulm and Hohenlinden, and by a skilful manœuvre decided the victory of Jena (1806). Drouet took a brilliant part in the siege of Dantzic, and signed the capitulation of the town; he fought at Mohrungen, and was severely wounded at Friedland (1807). After this battle he was made grand officer of the Legion of Honour, was created Count d'Erlon, and received a pension. He afterwards served with distinction in the Peninsular War, and defeated General Hill at the Col de Maya. After the first Restoration he was named commander of the 16th military division. He presided at the council of war, at Lille, which acquitted General Excelmans; but in March 1815 he was arrested on suspicion of treason, and suffered a short imprisonment. He was present under Napoleon at Waterloo, and was severely reproached by the emperor for not bringing his division into action. After the second Restoration he quitted France, and did not return till 1825. He was appointed governor of Algeria in 1834, was created marshal of France in 1843, and died at Paris January 25, 1844.

DROWNING is one of the various forms of death from suffocation, the asphyxiating agent being water; and, accordingly, all the appearances characteristic of death from asphyxia or apnœa are present,—varying in intensity according to the manner of the death, whether it has or has not been attended with violent struggling. In addition, owing to the medium in which the death occurs, certain other signs specially characteristic of drowning are never absent.

By older authors a peculiar form of death by drowning was described, in which the appearances of asphyxia were awanting, and also the special signs of this form of death. To this the name of syncopal asphyxia was given. Hence, in treating of drowning, descriptions of these two forms were given, and in the case of bodies recovered from the water death was said to have occurred either from asphyxia or from syncope. Now, undoubtedly it often happens when persons fall or are thrown into the water that, in consequence of fright or of the shock sustained by violent contact with the surface of the water, no effort is made to save themselves, and death rapidly ensues from syncope. In such cases none of the characteristic signs of drowning are found, and, so far as the examination of the body is concerned, it is impossible to decide upon the exact cause of death. It is quite within the bounds of possibility that in such cases death may have been effected by other means, and the body have been thrown into the water to conceal the true cause of death.

No such uncertainty, however, attends the investigation of a case of drowning by true asphyxia, as it was called. The drowned individual struggles to reach the surface of the water in his efforts to respire; as he does so he draws water into his windpipe which provokes cough. This expels the air from his lungs, and the water which threatened to suffocate him; and as he sinks, in his struggles he endeavours again to respire, but now draws water into his mouth which chokes him, and can only be got rid of by swallowing. Insensibility then comes on, and death rapidly but placidly ensues from a true asphyxia.

If the body be recovered—say within two hours—it is relaxed, and generally presents a pallid appearance. The face is slightly congested, the features placid and composed. The lips are livid, and the tongue is either protruded from the mouth, firmly grasped by the teeth, or it is applied so closely to the dental arch that the various teeth leave along its edge a distinct imprint. Here and there on the surface of the trunk may be observed patches of lividity which cannot be accounted for by the usual gravitation of blood which takes place more or less in all forms of death. On the thighs the skin presents a roughened appearance, owing to the unusual development of the papillæ, and to this the name of *cutis anserina*, or goose-skin, has been applied. Among the external signs which we are passing in review the state of the hands and fingers merits special attention. In his dying agonies the drowned individual spasmodically clutches for help in all directions; and, should it be a pond or a canal with built retaining walls into which he has fallen, his nails may be injured, sand or mud may be found beneath them, and, firmly grasped in the hand, may be vegetable structures from the sides or the bottom of the pond; or, on the other hand, his fingers may present traces of recent injury.

Internally, the usual signs of asphyxia or apnœa are well marked. These are:—(1) A distended condition of the right cavities of the heart with dark fluid blood, while the left are well contracted, and are either empty or contain only a small quantity of dark-coloured blood. (2) The lungs are developed, and highly congested. On their tissue being incised, the cut surfaces on pressure give out dark-coloured blood and frothy mucus in large quantity. (3) There is congestion of the mucous lining of the air passages; and (4) dark colour and fluidity of the blood through the body.

Among the signs specially characteristic of this form of asphyxia we have:—(1) An unusual quantity of water in the stomach (amounting to one or two pints), which can only be accounted for by water having been swallowed during the last agonies of death. In many cases this cannot be determined with any degree of certainty, the fluid found in the stomach presenting no characters by which it can be positively identified as having formed a portion of the water in which the drowning occurred. In other cases, the fluid by certain characters, as its taste, can be determined to be sea-water, or from its containing some foreign substances, such as aquatic plants or insects, &c., can be identified as the water of the pond or river in which deceased was found. (2) Water in small quantity has been detected in the air-passages. But this, as we shall show, is a sign of little importance, and even in the most favourable circumstances one not easily observed. (3) A peculiar foamy froth presents itself in the throat and windpipe. The appearance of this froth is most striking. It is of a silvery whiteness, and when closely examined is seen to be composed of an infinitude of minute bullæ of air. Its origin is easily explained. In the struggle for breath, mucus is poured out along the air passages in greatly increased quantity, and this, together with any water that may have entered, is churned up along with the air which is pent up in the windpipe. Where death has been attended with violent struggling this froth is poured out in great quantity, and may occupy the mouth and nostrils. It is a sign of great importance, as showing that the person was alive while in the water. It is, however, apt to be confounded with a somewhat similar appearance in two other forms of death. When acute bronchitis proves fatal, the air-passages are filled with frothy mucus—which, however, differs in its external characters from the froth found in the drowned. It is not foamy, and the bullæ of air are much larger. In addition the special signs of an acute disease of the bronchial tubes are present. In death occurring during a fit of epilepsy, frothy mucus is also often found in the windpipe, but in comparatively small quantity as compared with death by drowning, and the bullæ are of larger size.

Of course when all the characteristic signs are present the evidence of drowning is so much the stronger; but it is quite possible, from the presence of a well-marked sign, to be certain as to the cause of death. A girl had fallen asleep during the night close to a stove in the cabin of a coal barge. Her clothes accidentally caught fire, and the pain of the burning quickly awoke her. In her desperation she rushed up the cabin stairs and threw herself into the water. In the morning her body was recovered considerably burned and covered with the charred dress. The conduct of the parties in the barge at the time was open to suspicion, and it was of importance to determine whether the body had not been thrown into the water after death. All the signs of death by drowning were well marked. The stomach contained water in considerable quantity, and floating on the surface of this fluid were two charred fragments of the dress. These must have been swallowed. The burnt dress was very friable, and portions of it similar to those found floating in the stomach broke away on the slightest touch. The surface of the canal in the immediate neighbourhood of deceased must, during her dying agonies, have been covered with these fragments, and the water which she swallowed happened to contain two of these fragments. Their presence clearly indicated that deceased was alive after she had reached the water. Again, cases have come under our notice, and many such are on record, where in the hand of the deceased have been found firmly grasped a bunch of aquatic vegetable structures which were known to grow only at the bottom of the pond in which the body was found.

Experiments on dogs show that complete immersion produces fatal asphyxia in four minutes, and in man from one to two minutes suffices to cause death. On the other hand, a certain amount of practice enables experienced swimmers to resist asphyxia; and it is related that in 1872 the champion swimmer of England, of the name of Johnson, remained under water for three minutes and ten seconds. It is also known that recovery has followed after an immersion of twenty minutes. In such cases it is to be presumed that the immersion was not complete. As to the sensations of the drowned, after the first struggle for breath, the brain becomes loaded with venous blood, and unconsciousness to external objects ensues. Captain Marryatt tells us that his sensations as he was drowning were rather pleasant than otherwise: "The first struggle for life once over, the water closing round me assumed the appearance of waving green fields. . . . . It is not a feeling of pain, but more like sinking down, overpowered by sleep, in the long soft grass of a cool meadow." (*Life*, vol. i. p. 74.) Hence drowning is a favourite death with suicides, in whom—resolutely bent, as they generally are, on self-destruction—the preliminary struggle is soon over. The presence of marks of violence is our only indication of homicide, and when these are absent the verdict of the medical jurist must be that the case is either one of suicide or of simple accident.

One circumstance, however, interferes with the recognition of the signs which we have passed in review, and that is the presence of putrefaction or decay. In consequence of death having occurred in such a medium as water, and as from the sinking of the body it is not exposed to atmospheric air, putrefaction in the colder months of the year proceeds slowly; but in summer, owing to the rapid development of gas in all the soft structures of the body, but especially in the intestines, the body quickly comes to the surface of the water, and decomposition proceeds with great rapidity. All the canals of the body are relaxed, and the pressure of gas is such as to force the froth from the air passages, the water from the stomach, and the blood from the heart. "Almost never," says Devergie, the great authority on the effects of putrefaction in the drowned, "can the signs of drowning during life be determined in summer, so quick is the gaseous putrefaction." Hence, too great caution cannot be exercised by the medical jurist in giving a positive opinion in such cases.

It is remarkable that the progress of putrefaction in persons who have died by drowning should differ widely

it of the same process in other forms of death.
iry cases, the first signs of putrefaction manifest
es in the lower parts of the abdomen. The rest
unk is attacked, then the extremities, and lastly

In drowning, on the contrary, the first part of
to show evidence of decay is the face: and in the
a few hours, so rapid is the advance of the putre-
process, that it becomes utterly impossible to
the features. Hence it is that it has been chiefly
of drowning that difficulties have arisen as to
ition, in consequence of that part of the body by
ersons are most readily recognized undergoing
so rapidly. Devergie, who, from his official con-
vith the Morgue at Paris, enjoyed unusual facilities
hing the various stages of putrefaction in the
has carefully described them, and we now proceed
résumé of his observations. The 1st stage includes
discoloration of the skin, first noticed on the face
, which gradually extends over the body. The 2d
olution of gas, distending the abdomen, and causing
inges to which we have already adverted. The 3d
brown putrefaction, which affects all the parts of
previously coloured green. The 4th is that of
. The discoloured parts soften, liquefy, and dis-
Under such circumstances the body rapidly
nd the bones fall asunder. On the other hand, in
ther the process of liquefaction is arrested, and the
become solidified, owing to their conversion into
, a peculiar kind of animal soap. To this stage—
-Devergie gives the name of saponification. The
is termed desiccation, or drying, from the con-
emoval of the fluids from the body, which, thus
, is liable, from the action of the elements, to
corrosion; and at the same time long immersion
the formation of various incrustations. Devergie
these two conditions under the heads of corrosion
ustation. In the 9th and last stage we have the
on of the soft parts generally. In the liquid
sition the part of the body first attacked was the
the same order is observed in the later stages—
parts of the face, now hardened by their transfor-
nto adipocire, fall off, and leave nothing but a
skeleton of a face behind, the rest of the body
nparatively perfect. This peculiar progress of the
f decomposition in the drowned explains the cases
of apparently decapitated heads, and of bodies
g of headless trunks, having been found floating in

These stages of the putrefactive process Devergie
not follow any definite order or period of sequence;
case demands careful investigation as to the con-
the body and the time of the year when the
occurred; but as the result of his experience he
the respective seasons of summer and winter make
a month's difference in the period at which the
ianges occur.

the treatment of the drowned, a complete revolu-
in recent times taken place in its details. To
renewal of the respiration it was formerly recom-
that air should be forcibly introduced into the
means of a pair of bellows, and, according to the
ections of the Humane Society, the body was "to
shaken every ten minutes in order to render the
of animation more certain." These expedients
ingularly inefficacious except in cases where the
oposals of the society, such as rubbing and the
on of warmth, would of themselves have procured

In 1856 Dr Marshall Hall devised his ready
or postural treatment of the asphyxiated, and by
s, and by actual results in cases of still birth and
ing, proved that respiration could be imitated by simply changing the position of the body. Since then Dr R. Silvester has suggested a still more simple plan of postural treatment which, along with that of Dr Marshall Hall, has been adopted by the Humane Society and also by the National Life Boat Institution, from whose published directions we give the modern treatment of the drowned by both methods, which is "in use in Her Majesty's Fleet, in the Coast-guard Service, and at all the stations of the British Army at home and abroad."

DIRECTIONS FOR RESTORING THE APPARENTLY DROWNED.

I. Send immediately for medical assistance, blankets, and dry clothing, but proceed to treat the patient *instantly* on the spot, in the open air, with the face downward, whether on shore or afloat; exposing the face, neck, and chest to the wind, except in severe weather, and removing all tight clothing from the neck and chest, especially the braces. The points to be aimed at are—first and *immediately*, the restoration of breathing; and secondly, after breathing is restored, the promotion of warmth and circulation. The efforts to restore breathing must be commenced immediately and energetically, and persevered in for one or two hours, or until a medical man has pronounced that life is extinct. Efforts to promote warmth and circulation, beyond removing the wet clothes and drying the skin, must not be made until the first appearance of natural breathing; for if circulation of the blood be induced before breathing has recommenced, the restoration to life will be endangered.

II.—TO RESTORE BREATHING.—*To clear the throat.*—Place the patient on the floor or ground with the face downwards, and one of the arms under the forehead, in which position all fluids will more readily escape by the mouth, and the tongue itself will fall forward, leaving the entrance into the windpipe free. Assist this operation by wiping and cleansing the mouth. If satisfactory breathing commences, use the treatment described below to promote warmth. If there be only slight breathing—or no breathing—or if the breathing fail, then—

To excite breathing—Turn the patient well and instantly on the side, supporting the head, and excite the nostrils with snuff, hartshorn, and smelling salts, or tickle the throat with a feather, &c. if they are at hand. Rub the chest and face warm, and dash cold water, or cold and hot water alternately, on them. If there be no success, lose not a moment, but instantly—

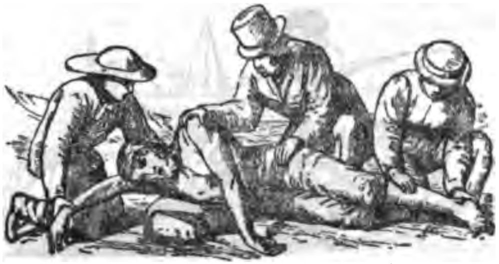


FIG. 1.—Inspiration (Dr Marshall Hall's method).

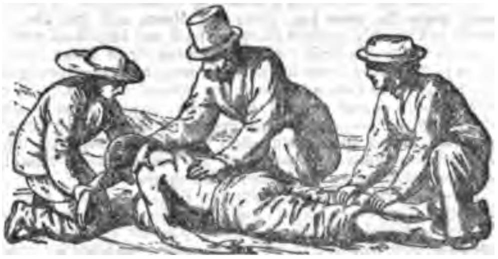


FIG. 2.—Expiration (Dr Marshall Hall's method).

To imitate breathing—Replace the patient on the face, raising and supporting the chest well on a folded coat or other article of dress. Turn the body very gently on the side and a little beyond, and then briskly on the face, back again, repeating these measures cautiously, efficiently, and perseveringly, about fifteen times in the minute, or once every four or five seconds, occasionally varying the side. (By placing the patient on the chest, the weight of the body forces the air out; when turned on the side, this pressure is removed.

and air enters the chest.) On each occasion that the body is replaced on the face, make uniform but efficient pressure with brisk movement on the back between and below the shoulder-blades or bones on each side, removing the pressure immediately before turning the body on the side. During the whole of the operations let one person attend solely to the movements of the head and of the arm placed under it. (The first measure increases the expiration—the second commences inspiration.) The result is respiration or natural breathing, and, if not too late, life.

Whilst the above operations are being proceeded with, dry the hands and feet, and as soon as dry clothing or blankets can be procured, strip the body, and cover or gradually reclothe it, but taking care not to interfere with the efforts to restore breathing.

III. Should these efforts not prove successful in the course of from two to five minutes, proceed to imitate breathing by Dr Silvester's method, as follows:—Place the patient on the back on a flat surface, inclined a little upwards from the feet; raise and support the head and shoulders on a small firm cushion or folded article of dress placed under the shoulder-blades. Draw forward the patient's tongue, and keep it projecting beyond the lips; an elastic band over the tongue and under the chin will answer this purpose, or a piece of string or tape may be tied round them, or by raising the lower jaw, the teeth may be made to retain the tongue in that position. Remove all tight clothing from about the neck and chest, especially the braces.

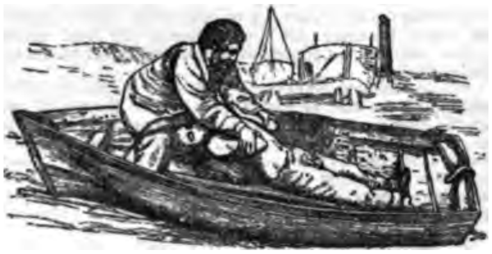


Fig. 3.—Inspiration (Dr Silvester's method).

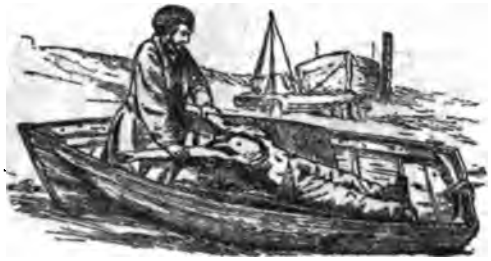


Fig. 4.—Expiration (Dr Silvester's method).

To imitate the movements of breathing—Standing at the patient's head, grasp the arms just above the elbows, and draw the arms gently and steadily upwards above the head, and keep them stretched upwards for two seconds. (By this means air is drawn into the lungs.) Then turn down the patient's arms, and press them gently and firmly for two seconds against the sides of the chest. (By this means air is pressed out of the lungs.) Repeat these measures alternately, deliberately, and perseveringly, about fifteen times in a minute, until a spontaneous effort to respire is perceived, immediately upon which cease to imitate the movements of breathing, and proceed to induce circulation and warmth.

IV.—Treatment after Natural Breathing has been restored. *To promote warmth and circulation*—Commence rubbing the limbs upwards, with firm grasping pressure and energy, using handkerchiefs, flannels, &c. (By this measure the blood is propelled along the veins towards the heart.) The friction must be continued under the blankets or over the dry clothing. Promote the warmth of the body by the application of hot flannels, bottles, or bladders of hot water, heated bricks, &c., to the pit of the stomach, the armpits, between the thighs, and to the soles of the feet. If the patient has been carried to a house after respiration has been restored, be careful to let the air play freely about the room.

On the restoration of life, a teaspoonful of warm water should be given; and then, if the power of swallowing have returned, small quantities of wine, warm brandy-and-water, or coffee should be administered. The patient should be kept in bed, and a disposition to sleep encouraged.

General Observations.—The above treatment should be persevered in for some hours, as it is an erroneous opinion that persons are irrecoverable because life does not soon make its appearance, persons having been restored after persevering for many hours. The appearances which generally accompany death are the following:—breathing and the heart's action cease entirely; the eyelids are generally half closed, the pupils dilated; the tongue approaches to the under edges of the lips, and these, as well as the nostrils, are covered with a frothy mucus; coldness and pallor of surface increase.

The following cautions should be attended to:—Prevent unnecessary crowding of persons round the body, especially if in an apartment. Avoid rough usage, and do not allow the body to remain on the back unless the tongue is secured. Under no circumstances hold the body up by the feet. On no account place the body in a warm bath unless under medical direction, and even then it should only be employed as a momentary excitant.

Dr Silvester's method is more generally practised than that of Dr M. Hall,—its special advantages being that it commences by imitating inspiration, and more completely distends the chest. But we are of opinion that the combination of the two methods as recommended above should undoubtedly be practised in every case.

It has frequently been pointed out that in fatal cases of drowning the right auricle of the heart is very much distended; and it has been plausibly urged by Professor Struthers of Aberdeen (*Edinburgh Medical Journal*, 1857, p. 418) that the movements of respiration may be successfully imitated, and air may enter the lungs, and yet the patient may not recover in consequence of the stoppage of the action of the heart. He recommends that blood should be drawn from the external jugular vein, so as to relieve the engorged auricle, which, from its distension, is paralysed. The abstraction of a small quantity of blood is all that is required to effect this—from half to one or two table-spoonfuls. Finally, as a last resource, galvanism must be had recourse to. Both this and the blood-letting must be practised by a qualified medical man; but it is important to know that the methods of Dr Hall and Dr Silvester can easily be learned by any one, and that, if early and perseveringly applied, they are attended with a large measure of success. The treatment must be continued for at least eight hours, should there be an absence of extreme pallor, and while any heat of the body remains.

The question of the treatment of the drowned cannot be regarded as definitely settled, and the plans of Hall and Silvester have from time to time been subjected to criticism. Among the latest suggestions is that of Dr B. Howard of America, who, by means of what he terms his "direct" method, which mainly consists in pressure of the chest from above (the patient being placed on his back), claims that air is more easily introduced into the lungs, and that the expansion and contraction of the chest are more perfectly attained (see *Lancet*, August 11, 1877). At the meeting of the British Medical Association at Manchester 1877, Dr Howard practically demonstrated his plan on the living subject, and there can no doubt that involuntary respiration was readily produced. Further evidence, however, is necessary from actual cases of suspended animation.

See the treatises on Medical Jurisprudence by Devergie, Orfila, Casper, Taylor, Guy, and Woodman and Tidy; article "Apnœa," by G. Harley, M.D., in vol. v. of Holmes's *Surgery*, 2d edition, p. 889; and Report on Asphyxia by Committee of the Royal Medical and Chirurgical Society of London, in vol. xlv. of *Transactions*, 1862. (H. D. L.)

DROZ, François-Xavier Joseph (1773–1850), a French writer on moral and political subjects, was born on October 31, 1773, in the city of Besançon, where his family had furnished men of considerable mark to the legal profession. His own legal studies led him to Paris in 1792; he arrived on the very day after the dethronement of the king, and was present during the massacres of September; but on the declaration of war he joined the volunteer battalion of the Doubs, and for the next three years served in the army of the Rhine. Receiving his discharge on the score of ill health, he soon after obtained a much more congenial post in the newly-founded *école centrale* of his native city; and in 1799 he made his first appearance as an author by an *Essai sur l'art oratoire*, Paris, Fructidor, An VII., in which he acknowledges his indebtedness more especially to Hugh Blair. This early reference to Scottish literature is interesting in connection with the peculiarly Scottish tone of mind which is observable in his writings, and has attracted the notice of Sainte-Beuve. Removing to Paris in 1803, he became intimate not only with the like-minded Ducis, but also with the sceptical Cabanis; and it was at the philosopher's advice that, in order to catch the public ear, he produced the romance of *Lina*, which Sainte-Beuve has characterized as a mingled echo of Florian and *Werther*. Like several other literary men of the time, he obtained a post in the revenue office known as the *Droits réunies*, then under the control of M. François of Nantes; but from 1814 he devoted himself exclusively to literature and became a contributor to various journals. Already favourably known by his *Essai sur l'art d'être heureux*, Paris, 1806, his *Éloge de Montaigne*, 1812, and his *Essai sur le beau dans les arts*, 1815, he not only gained the Monthyon prize in 1823 by his work *De la philosophie morale ou des différents systèmes sur la science de la vie*, but also in 1824 obtained admission to the Académie Française. The main doctrine inculcated in this treatise is that society will never be in a proper state till men have been educated to think of their duties and not of their rights. It was followed in 1825 by *Application de la morale à la philosophie et à la politique*, and in 1829 by *Économie politique, ou principes de la science des richesses*, a methodical and clearly written treatise, which has had the honour of being edited by Michel Chevalier in 1854. His next and greatest work was a *Histoire du règne de Louis XVI.* (3 vols. Paris, 1838–1842), the result of very careful and prolonged study, and marked by greater vigour of style and deeper powers of thought than he had previously displayed. As he advanced in life Droz had become more and more decidedly religious, and the last work of his prolific pen was *Pensées du Christianisme*, 1842. Few have left so blameless a reputation: in the words of Sainte-Beuve, he was born and he remained all his life of the race of the good and the just.

See Guizot, *Discours Académiques*; Montalembert, "Discours de Reception," in *Mémoires de l'Académie francaise*; Sainte-Beuve, *Causeries du lundi*, t. iii.; Michel Chevalier, Notice prefixed to the *Economie politique*.

DRUIDISM, the name usually given to the religious system of the ancient Gauls and Britons. The word Druid, one form or other of which is used in early Celtic records to designate a class of priests corresponding to the Magi or wise men of the ancient Persians, is of uncertain etymology. The derivation from the Greek δρῦς, an oak, though as old as the days of the elder Pliny, is probably fanciful.

We find in Cæsar the first and at the same time the most circumstantial account of the Druids to be met with in the classical writers. In the digression on the manners and customs of Gaul and Germany which occupies a portion of the sixth book of his Gallic war, he tells us that all men of any rank and dignity in Gaul were included among either the Druids or the nobles. The former were the religious guides of the people as well as the chief expounders and guardians of the law. On those who refused to submit to their decisions they had the power of inflicting severe penalties, of which excommunication from society was the most dreaded. As they were not a hereditary caste, and enjoyed exemption from service in the field as well as from payment of taxes, admission to the order was eagerly sought after by the youth of Gaul. The course of training to which a novice had to submit was protracted, extending sometimes over twenty years. All instruction was communicated orally, but for certain purposes they had a written language in which they used the Greek characters. The president of the order, whose office was elective and who enjoyed the dignity for life, had supreme authority among them. They taught that the soul was immortal. Astrology, geography, physical science, and natural theology were their favourite studies. Britain was the head-quarters of Druidism, but once every year a general assembly of the order was held within the territories of the Carnutes in Gaul, probably in the neighbourhood of the modern Dreux. The Gauls in extreme cases offered human sacrifices, usually criminals. Their chief deity was identified by Cæsar with the Mercury of the Romans. Writing a few years later, Cicero, in his treatise on divination, introduces his brother Quintus as remarking on the existence among the Gauls of augurs or soothsayers, known by the name of Druids. With one of these, Divitiacus, an Æduan, Quintus says he was well acquainted. Cicero's contemporary, Diodorus Siculus, informs us that there were among the ancient Gauls bards, certain philosophers and theologians named Druids, and soothsayers. He also hints at some connection between their philosophy and that of Pythagoras. The geographers, Strabo and Pomponius Mela, add little to our knowledge of the Druids. Lucan, in his *Pharsalia*, mentions, among the Gallic and other tribes that relapsed into their former ways upon Cæsar's crossing the Rubicon, "the worshippers with bloody rites of Teutates, Hesus, and Taranis," and refers immediately afterwards to the bards and Druids. Something more noteworthy is told by the elder Pliny. According to him the Gallic Druids held the mistletoe in the highest veneration. Groves of oak were their chosen retreats. Whatever grew on that tree was thought to be a gift from heaven, more especially the mistletoe. When thus found the latter was cut with a golden knife by a priest clad in a white robe, two white bulls being sacrificed on the spot. The name given it by the Druids signified in their language All-Heal; and its virtues were believed to be very great. Two other herbs, called selago and samolus, were likewise greatly valued by them for their medicinal efficacy. But the most remarkable of all the Druidical charms was the anguineum, or snake's egg. It was said to be produced from the saliva and frothy sweat of a number of serpents writhing in an entangled mass, and to be tossed up into the air as soon as formed. The fortunate Druid who managed, as it fell, to catch it in his sagum, or cloak, rode off at full speed on a horse that had been in waiting for him, pursued by the serpents till they were stopped by the intervention of a running stream. A genuine specimen of this egg when thrown into the water would float against the current, even if encased in gold. Pliny declares that he had seen one. "It is," he says, "about the size of a moderately large round apple, and has a cartilaginous rind studded with cavities like those on the arms of a polypus." Tacitus, in describing the attack made on the island of Mona (Anglesea) by the Romans under Suetonius Paulinus, represents the legionaries as being awe-struck on landing by the appearance of a band of Druids who, with hands uplifted towards heaven, poured forth terrible imprecations on the heads of the invaders. The courage of the Romans, however, soon overcame such fears; the Britons were put to flight; and the groves of Mona, the scene of many a sacrifice and bloody rite, were cut down. The annalists Lampridius and Vopiscus, two of the *Scriptores Historiæ Augustæ*, introduce us, if the "Dryas" of these writers be connected, as is probable, with the "Druides" of Cæsar and others, to a new branch of the order—Druidesses, who, however, are simply prophetic women. For example, Vopiscus tells us, on the authority of his grandfather, who had the story from the future emperor himself, that it had been foretold to Diocletian by one of these women that he would wear the purple after he had slain a wild boar. Many years afterwards, when Diocletian found himself, on the death of Numerian, unexpectedly declared emperor by the troops, he at once cut down with his sword Arrius Aper, regarding whom dark suspicions were afloat, exclaiming, "At length I have slain the fated wild boar," and thus fulfilled the prophecy delivered to him in Gaul by the weird woman. Ausonius of Bordeaux, tutor of Gratian, son of the Emperor Valentinian, in his *Professores*, or notices of the professors of his native city, apostrophizes the rhetorician Attius Patera as sprung from a race of Druids and from the priesthood of Balenus, and as deriving his name of Patera from being connected through the latter with the mysteries of Apollo. He also addresses another as keeper of the temple of Balenus, and as the offspring of the Druids. Lastly, Ammianus Marcellinus, after noticing the foundation of Marseilles by a colony of Phocæans, goes on to state that when the people in those parts had been gradually civilized, learned studies, which had been begun by the bards, the Euhages (probably a corruption of the Οὐάτεις, *i.e.*, *Vates*, of Strabo), and the Druids, throve vigorously. Of these, he says the Druids were intellectually superior to the others, and were formed into unions in accordance with the precepts of Pythagoras.

The early Christian fathers seldom mention the Druids. Origen, Clement of Alexandria, and others speak of them as philosophers or priests among the Gauls, but in a manner that shows they knew almost nothing about them. In early Irish poems and tales, however, a class of persons called by this name is frequently referred to, who also appear as Magi in certain well-known lives of Irish saints written in Latin. These Irish Druids were a kind of sorcerers. They were said to be in league with the demons of paganism, and to be able by this agency to do good to their friends and mischief to their enemies. The followers of the first missionaries of Christianity in Ireland and Scotland seem to have thought it necessary, in order to prove the superiority of the new faith, to spread the belief that its apostles also were gifted with supernatural powers, which they could use more especially for the purpose of counteracting the malice of these Druids. Thus Adamnan, in his life of Columba, represents that saint as miraculously baffling the machinations of Broichan, the Druid of the Pictish king Brude, when they met at the court of the latter near the mouth of the Ness.

To John Toland probably belongs the credit of being the first to plan, for he did little more, a connected history of the Druids, in which the scanty notices of ancient writers were to be expanded and largely supplemented by details drawn from other sources. This he did in three letters addressed to Viscount Molesworth, and first published from the author's papers in 1726, some years after his death. A little later, Pelloutier, in his *Histoire des Celtes*, carried out a portion of Toland's design by giving a lengthened account of the origin, position, and influence of Druidism among the early Celtic tribes. On the foundations thus laid others were not slow to build. It is from Cæsar and Pliny, of course, that the materials have been chiefly derived. But fragments of very doubtful value were eagerly appropriated from every quarter, and in this way an imposing structure was reared, the solidity of which till very recently few ever thought of doubting. If we may trust these writers, the ancient priesthood of Britain and Gaul, in pomp of ritual no less than in learning and influence, rivalled the hierarchies of later days. Clad in white and wearing ornaments of gold, they celebrated their mystic rites in the depths of the forest. The Hesus mentioned by Lucan was said, on the authority of a remark by Lactantius, to be their chief deity. But they had other gods, especially Apollo, whom they worshipped under the name of Belinus, supposed to be the Phœnician Baal. They believed in metempsychosis, or the doctrine of the transmigration of souls. That their philosophy was identical with that of Pythagoras was held as certain, though whether Pythagoras was the instructor of the Druids or the Druids of Pythagoras, or whether indeed both did not derive their tenets from a common source, were moot questions. Pythagoras's friend Abaris, the mysterious Hyperborean philosopher who rode on an arrow, the gift of Apollo, must have been a British Druid. Botany, astronomy, medicine, and letters were all subjects studied by the Druids; though, in spite of their boasted civilization, many of their rites were barbarous in the extreme. In mechanics they had attained to no mean skill, since the ponderous megalithic remains of Britain and France could have been set up only by them. Stone circles like Stennis and Callernish were ancient temples, once surrounding groves sacred to Druidism. According to Stukeley, Stonehenge was the cathedral of the archdruid of all Britain, and Avebury with its avenues had been originally constructed in the form of a circle with a serpent attached to it,—the circle being regarded as the symbol of the Supreme Being, and the serpent of the divine Son. Dolmens or cromlechs were transformed into altars, and even the menhir or stone pillar, and the rocking-stone, were pressed into the service of the druidical priesthood. In the neighbourhood of the circles, as well as on the tops of mountains, may be seen cairns surmounted each by a flat stone, on which Druid fires were lighted. Over their countrymen the authority of the Druids was almost unbounded, continuing to assert itself long after the order had passed away. With Druidism every unexplained custom and almost every relic of Celtic antiquity were held to be connected, and the superstitions that still linger in the ancient homes of the Celtic race were set down as derived from the same source. Its decadence is attributed by these writers to the hostility of the Romans. Ardent lovers of their country as well as of liberty, the Druids, it is asserted, were the uncompromising foes of Roman rule in the west. Hence sprang the orders issued for their suppression by Claudius, to which reference is made both by Pliny and Suetonius. In the end, Rome proved too strong for Druidism, and the political power of its priesthood was soon broken, especially in Gaul and South Britain. Some, among whom Herbert is prominent, maintain that, after the destruction of pagan Druidism as a system, the order was revived as a corrupt form of Christianity, in which the truths of the latter were largely mixed up with the rites of Mithras, the sun god of the Persians. This hypothesis, to which its supporters have given the name of neo-Druidism, has already been noticed in the article CELTIC LITERATURE (vol. v. p. 318).

These views were for a long time generally received in this country as well as on the Continent. In France, Druidism has proved an attractive subject to some writers of a high order of ability, who have discussed it, if not from a more critical, at least from a more philosophical, stand-point. Amédée Thierry, in his *Histoire des Gaulois*, while adopting in the main the opinions of Toland, Pelloutier, and their followers, finds in the accounts that have come down to us traces of two distinct systems of religion in ancient Gaul. One of these was a worship of natural phenomena and objects, akin to the polytheism of the Greeks; the other a kind of metaphysical pantheism, strikingly resembling the religions of some Eastern nations. The latter, according to him, was the foundation of Druidism, and had been brought into the country when the Cymric branch of the Gauls entered it under a leader named Hu, or Hesus.

his death. The more ancient inhabitants, also , were the polytheists, whose religious belief, Cymri did not altogether destroy but rather l with their own. Thierry further thinks that as on the decline in Gaul before the days of er a time the Gallic nobles on the one hand, ple on the other, became alike jealous of a hority that controlled both and had suc- eatly reducing their political influence. For Druids retained their power as a religious and , and preserved many of their privileges; but ate of Cæsar's invasion these had so diminished and not Gaul, was recognized as their chief he most distinguished among the expounders is undoubtedly Jean Reynaud, one of the small school of thinkers whose metaphysical have exercised in France a real, if an indirect nfluence. Reynaud, who was of a mystical , began in 1836, along with Pierre Leroux, on of *L'Encyclopédie Nouvelle*, which, how- ver finished. For this the former wrote the disme," which he afterwards enlarged and gave separately under the title of *L'Esprit de la* ted to his friend, the historian Henri Martin. orate and in some respects able essay. Rey- ns that the ancient Druids were the first to teach ctrine of the soul's immortality, and that they y as high conceptions of the true nature of ws themselves. If they afterwards encouraged of subordinate deities, it was for the purpose ; to Druidism that class of uneducated minds e cultus of demi-gods and angels has more an the worship of the Unseen One. Hesus, same word as the *Αἶσα* of the Greeks, was the solute supreme Being whose symbol on earth and was quite distinct from Hu, the leader of Gauls. The mistletoe, when found growing on presented man, a creature entirely dependent upport, and yet with an individual existence Human sacrifices were a natural consequence dominant now as in the days of the Druids, r the victim the more complete the atonement e Deity for the sins of man. Druidism at last disappeared, because, according to element was wanting in its system both of f religion, necessary to the true development ociety—charity or love. The Druids aimed improvement of both, but failed to prescribe ns of promoting it. Christianity supplied ded, and Druidism disappeared—not, however, complished what was its special mission, the in Western Europe of the idea of the unity of far all this is mere theory founded on in- a, or an attempt, more or less successful, to istence among the Gallic tribes of certain ng the true nature of God and his relation ch afterwards degenerated into the grossest it would be out of place to discuss here. ews have been to a great extent accepted by n, one of the foremost of French historical both countenance the neo-Druidical fancies d Herbert. In Germany the latest authority seems to be Barth—*Ueber die Druiden* -who follows closely the views long popular try. To judge from the article "Druiden" ition (1875) of Meyer's *Conversations-Lexikon*, er has yet found currency there.

-Toland's *Specimen of the Critical History of the and Learning, containing an Account of the Druids,* of *several Pieces of Mr John Toland, now first published from his original Manuscripts*, 2 vols. 8vo, London, 1726; Pelloutier (Simon), *Histoire des Celtes*, 2 vols. 12mo, Paris, 1740–1750; nouvelle édition par M. de Chiniac, 2 vols. 4to, or 8 vols. 8vo, Paris, 1770–1771; Stukeley's *Stonehenge, A Temple restored to the British Druids*, fol. London, 1740; Stukeley's *Abury, A Temple of the British Druids*, fol. London, 1743; Frick (Johann Georg.), *Commentatio de Druidis occidentalium populorum philosophis*, new edition, 4to, Ulmæ, 1744; Borlase's *Antiquities, Historical and Monumental, of the County of Cornwall*, second edition, fol. London, 1769; Davies (Edward), *Mythology and Rites of the British Druids*, 8vo, London, 1809; Thierry's *Histoire des Gaulois*, Paris, 1828; Barth, *Ueber die Druiden der Kelten*, Erlangen, 1828; Higgins's *Celtic Druids*, London, 1829; (Herbert's) Essay on the Neo-Druidic Heresy in *Britannia*, pt. i. London, 1838; Dr J. H. Burton, in *Edinburgh Review*, July 1863; Reynaud, *L'Esprit de la Gaule*, Paris, 1866; Henri Martin, *Histoire de France*, vol. i., Paris (no date); Stuart's *Sculptured Stones of Scotland*, vol. ii., printed for the Spalding Club, 1867. (J. M'D.)

DRUM, a musical instrument of percussion, which is supposed to have been introduced into Europe from the East by the Moors or after the Crusades. In certain forms, however, it was known in Europe in classical times. The Greek and Roman *tympanum* seems from descriptions and pictorial representations to have included not only tambourines but kettledrums of a small size, or at least instruments convex on one side like the kettledrum. The instrument designated in Scripture a timbrel (Heb. *toph*) was undoubtedly a kind of tambourine, such as might be conveniently played by females. In India and Egypt the use of drums in a considerable variety of forms may be traced back to the earliest historic times. The tam-tam or tom-tom of India, a cylindrical drum of some size beaten with the fingers, had its counterpart in Egypt at least as early as 1600 B.C. Among savage races, whose music has not risen above the primitive or percussive stage, the drum is naturally the chief, and in many cases the sole instrument employed. Three principal forms of drum are in general use in the modern orchestra,—the common or side drum, the base or Turkish drum, and the kettledrum. The first is composed of a cylinder of wood, or, more generally, of metal, covered at each end with vellum or parchment, the tension of which is regulated by strings. As its name indicates, it is worn at the side of the performer, who beats upon the upper end with two sticks. Its distinctive though not its exclusive use is to accompany the military fife band. The base drum is a larger instrument of the same kind, the cylinder being composed of oak. It is beaten at both ends with drum-sticks furnished with leather pads. It is an important constituent of a full military band, but it is also employed in the orchestra, especially by more recent composers. The kettledrum is the most important form of the instrument in orchestral as distinct from military music. It is composed of a basin of brass or copper, almost hemispherical in shape, covered with vellum attached to an iron ring, and it is usually placed upon an iron tripod. By means of screws it is capable of being tuned within certain necessarily narrow limits. Kettledrums are always used in pairs, one being tuned to the key-note and the other to the fourth below. The music is invariably written in the key of C; and the key in which it is to be played, if different, is indicated in words at the beginning of the passage. The three forms of drum just described are essential in every complete orchestra. In addition other percussive instruments, such as the gong and the tam-tam, are sometimes introduced for the sake of particular effects.

DRUMMOND, Henry (1786–1860), an English banker, politician, and miscellaneous writer, remarkable for the versatility of his gifts and the eccentricity of his character, was born on the 5th December 1786. He was the eldest son of Henry Drummond, a prominent London banker, by a daughter of the first Lord Melville. He was educated at Harrow and at Christ Church, Oxford. His name is permanently connected with the university through the chair of political economy, which he founded in 1825. He entered Parliament in early life, and took an active interest from the first in nearly all departments of politics. Thoroughly independent and often eccentric in his views, he yet acted generally with the Conservative party. He was an effective speaker, clear and forcible, and on occasion caustic and severe. From 1847 until his death on the 20th February 1860 he represented West Surrey. Drummond took a deep interest in religious subjects, and published numerous books and pamphlets on such questions as the interpretation of prophecy, the circulation of the Apocrypha, the principles of Christianity, &c., which attracted considerable attention. He was intimately associated with the origin and spread of the Catholic Apostolic or "Irvingite" Church. Stated meetings of those who sympathized with Irving were held for the study of prophecy, between 1826 and 1830 at his seat of Albury Park, in Surrey; he contributed very liberally to the funds of the new church; and he became one of its leading office-bearers. The numerous works he wrote in defence of its distinctive doctrines and practice were generally clear and vigorous, if seldom convincing.

DRUMMOND, Thomas (1797–1840), was born at Edinburgh in October 1797, and was educated at the High School there. He was appointed to a cadetship at the Royal Military Academy, Woolwich, in February 1813; and by Christmas of that year he had entered the Second Academy. He early distinguished himself by his aptitude for mathematics, and an original demonstration in conic sections, discovered by him whilst still in the junior Academy, was published in Leybourn's *Mathematical Repository*. In 1815 he entered the Royal Engineers. In 1819, when meditating the renunciation of military service for the bar, he made the acquaintance of Colonel Colby, from whom in the following year he received an appointment on the trigonometrical survey of Great Britain. During his winters in London he applied himself indefatigably to the higher branches of mathematics, and attended the chemical lectures of Brande and Faraday at the Royal Institution. The mention at one of these of the brilliant luminosity of lime when incandescent suggested to him the employment of that material instead of the Argand lamp for making surveying stations visible when far distant. In the autumn of 1824 he assisted Captain Colby in the selection of stations for the great triangulation, and the best situation as a base for the survey ordered to be made in Ireland. His lime-light apparatus (the Drummond light) and heliostat, both completed in 1825, he first put to a practical test in 1826 at the stations of the Irish survey. In the next season he brought into use an improved form of his heliostat, in which the telescope was dispensed with. Through the recommendation of Mr Bellenden Ker, Drummond was in 1831 appointed by Lord Brougham to be superintendent of the Boundary Commission. On the passing of the Reform Act he resumed his duties on the survey,—which, however, he soon finally quitted in order to become private secretary to Lord Althorp, the chancellor of the exchequer. In 1834, on the dissolution of the Government, he received a pension of £300 a year, which he drew until September 30, 1835. In July of that year he was made under-secretary of state for Ireland; and when, in 1836, the bill for municipal reform in that country was introduced into Parliament, he undertook the direction of the officers appointed to determine the boundaries of the boroughs. He was in October 1836 made head of the Irish Railway Commission, the report of which was completed in 1838. The health of Captain Drummond,—impaired originally by exposure during the Irish survey, and further injured by his unwearied exertions on the Boundary Commission—had, through his last labours in connection with the railways of Ireland, received a strain from which it never recovered. His strength gradually gave way, and he died on the 15th April 1840.

See Captain Larcom in *Papers on Subjects connected with the Duties of the Corps of Royal Engineers*, vol. iv., 1840.

DRUMMOND, William (1585–1649), of Hawthornden, a Scottish poet of the Spenserian school, and descendant of an old family of noble blood, was born at Hawthornden, near Edinburgh, on the 13th December 1585. His father, John Drummond, was the first laird of Hawthornden; and his mother, Susannah Fowler, was well-connected, her brother William being private secretary to Queen Anne, and a man of literary tastes. Drummond received his early education at the Edinburgh High School, and graduated as M.A. of the recently founded (1582) metropolitan university in July 1605. The years 1607 and 1608 were spent at Bourges and Paris in the study of law; and, in 1609, Drummond was again in Scotland, where, by the death of his father in the following year, he became laird of Hawthornden at the early age of twenty-four. The list of books he read up to this time indicates a strong preference for the finer and more imaginative, as distinguished from the argumentative kinds of literature. Accordingly, on finding himself his own master, Drummond naturally abandoned law for the muses; "for," says his biographer in 1711, "the delicacy of his wit always run on the pleasantness and usefulness of history, and on the fame and softness of poetry." He was a good linguist, and read Latin, Greek, Italian, Spanish, French, and Hebrew. He had already written several poems, chiefly sonnets; and some early letters, which have been preserved, show a fine command of pure English, as well as Drummond's critical sagacity in abandoning the Scottish dialect for the language raised to literary supremacy by the illustrious Elizabethans. Drummond's first publication appeared in 1613, and was an elegy on the death of Henry, prince of Wales, called *Teares on the Death of Mœliades*. As might have been expected from Spenser's influence, it is pastoral throughout. Milton, in his Lycidas, has at once imitated and surpassed this early poem of Drummond's. In 1614 Drummond for the first time met Sir William Alexander, known later as earl of Stirling, the author of a ponderous poem on *Doom's-day*. In the following year Drummond sustained a dreadful blow in the death of Miss Cunningham of Barns, to whom he was engaged to be married. In 1616, the year of Shakespeare's death, appeared *Poems: Amorous, Funerall, Divine, Pastorall: in Sonnets, Songs, Sextains, Madrigals*, being substantially the story of his love and loss. Drummond's next poem is entitled *Forth Feasting: A Panegyric to the King's Most Excellent Majesty*, and celebrates James's visit to Scotland in 1617. In 1618 there was an interesting correspondence between Drummond and Drayton; and, about the close of the same year, or about the beginning of 1619, Drummond was honoured with a visit of a fortnight or more from the great literary dictator of the time—Ben Jonson. Drummond, as tradition relates, sat awaiting Jonson's arrival under the shade of a fine sycamore, and exclaimed when Jonson came in sight, "Welcome, welcome, royal Ben!" Upon which the dramatist rejoined, "Thank ye, thank ye, Hawthornden." The famous account of their conversations, long supposed to be lost, was discovered in the Advocate's Library, Edinburgh, by Mr David Laing, and, after being read to the Society of Scottish Antiquaries in 1832, appeared, ten years later, as a publication of the Shakespeare Society. The conversations are full of interesting literary gossip, and embody Ben's opinion of himself and of his host, whom he frankly told that he "was too good and simple, and that oft a man's modesty made a fool of his wit."

The next few years in Drummond's life are comparatively uneventful, being marked only by correspondence with Sir William Alexander and Drayton. In 1623, the year of a great famine and consequent mortality in Scotland, appeared the poet's fourth publication, entitled *Flowers of Zion: By William Drummond of Hawthornedenne: to which is adjoyned his Cypresse Grove.* From 1625 till 1630 Drummond was probably for the most part engaged in travelling on the Continent. In 1627, however, he seems to have been home for a short time, as, in that year, he appears in the entirely new character of the holder of a patent for the construction of military machines, entitled "Litera Magistri Gulielmi Drummond de Fabrica Machinarum Militarium, Anno 1627." The same year, 1627, is the date of Drummond's munificent gift of about 500 volumes to the library of Edinburgh University. This collection, to which Drummond afterwards made additions, is kept in a separate cabinet, and is particularly rich in the English poets. In 1630 Drummond again began to reside permanently at Hawthornden; and, in 1631, he received his last letter from Drayton, who died in London on the 23d of December. In 1632 Drummond married Elizabeth Logan, by whom he had five sons and four daughters. In 1633 Charles made his coronation-visit to Scotland; and Drummond's pen was employed in writing congratulatory speeches and poetry. As Drummond naturally preferred Episcopacy to Presbytery, we are not surprised to learn that he approved of the main object Charles had in view in this visit, although his peace-loving nature was averse to the means employed in establishing Episcopacy. Drummond was a true Scottish gentleman in his pride of blood. Partly to please the earl of Perth, and partly to satisfy his own curiosity, the poet had studied the genealogy of the family very carefully, and had given due prominence to the fact that Annabella Drummond, daughter of Sir John Drummond of Stobhall, was the queen of Robert III. This investigation was the real secret of Drummond's interest in Scottish history; and so we find that he now began his *History of the Lives and Reigns of the Five Jameses, Kings of Scotland*—a work which did not appear till 1655, and is remarkable only for its good literary style. His next work was called forth by the king's enforced submission to the opposition of his Scottish subjects. It is entitled *Irene: or a Remonstrance for Concord, Amity, and Love amongst His Majesty's Subjects*, and embodies Drummond's political creed of submission to authority as the only logical refuge from democracy, which he hated. In 1639 Drummond had to sign the Covenant in self-protection, but was uneasy under the burden, as existing squibs by him testify. Drummond's next work *Σκιαμαχία: or a Defence of a Petition tendered to the Lords of the Council of Scotland by certain Noblemen and Gentlemen*, January, 1643, is a political pamphlet in support of those royalists in Scotland who wished to espouse the king's cause against the English Parliament. Its burden is a passionate invective on the intolerance of the then dominant Presbyterian clergy; but *Irene* fails to do justice to the substantial work they had done. Drummond's subsequent works may be described briefly as royalist pamphlets, written with more or less caution, as the times required.

After being an invalid for several months, the poet died on the 4th December 1649, and was buried in the churchyard of Lasswade, a neighbouring village.

The only works of Drummond which call for special notice are the *Cypresse Grove* and the poems. The *Cypresse Grove*, one of the noblest prose poems in literature, exhibits great wealth of illustration, much fine thinking, and an extraordinary command of musical English. It is an essay on the folly of the fear of death, and shows how much the author was impressed with the comparative insignificance of this world. "This globe of the earth," says he, "which seemeth huge to us, in respect of the universe, and compared with that wide pavilion of heaven, is less than little, of no sensible quantity, and but as a point" (1711 edition, p. 123). Death, he argues, from many of its accidental associations, appears to be much more dreadful than it really is. Its universality, and a correct estimate of human life, ought to nerve us against the fear of death. Further, we should remember that death is not annihilation, but the vestibule to immortality and a higher life. The essay, which is composed throughout in a strain of lofty idealism, is concluded in the form of a vision.

A noteworthy feature in Drummond's poetry is that it manifests no characteristic Scottish element, but owes its birth and inspiration rather to the English and Italian masters. This was owing partly to his anti-Presbyterian bias and his long residence abroad; but it was also natural, on other grounds, for a quiet, cultured, and meditative poet to imitate the Elizabethans and the great Italian writers. Drummond was essentially a follower of Spenser, delighting in the description of outer nature; but, amid all his sensuousness, and even in those lines most conspicuously laden with lustrous beauty, there is a dash of melancholy thoughtfulness—a tendency deepened by the death of his first love.

Drummond was so successful as a writer of sonnets that he was called "the Scottish Petrarch;" and his sonnets are still ranked immediately after Shakespeare's, Milton's, and Wordsworth's. Most of his poems are steeped in the pre-Copernican ideas of astronomy, and are marked by a sense of the smallness of the visible in comparison with the infinite lying beyond. This is one of Drummond's favourite moods; and he is constantly harping upon such phrases as "the All," "this great All." Even in such of his poems as may be called more distinctively Christian, this philosophic conception is at work. Drummond's poems are distinguished by pensive beauty, sweetness of versification, and richly worded descriptions, but lack vigour and originality. Altogether this poet is to be remembered as the best representative of "sweetness and light" amid much that was dull and ephemeral in contemporary Scottish literature.

There are several editions of his works:—(1) Hall's edition of the prose works, published in 1655; (2) Phillips's (a nephew of Milton) edition of the poems, which appeared in the same year; (3) Bishop Sage's, published in 1711, the only complete edition of Drummond's writings; (4) an edition of his poems by Lord Dundrennan and David Irving, issued in 1832; (5) Cunningham's edition of the poems of 1833; and (6) Turnbull's in 1857. The only collected edition of the prose writings was published in 1711. Drummond's life has been ably written by Professor Masson (1873). (T. GI.)

DRUNKENNESS may be either an *act* or a *habit*, the latter consisting in frequent repetitions of the former. As an act it may be an accident, most usually arising from the incautious use of one or other of the commonly employed intoxicating agents; as a habit it is one of the most degrading forms of vice which can result from the enfeeblement of the moral principle by persistent self-indulgence.

Drunkenness is a mere complexity of symptoms which may arise from many different causes. To be drunk is simply to be apoplectic; and the close resemblance between the pathological and the toxic phenomena has been the cause of many untoward accidents. Cold alone may produce such peculiar effects that Captain Parry has said, in his *Journal*, "I cannot help thinking that many a man may have been punished for intoxication who was only suffering from the benumbing effects of frost; for I have more than once seen our people in a state so exactly resembling that of the most stupid intoxication, that I should certainly have charged them with that offence had I not been quite sure that no possible means were afforded them on Melville Island to procure anything stronger than snow water."

But, apart from the pathological causes of seeming drunkenness, this condition may be actually produced by a multitude of agents whose use is so wide-spread throughout the world as inevitably to lead to the belief that their moderate employment must subserve some important object in the economy of nature. Moreover, the physiological action of all these agents gradually shades into each other, all producing or being capable of producing consecutive paralysis of the various parts of the nervous system, but only in doses of a certain amount,—a dose which varies with the agent, the race, and the individual. Even the cup so often said to "cheer, but not inebriate," cannot be regarded as altogether free from the last-named effect. Tea-sots are well known to be affected with palpitation and irregularity of the heart, as well as with more or less sleeplessness, mental irritability, and muscular tremors, which in some culminate in paralysis; while positive intoxication has been known to be the result of the excessive use of strong tea (*Third Annual Report of the Massachusetts Board of Health*, p. 129). In short, from tea to haschisch we have, through hops, alcohol, tobacco, and opium, a sort of graduated scale of intoxicants, which stimulate in small doses and narcotize in larger,—the narcotic dose having no stimulating properties whatever, and only appearing to possess them from the fact that the agent can only be gradually taken up by the blood, and the system thus comes primarily under the influence of a stimulant dose. In certain circumstances and with certain agents—as in the production of chloroform narcosis—this precursory stage is capable of being much abbreviated, if not altogether annihilated; while with other agents—as tea—the narcotic stage is by no means always or readily produced. It is well to remember, also, that there is not a shadow of proof that the moderate use of any one of these agents as a stimulant has any definite tendency to lead to its abuse; it is otherwise with their employment as narcotics, which, once indulged in, is almost certain to lead to repetition, and to a more or less rapid process of degradation; but there are many exceptions to this latter statement. In regard to this matter it is interesting to know that opium, which, used in excess, is one of the most deleterious of these stimulants, is employed by 400,000,000, or nearly one-third of the whole human race, and that among these we have the Chinese, who almost to a man are opium smokers, and who nevertheless are well known to be one of the most frugal and industrious of peoples, "powerful, muscular, and athletic, and the lower orders more intelligent, and far superior in mental acquirements, to those of corresponding rank in our own country." It is also interesting to know that a late judge who lived to nearly ninety years of age believed he had prolonged his life and added greatly to his comfort by the moderate use of ether, which he was led to employ because neither wine nor tobacco agreed with him; while the immoderate use of the same agent has—particularly of late, and in the north of Ireland—given rise to a most deleterious form of drunkenness. And, however degrading, demoralizing, and pauperizing the vice of drunkenness may be, it is important to remember in all our thoughts concerning it, that it is the outcome of a craving innate in human nature, whether civilized or savage, and that there has been no period in the world's history, and no nation on its surface, in which one or other, and often several simultaneously of the many natural or artificial nervine stimulants have not been employed, and well it has been for those who have used them moderately. Two great influences have been regarded as of importance in regulating the prevalence of intemperance—temperature and race. Of these unquestionably race is by far the most influential. Within the isothermal lines of 77° Fahr. north and south of the equatorial line of 82° 4′ Fahr. the mild native tribes seek their happiness in a quiet introspective self-complacency termed keyf, induced by opium or haschisch. Between the isothermal lines of 77° Fahr. and 50° Fahr. north and south lie those regions where the grape-vine grows luxuriantly, and in these riotous intemperance, though it is comparatively rare, is no longer regarded as the disgraceful social crime it is looked on in the tropics: while beyond the isotherms of 50° Fahr. north and south the vine is no longer grown, and the stronger beers and distilled spirits become the wide-spread sources of a deeper intoxication, which too often terminates in crime, a result almost unknown in southern latitudes. How much of this is actually due to the more highly intoxicating qualities of the fluids imbibed, and how much to what Parry would rightly have termed the intoxicating quality of the climate, has never been fairly ascertained; but this much is known, that in these northern climes what is merely a stimulant dose in moderate weather becomes stupefying under the influence of cold;—not because cold increases the intoxicating power of any liquor, but because the previous excitement of the cerebro-spinal system produces a condition of functional exhaustion which makes it more readily succumb to the benumbing influence of cold,—renders it, as we say, more liable to become morbidly congested by the reflex action of cold applied to the surface.

But of the two great influences which regulate the prevalence of intemperance, that of race far exceeds that of temperature. A glance at the map of the world, coupled with some knowledge of its history, teaches us that, whether in temperate, subtropical, or tropical regions, wherever the Teuton is, there drunkenness prevails; and the wild orgies in which Tacitus tells us the Teuton of his day indulged in the cold climate of northern Europe are reproduced with wonderful circumstantiality irrespective of climate or temperature. It may be, as a recent speaker has said, that "a national love for strong drink is a characteristic of the nobler and more energetic populations of the world;" it may be, as he goes on to say, that it "accompanies public and private enterprise, constancy of purpose, liberality of thought, and aptitude for war; it," as he further adds, "exhibits itself prominently in strong and nervous constitutions, and assumes in very many instances the character of a curative of itself." In other words, in certain constitutions the moderate use of stimulants excites to action rather than to a sensual keyf, and the pleasurable stimulus of action renders such individuals less likely to fall into degrading habits of excess.

The effects of intoxicants are variously modified by the temperament of the individual and the nature of the inebriant. When that is alcohol, its action on an average individual is first to fill him with a serene and perfect self-complacency. His feelings and faculties are exalted into a state of great activity and buoyancy, so that his language becomes enthusiastic, and his conversation vivacious if not brilliant. The senses gradually become hazy, a soft humming seems to fill the pauses of the conversation, and modify the tones of the speaker, a filmy haze obscures the vision, the head seems lighter than usual, the equilibrium unstable. By and by objects appear double, or flit confusedly before the eyes; judgment is abolished, secretiveness annihilated, and the drunkard pours forth all that is within him with unrestrained communicativeness; he becomes boisterous, ridiculous, and sinks at length into a mere animal. Every one around him, the very houses, trees, even the earth itself, seem drunken and unstable, he alone sober, till at last the final [illegible] reached, and he falls on the ground insensible—[illegible]—a state from which after profound [illegible] last awakes feverish, exhausted, sick, and [illegible], with singing ears, a throbbing heart, and a violent [illegible].

oison primarily affects the cerebral lobes, and the
urts of cerebro-spinal system are consecutively
till in the state of *dead-drunkenness* the only parts
led by a benumbing paralysis are those automatic
the medulla oblongata, which regulate and main-
irculation and respiration. But even these centres
unaffected; the paralysis of these as of the other
f the cerebro-spinal system varies in its incomplete-
at times becomes complete, the coma of drunken-
inating in death. More usually the intoxicant is
eliminated and the individual restored to
ness, a consciousness disturbed by the secondary
f the agent he has abused, and which vary with
e of that agent. Whether, however, directly or
, through the nervous system the stomach suffers
case; thus nutrition is interfered with by the
ingestion of food, as well as by the mal-assimilation
hich is ingested; and from this cause, as well as
eculiar local action of the various poisons, we have
ous organic degenerations induced which in most
rten the drunkard's days.

rimary discomforts of an act of drunkenness are
emoved for the time by a repetition of the cause.
it has been an act may readily become a habit, all
readily that each repetition more and more
both the will and the judgment, till they become
nfit to resist the temptation to indulgence supplied
owledge of the temporary relief to suffering which
follow, and in spite of the consciousness that each
of the act only forges their chains more tightly.
is condition there is no hope of relief but in
abstinence; any one in this condition must be
as temporarily insane, and ought to be placed in
ate asylum till he regain sufficient self-control to
n to overcome his love for drink. The desire for
s is one of the strongest instincts of human
It cannot be annihilated, but may be regulated by
onscience, education, or by law when it encroaches
ghts of others or is injurious to the individual him-
the Intoxicating Liquors Licensing Act of 1872
ound drunk on a highway or public place or in a
ouse is liable to a fine of 10s., on a repetition of
e within twelve months to one of 20s., and on a
nce within twelve months to one of 40s. To be
riotous, or to be drunk while in charge of a horse,
, or a gun is punishable with a fine of 20s. or im-
nt for one month. And by the Police and Improve-
t of Scotland, 25 and 26 Vict. c. 101, § 254,
ound drunk on the streets are subject to a fine of
4 days' imprisonment, wherever that Act has been

These Acts, properly enforced, ought to restrain
ic exhibitions of drunkenness; while for those
casks who ruin their own health and pauperize
ilies, without perhaps ever appearing in public
y drunk, the only remedy which appears to promise
eform would seem to be the power of temporarily
g them to an inebriate asylum (G. W. B.)

ES, a people of Syria remarkable for the pertinacity
ss with which they have defended their independ-
nst the encroachments of Turkish supremacy, and
rofession of a form of religious belief, which, in
s of Dean Milman, is "one of the most extra-
aberrations which ever extensively affected the
man." The greater body, whom for the sake of
ce we shall distinguish as the Western Druses,
e mountainous region of the Lebanon and Anti-
; but there are also extensive settlements in
ran or Auranitis; a considerable colony exists
in Palestine proper, to the north-west of the
Tiberias; and it is believed that a number of Crypto-Druses--Druses, however, by religion only, and not by race—still maintain themselves in the neighbourhood of Cairo. The Western Druses are found as far north as Beyrout, as far south as Sur or Tyre, and as far east as Damascus; in the north they are intermingled with Maronites, and in the south with Greeks and Melchites. They form the exclusive population of about 120 towns and villages, and share with the Christians the occupation of nearly 230 more; their total number, not reckoning women and children, has been calculated at from 60,000 to 65,000 men. The chief town of the district which they occupy, though not their most populous settlement, is Deir-el-Kamar—the Convent of the Moon—situated about 15 miles south-east of Beyrout, in the district of Manaasif; it was the seat of the powerful family of the Abu Nekads, and in its vicinity is the palace of Ebteddin, formerly occupied by the emir Beshir Shehaab. Ammatam and Bakhlin in the Lebanon, and Hasbeya and Rosheya in the Anti-Lebanon, rank as sacred cities, and serve as rallying-points in time of war.

The Eastern or Hauranitic Druses are less known, and preserve their ancient customs and characteristics perhaps more perfectly than their western brethren. The date at which they first settled in the district is not ascertained; but for many generations the Hauran has been the chosen refuge of rebels and malcontents from the west, and has consequently increased its population at the expense of the Lebanon. The same process of emigration is still going on; and the Turkish Government has to be careful not to press too heavily on the defaulting Druse of the west, lest it needlessly augment the power of the more independent community. The number in the Hauran was stated by Cyril Graham at 7000 men in 1857; at present it must be much nearer 10,000. The principal town is Kunawat, the residence of the most influential of the Ookals.

In many respects the Druses are a mysterious people, and, in spite of the great additions made to our knowledge in the present century, many important questions in regard to them still await solution. Of their origin and ethnographical affinity no absolutely certain information has been obtained. Though they speak Arabic with a correctness that would do credit to the people of Mecca, and their feudal aristocracy refer to their Arab descent with feelings of pride, it is pretty generally agreed that, whatever may be true of certain families, the main body of the people does not belong to the Semitic family. Mr Cyril Graham regards them as of Indo-Teutonic race, and describes them as "fair-haired, of light complexion, strong and well-made, and often as tall as northern Europeans." Their own tradition vaguely connects them with China, where they firmly believe that to this day there exist numerous adherents of their creed, and whence they expect the advent of their promised deliverer. The mere fact that they possess a knowledge of the Celestial Empire in such contrast to the geographical ignorance of the other Syrian races is in itself remarkable enough; though it would be rash to assert that it is practically significant. According to an opinion mentioned by Sandys, and pretty often to be met with in the older accounts, they derive their name from a count of Dretux, and are mainly the descendants of a band of the crusaders who were left behind, and finally forgot their country and language and creed; but this story is disproved by the fact that allusion is made to their existence at an earlier date by Benjamin of Tudela.

A more modern theory identifies them with one or other of the tribes introduced into Northern Syria by Esarhaddon in the 7th century B.C. If its generally but not universally received derivation from Ismael Darazi be accepted, their present name, which is properly Durus, dates no further back than about the 11th century, and throws no light on the question of affinity; and just as little is to be learned from the various explanations current among themselves—those *put in possession* (of the faith), from the Arabic verb *darisa;* those who *read* the book of Hamze, as if from *darasa;* the *clever ones*, from *Durs;* the *shields*, from *Turs*, and so on. It is well known, however, that the district which they now occupy has over and again received extraneous additions to its population; and, in the absence of more precise information, it seems at least certain that, whatever may have been the original nucleus of his race, the Druse of the present day carries in his veins the mingled blood of a various ancestry, in like manner as his religion combines the products of many different intellectual moments. The presence of a Kurdish element is undoubted, and its influence may probably be traced in the peculiar position granted to the women.[1]

The rise and progress of the religion which gives unity to the race can be stated with considerable precision. As a system of thought it may be traced back in some of its leading principles to the Shiite sect of the Batenians, or Batiniya, whose main doctrine was that "every outer has its inner, and every passage in the Koran an allegorical sense," and to the Karamatians, or Karamita, who pushed this method to its furthest limits; as a creed it is somewhat more recent. In the year 386 A.H. (996 A.D.) Hakim Biamrillahi (*i.e.*, he who judges by the command of God), the sixth of the Fatimite caliphs, began to reign; and during the next twenty-five years he indulged in a tyranny at once so terrible and so fantastic that little doubt can be entertained of his insanity. As madmen sometimes do, he believed that he held direct intercourse with the deity, or even that he was an incarnation of the divine intelligence; and in 407 A.H., or 1016 A.D., his claims were made known in the mosque at Cairo, and supported by the testimony of Ismael Darazi. The people showed such bitter hostility to the new gospel that Darazi was compelled to seek safety in flight; but even in absence he was faithful to his god, and succeeded in winning over the ignorant inhabitants of Lebanon. According to Druse authority this great conversion took place in the year 410 A.H. Meanwhile the endeavours of the caliph to get his divinity acknowledged by the people of Cairo continued. The advocacy of Hasan ben Haidara Fergani was without avail; but in 408 A.H. the new religion found a more successful apostle in the person of Hamze ben Ali ben Ahmed, a Persian mystic, feltmaker by trade, who became Hakim's vizier, gave form and substance to his creed, and by his ingenious adaptation of its various dogmas to the prejudices of existing sects finally enlisted an extensive body of adherents. In 411 the caliph was assassinated by contrivance of his sister Sitt Almulk; but it was given out by Hamze that he had only withdrawn for a season, and his followers were encouraged to look forward with confidence to his triumphant return. Darazi, who had acted independently in his apostolate, was branded by Hamze as a heretic, and thus, by a curious anomaly, he is actually held in detestation by the very sect which probably bears his name. The propagation of the faith, in accordance with Hamze's initiation, was undertaken by Ismael Ben Muhammed *Temimi*, Muhammed ben *Wahab*, Abulkhair *Selama* ben Abdalwahab ben Samurri, and Moktana Bohaeddin, the last of whom was known by his writings from Constantinople to the borders of India. In two letters addressed to the emperor Constantine VIII. and Michael the Paphlagonian he endeavours to prove that the Christian Messiah reappeared in the person of Hamze.

The full exposition of the Drusian creed thus brought into existence, even in the somewhat imperfect state of European knowledge in regard to many of its details, would require a volume of considerable size: the following is a summary of its main doctrines. The Muahhidin or Unitarians, as the Druses call themselves, believe that there is one and only one God, indefinable, incomprehensible, ineffable, passionless. He has made himself known to man by ten successive incarnations in the persons of Ali, Albar, Alya, Moill, Kaim, Moezz, Aziz, Abu Zechariah, Mansur, and Hakim. No further incarnation can take place: in Hakim a final appeal was made to mankind, and after the door of mercy had stood open to all for twenty-six years, it was finally and for ever closed. When the tribulation of the faithful has reached its height, Hakim will reappear to conquer the world and render his religion supreme. The first of the creatures of God is the Universal Intelligence, impersonated in Hamze at the time of the last incarnation; he is the creator of all subordinate beings, and he alone has immediate communion with the Deity. Next in rank to him, and along with him supporting the throne of the Almighty, are four archangels, the Soul, the Word, the Right Wing, and the Left Wing, who were embodied respectively in Ismael Darazi, Mohammed ben Wahab, Selama ben Abdalwahal, and Bohaeddin; and beneath these again are spiritual agents of various ranks. The number of human beings admits neither of increase nor of decrease, and a regular process of metempsychosis is maintained. The souls of the virtuous pass after death into the bodies of Chinese Druses; those of the wicked may be degraded to the level of camels or dogs. All previous religions are mere types of the true, and their sacred books and observances are to be interpreted allegorically. As the admission of converts is no longer permitted, the faithful are enjoined to keep their doctrines secret from the profane; and in order that their allegiance may not bring them into danger, they are allowed to make outward profession of whatever religion is dominant around them. To this latter indulgence is to be attributed the apparent indifferentism with which they join the Mahometan in his prayers and ablutions, or sprinkle themselves with holy water in the Maronite churches. Obedience is required to the seven great commandments of Hamze, the first and greatest of which enjoins truth in words (but only of Druse towards Druse); the second, watchfulness over the safety of the brethren; the third, absolute renunciation of every other religion; the fourth, complete separation from all who are in error; the fifth, recognition of the unity of "Our Lord" in all ages; the sixth, complete resignation to his will; and the seventh, complete obedience to his orders. Prayer, however, is regarded as an impertinent interference with the Creator; while at the same time, instead of the fatalistic predestination of Mahometanism, the freedom of the human will is distinctly maintained. Not only is the charge of secrecy rigidly obeyed in regard to the alien world, but full initiation into the deeper mysteries of the creed is permitted only to a special class designated Ockals or Akals—probably from the Arabic *Akl*, intelligence—in contradistinction from whom all other members of the Druse community, whatever may be their position or attainments, are called Djahal or Ignorant. About 15 per cent. of the adult population belong to this order. Admission is granted to any Druse of either sex who expresses willingness to conform to the laws of the society, and during a year of probation gives sufficient proof of sincerity and stability of purpose. There appears to be no formal distinction of rank among the various members; and though the emir Beshir Shehaab used to appoint a sheik of the Ockals, the person thus distinguished obtained no primacy over his fellows. Exceptional influence depends on exceptional sanctity or ability. All are required to abstain from tobacco and wine; the women are to wear neither gold nor silver, nor silk, nor brocade; and although neither celibacy nor retirement from the affairs of the world is either imperative or customary, unusual respect is shown to those who voluntarily submit themselves to ascetic discipline. While the Ockals mingle frankly with the common people, and are remarkably free from what in Europe would be called clerical pretension, they are none the less careful to maintain their privileges. They are distinguished by the wearing of a white turban, emblematic of the purity of their life. Their food must be purchased with money lawfully acquired; and lest they should unwittingly partake of any that is ceremonially unclean, they require those djahels whose hospitality they share to supply their wants from a store set apart for their exclusive use. The ideal Ockal is grave, calm, and dignified, with an infinite capacity of keeping a secret, and a devotion that knows no limits to the interests of his creed. On Thursday evening, the commencement of the weekly day of rest, the members of the order meet together in the various districts, probably for the reading of their sacred books and consultation on matters of ecclesiastical or political importance. Their meeting-houses, *kolowés*, *halwes*, or *khalwas*, are plain, unornamented edifices, usually built in secluded spots, and not unfrequently on isolated eminences. "All have property attached to them, the revenues of which are consecrated to the relief of the poor and the demands of hospitality. In one at Necha, in the Shoof, a lamp is kept burning night and day."[1] Even while the Ockals are assembled, strangers are readily enough admitted to the *kolowés*; but as long as they are present the ordinary ceremonies are neglected, and the Koran takes the place of the Drusian scriptures. In has been frequently asserted that the image of a calf is kept in a niche, and traces of phallic and gynæocratic worship have been vaguely suspected; but there is no authentic information in support of either statement. The calf, if calf there be, is probably a symbol of the execrable heresy of Darazi, who is frequently styled the calf by his orthodox opponents. Ignorance is the mother of suspicion as well as of devotion; and accordingly the Christian inhabitants of the Lebanon have long been persuaded that the Druses in their secret assemblies are guilty of the most nefarious practices. Of this allegation, so frequently repeated by European writers, there seems to be little evidence; and it is certain that the sacred books of the religion inculcate what is on the whole a high-toned morality. Colonel Churchill, in his last volume, asserts that while the majority of the people follow the pure teaching of Bohaeddin, there still exists a party which indulges in the "dark and unscrupulous libertinism of Darazi."

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[1] *Cf.* Lord Carnarvon's suggestive account of the Yezidis.

The Druses, like the Arabs, have a high reputation for hospitality, and they give special welcome to the English, whom they regard as their particular friends and allies. Whoever presents himself at their door in the quality of a suppliant or passenger is sure of being entertained with food and lodging in the most generous manner. Volney often saw the lowest peasants give their last morsel of bread to the hungry traveller; and their only answer to the accusation of imprudence was, "God is great and liberal, and all men are brethren." Beggary at the same time is altogether unknown among the common people, and the Ockals are not a mendicant order. It would be easy to illustrate by many a striking incident the fidelity with which they keep inviolate the pledge tacitly given to the guest who has eaten of their bread and salt. Nor is their hospitality unassociated with other virtues. "There was nothing," says Lord Carnarvon, "which surprised me more than the self-possession, the delicate appreciation of wishes and feelings, the social ease, and to a great extent the refinement which distinguished the conversation and manners of those amongst the Druse chiefs whom I then met, and on which no drawing-room of London or Paris could have conferred an additional polish;" and a similar testimony is borne by Mr Chasseaud, who was brought up in the city of Beyrout, and had abundant opportunities of observation. There is a darker side, indeed, to the picture;—though, after all, while his merits are in the main peculiarly his own, the Druse only gives additional intensity to the ruthlessness and revengefulness of so many of the Eastern nations.

Polygamy is not permitted. Among the old feudal families intermarriage is often restricted to one or two houses; and the daughter of a sheik will rather remain a virgin than bring disgrace on her blood by a *mésalliance*. The marriage of near relations is naturally the consequence; but, whatever may have been formerly the case, it no longer appears to be the custom for brother and sister to wed. All prenuptial arrangements on the part of the woman are conducted by the father, who cannot act, however, without her consent. On the wedding day a number of Ockals and a few of the bridegroom's relations go to the bride's house; the marriage contract is drawn up and read; and the bride, completely enveloped in a veil, is led off on horseback to her husband, accompanied by her friends, both male and female. As she approaches her future home, the bridegroom's party sallies forth, and a mock contest, with blank cartridge, ensues. Ultimately the bride is successful; shouts of welcome follow her into the harem, where she is received and caressed by the women of her husband's family. After a little she is left alone; the bridegroom enters, lifts her veil, takes his first glance at his wife, replaces it, and withdraws. The revels continue for several days.[2] Divorce is freely allowed; but when once obtained it cannot be cancelled, though either party is free to marry again. Births are rarely celebrated with any public or private jubilation. When a sheik dies, all the sheiks in the mountain are at once informed. Next day they assemble, and the dead body is borne forth in an open coffin to meet all those whom it is especially wished to honour. All day long the mourners walk up and down the medan, or tilt-yard, in parties of fifty and sixty, singing or reciting eulogy or dirge; and every now and then a number rush into the "lichroom" and kiss the dead man's hands and face and beard. A little before sunset the burial takes place. The women watch afar off, while the men follow silently to the grave. A few passages from the Koran are read by the Ockals, and the ceremony is over. The family mausoleums are built without doorways, and the wall has to be broken down to admit each new tenant. Those who die in the odour of sanctity are buried in their own houses: the tomb is in the form of an altar, and stands east and west, and the body is laid on its side with the face looking to the south.[3]

Education, according to Eastern ideas, receives considerable attention among the Druses; and all their ladies, in contrast to the majority of their countrywomen, can both read and write. The defence and the diffusion of their religion were originally undertaken in great measure by means of little books or treatises; and from an early period several of the wealthier sheiks have prided themselves on their collection of manuscripts. For a people so small in number, their literature, though almost purely theological, is remarkably extensive—a fact which may probably be ascribed to the influence of the Semitic element. In spite of the excessive care with which their manuscripts have been guarded (and they are enjoined if need be to kill any alien found in possession of their sacred books), a considerable number, undoubtedly genuine, have found their way to Europe. A copy of the *Book of the Testimonies to the Mysteries of the Unity*, consisting of seventy treatises in four folio volumes, was found in the house of the chief Ockal at Bakhlin, and presented in 1700 to Louis XIV. by Nusralla Ibn Gilda, a Syrian doctor. Other manuscripts are to be found at Rome in the Vatican, at Oxford in the Bodleian, at Vienna, at Leyden, at Upsala, and at Munich; and Dr Porter got possession of the seven standard works of Druse theology while at Damascus. The Munich collection was presented to the king of Bavaria by Clot-bey, the chief physician in the Egyptian army during its occupation of Syria; and for a number of the other manuscripts we are indebted to the elder Niebuhr. A history of the Druse nationality by the emir Haider Shehaab is quoted by Urquhart.

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[1] Churchill, ii. p. 255.

[2] Churchill, ii. 292; Porter's *Giant Cities of Bashan*, p. 296.

[3] Urquhart, vol. ii. p. 328.

From an early period, the internal organization of the Druses has been constructed after a patriarcho-feudal type, which, as usual, has placed a large amount of arbitrary power in the hands of the chiefs or sheiks, and given rise to an endless succession of petty feuds and confederations between the various clans or families. Into the picturesque confusion of the resulting history, complicated as it is by Turkish encroachments and intrigue, it would be useless to enter; and the curiosity of the reader may easily be gratified by turning to Colonel Churchill's interesting, if somewhat diffuse and desultory, volumes. The following, however, may be mentioned as among the most important of the clans, which at one period or other have acquired an influential position in the Lebanon:—The Tnoohs or Tanuchs, now extinct, who had their seat at Abeigh or Obeah, in the Shahaar, a short distance to the S. of the Bahr Beyrout; the Talhook family, originally the Beni Hazamm, one branch of which has its principal residence at Heittat, and the other at Allaye, about nine and ten miles respectively S.E. of Beyrout; the Abdelmeliks with their seat at Ebtater, about four miles E. of Heittat; the Cadis of Bisdor, nearly two miles to S. of Heittat, an offshoot of the Tnoohs; the house of Raslan with its seat at Shwyfat, seven miles S. of Beyrout; Aminadins, now settled at Abeigh, remarkable for their attention to religion; the house of Jumblatt or Djembelat with its splendid mansion at Muctara on the eastern bank of the Nahr-el-Awleh, the Abu-Nekads, formerly the feudal lords of Deir-el-Kamar; the house of Abu-Harmoosh, the Amads, and the Eids.

The Druses first attained to pre-eminence in the Lebanon under the presidency of the Arab family of the Tnoohs, which had adopted the doctrines of Hamze. For a long time they continued to be tolerated as serviceable allies by the orthodox Mahometans, and the Tnoohs even obtained possession of Beyrout; but about 1300, after Malek Ashraf had expelled the Christians from Syria, he turned his attention to the Lebanon and ordered the Druses to erect mosques throughout their territory. They refused, and prepared to defend themselves; but their forces were defeated at Ain-Sofar, about halfway between Beyrout and the Bekaa. A long period of peace ensued, and while acknowledging the supremacy of the Sultan of Egypt, the Druses attained considerable importance. An impetus was given to their religion by the emir Jemaladin Said Abdallah Tnooh (d. 1480), whose shrine at Abeigh is still visited by pious pilgrims.

On the defeat of the Egyptian sultan by the Ottoman invader Selim I., in 1517, the Druses were obliged to submit to the new dynasty, which bestowed the chief power in the Lebanon on Fakaradin-Maan, a member of a Mohametan family originally known as the Beni-Rabua, who had immigrated from the Nahrain about 1145. The family of the Tnoohs which had already been destroyed by internal feuds, was thrown into the shade and never recovered its position. In the early part of the 17th century, the interest of European nations was excited in the fate of the emir Fakaradin Maan II., who on the failure of his plans sought refuge for a time with the grand-duke of Tuscany and the king of Naples, but ultimately perished by the bow-string in the city of the sultans. His family died out in the beginning of the 18th century, and the position of Grand Emir was bestowed on a member of the house of Shehaab, originally a branch of the Beni Koreish of Mecca. In 1713 the emir Haider Shehaab, having routed the Turkish forces at Aindara with the assistance of the sheiks of the Cadis, Abu-Nekads, Abd-el-Meliks, and Talhooks, immediately afterwards divided the whole of the southern Lebanon into territorial districts, and bestowed the administration on the chiefs to whom he had been principally indebted. Each *mocaatagee* thus created had full power of taxation and punishment over the district entrusted to him by his *mocaata* or contract; and the system thus instituted continued in force till its abolition by Fuad Pasha in 1860. The events of the next hundred years—full as those years were of revolutions and counter-revolutions in which the Druses had ample share—belong rather to the general history of the Lebanon than to the special history of the Druses. The latter part of the period is occupied by the life of the emir Beshir Shehaab, undoubtedly one of the most remarkable men who ever fought and intrigued in Syria. In 1799, along with many of the Druses, he accepted the advances of Sir Sidney Smith, and swore perpetual hostility against the French, who were, however, soon after driven back to Egypt without his assistance; and in 1823 his co-operation, though only supported by the half-hearted acquiescence of most of the sheiks, was of the greatest service to the cause of Ibrahim Pasha against the Turks. Not long after the restoration of the authority of the Porte, which in spite of their emir had been considerably furthered by the Druse sheiks, the peaceful relations which from time immemorial had existed between the Druses and the Maronites gradually gave place to the bitterest hostility. Under the patronage of the next emir, Beshir el Kassim (himself a proselyte to their religion), and instigated by their patriarch and priest, the Maronites began to assert their independence of the Druse sheiks under whose feudal authority they were placed. Civil war broke out in 1841, and raged for three years. In January 1842 the Turkish Government appointed Omar Pasha as administrator of the Druses and Maronites, with a council of four chiefs from each party; but the pasha attempting to effect a disarming, was in November besieged in the castle of Beit-el-din by the Druses under Shibli-el-Arrian. At the instigation of the European powers he was recalled in December, and the Druses and Maronites were placed under separate *kaimakams* or governors. Disturbances again broke out in 1845: the Maronites flew to arms, but with the assistance of the Turks their opponents carried the day. A superficial pacification effected by Shekib Effendi, the Ottoman commissioner, lasted only till his departure; and the Porte was obliged to dispatch a force of 12,000 men to the Lebanon. Forty of the sheiks were seized and the people nominally disarmed; and in 1846 a new constitution was inaugurated by which the kaimakam was to be assisted by two Druses, two Maronites, four Greeks, two Turks, and one Metuali. All, however, was in vain: the conflict was continued through 1858, 1859, and 1860; the Druses plundered and massacred, and the Turkish soldiers looked on or even assisted in the bloody work. At Damascus even the Christians were slain in thousands, and the remnant was only saved by Abd-el-Kader's magnanimous protection. The European powers now determined to interfere; and by a protocol of the 3d of May it was decided that the Lebanon should be occupied by a force of 20,000 men, of whom the half were to be French. A body of troops was accordingly landed on the 16th of August under General Beaufort d'Hautpoul; and Fuad Pasha, who had been appointed Turkish commissioner with full powers, proceeded to bring the leaders of the massacres to justice. An international commission met at Beyrout on the 5th October; but the Turks connived at the escape of culprits, the members could not come to agreement, and the proceedings were practically stultified. The French occupation continued till 5th June 1861, and the French and English squadrons cruised on the coast for several months after. In accordance with the recommendation of the European powers the Porte determined to appoint a Christian governor not belonging to the district, and independent of the pasha of Beyrout, to hold office for three years. The choice fell on Daud Pasha, a Catholic Armenian, who was installed on 4th of July. In spite of many difficulties, and especially the ambitious conduct of the Maronite Jussuf Karam, he succeeded in restoring order; and by the formation of a military force from the inhabitants of the Lebanon he rendered unnecessary the presence of the Turkish soldiery. He was reappointed for five years at the close of his first term; and his administration seems to have effected a permanent pacification.

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DRUSIUS, or **Van den Driesche, Johannes** (1550-1616), a learned Protestant divine, distinguished specially as an Orientalist and exegete, was born at Oudenarde, in Flanders, on the 28th June 1550. Being designed for the

studied Greek and Latin at Ghent, and
t Louvain: but his father having been out-
s religion, and deprived of his estate, retired
where the son followed him in 1567. He
mirable teacher of Hebrew in Chevalier, the
rientalist, with whom he resided for some time
e. In 1572 he became professor of Oriental
t Oxford. Upon the pacification of Ghent
turned with his father to their own country,
pointed professor of Oriental languages at
he following year. In 1585 he removed to
d was admitted professor of Hebrew in the
Franeker, an office which he discharged with
till his death, which happened in February
acquired so extended a reputation as a
t his class was frequented by students from all
it countries of Europe. His works prove him
n well skilled in Hèbrew and in Jewish
and in 1600 the States-general employed him,
f 400 florins a year, to write notes on the most
ages in the Old Testament; but, as he was
terrupted in prosecuting this undertaking, it
lished until after his death. As the friend of
was charged by the orthodox and dominant
nfairness in the execution of this task, and
en years of his life were, therefore, somewhat
y controversy. He carried on an extensive
ce with the learned in different countries; for,
in Hebrew, Greek, and other languages, there
mongst his papers upwards of 2000 written in
had a son, John, who died in England at the
y-one, and was accounted a prodigy of learning.
ered Hebrew at the age of nine, and Scaliger
was a better Hebrew scholar than his father.
large number of letters in Hebrew, besides
Proverbs of Solomon and other works.

es the number of the printed works and treatises of
sius at forty-eight, and of the unprinted at upwards
f the former more than two-thirds were inserted in
entitled *Critici Sacri, sive Annotata doctissimorum*
etus et Novum Testamentum (Amsterdam, 1698, in 9
London, 1660, in 10 vols. folio.) Amongst the works
to be found in this collection may be mentioned—1.
ebraicum vetus, (1584, 4to); 2. *Tabulæ in Gramma-*
cam ad usum Juventutis, (1602, 8vo); 3. An edition
everus (Franeker, 1807, 12mo); 4. *Opuscula quæ ad*
spectant omnia, (1609, 4to); 5. *Lacrymæ in obitum*
1609, 4to); and 6. *Grammatica Linguæ Sanctæ nova*

S, **Marcus Livius**, a patrician of the age of the
a colleague of Caius Gracchus in the tribune-
c. He was a creature of the senatorial party,
ployed by them to outbid the measures of the
une. Gracchus had proposed to found three
side Italy; Drusus provided twelve in Italy.
ad proposed to distribute allotments to the
ns subject to a state rent-charge; Drusus pro-
free of all charge. Gracchus had proposed to
tins the citizenship; Drusus added immunity
l punishment, even in the field. The bait thus
swallowed; the people forsook their champion,
easy victim to the hired braves of Opimius.
rewarded for his services by the consulship,
eld, 112 B.C. He received Macedonia for his
here he distinguished himself in a campaign
Scordisci, whom he drove across the Danube
being the first Roman general who reached that
probable that he is the Drusus mentioned by Plu-
ing died in the year of his censorship, 109 B.C.
S, **Marcus Livius**, son of the preceding, and,
er, during the first part of his career a thorough
the optimates. From his earliest youth he
devoted himself to politics, was assiduous as a pleader in the law-courts, and lavished in gifts and shows the large fortune which he had inherited. By such popular acts he rose to be tribune of the people, 91 B.C. In the agitation which was then raging for the transfer of the judicial functions from the equites to the senate, he proposed as a compromise a measure which restored to the senate their office of judges, while the numbers were doubled by the admission of 300 equites. But the senate was lukewarm, and the knights whose occupation was threatened offered the most violent opposition. In order, therefore, to catch the popular votes, he coupled with this measure others for the establishment of colonies in Italy and Sicily, and the distribution of corn at a reduced rate. By help of these riders the bill was carried, but not till its most factious opponent, the consul Philippus, had been arrested by Drusus and carried off to prison. To strengthen his hands Drusus now sought a closer alliance with the Italians, promising them the long coveted boon of the Roman franchise. The senate, who had before suspected his aims, broke out into open opposition. His laws were abrogated as informal, and each party armed its adherents for the civil struggle which was now inevitable. It was only prevented, or rather postponed, by the assassination of Drusus. One evening as he was returning to his house he was struck by a dagger, and fell at the foot of his father's bust, exclaiming with his dying breath, "When will the republic find again a citizen like me?" His character is hard to decipher, and is one of the moot problems of Roman history. To some he has appeared an unscrupulous adventurer, who deserted his own order to gratify his selfish ambition; others have pronounced him the ablest and wisest of the Roman demagogues. That he was proud and ambitious there can be no question. When a quæstor in Asia he refuses to wear the robes of office, "ne quid ipso esset insignius." When summoned before the senate he bids them come to him—"they will find me in the Curia Hostilia"—and they came. No less certain is it that the reforms he advocated were, on the whole, salutary and needful. The corruption of the equites was flagrant; the claims of the Italians to the franchise were just and pressing. Drusus was the Mirabeau of the social revolution of Rome, and had his measures been carried Rome might have been spared the most terrible of her civil wars.

DRYADES, or **Hamadryades**, in Greek Mythology, were nymphs of trees and woods, each particular tree or wood being the habitation of its own special Dryad, just as each river was the abode of its own local god. From being so closely identified with trees, the Dryades came to be thought of as having been, like the trees, produced from the earth, as Hesiod says, *Theog.*, 129.

DRYANDER, Jonas (1748–1810), a Swedish naturalist of eminence, and a pupil of Linnæus, was born in 1748. By his uncle, Dr Lars Montin, to whom his education was intrusted, he was sent to the university of Gottenburg, whence he removed to Lund. After taking his degree there in 1776, he studied at Upsala, and then became for a time tutor to a young Swedish nobleman. He next visited England, and, on the death of his friend Dr Solander in 1782, he succeeded him as librarian to Sir Joseph Banks. He was librarian to the Royal Society and also to the Linnean Society. Of the latter, in 1788 he was one of the first founders, and, when it was incorporated by royal charter in 1802, he was chiefly concerned in the drawing up of its laws and regulations. He was vice-president of the society till the time of his death, which took place in October 1810.

Besides papers in the Transactions of the Linnean and other societies, Dryander published *Dissertatio gradualis Fungos Regno Vegetabili vindicans*. Lond. 1776. and *Catalogus Bibliothecæ Historico-Naturalis Josephi Banks, Bart.*, Lond. 1796–1800, 5 vols. He also edited the first and part of the second edition of Aiton's *Hortus Kewensis*, and Roxburgh's *Plants of the Coast of Coromandel*.

DRYDEN, John (1631-1700), the poet, born on the 9th of August 1631, at Aldwinkle, in Northamptonshire, was of Cumberland stock, though his family had been settled for three generations in Northamptonshire, had acquired estates and a baronetcy, and intermarried with landed families in that county. His great-grandfather, who first carried the name south, and acquired by marriage the estate of Canons Ashby, is said to have known Erasmus, and to have been so proud of the great scholar's friendship that he gave the name of Erasmus to his eldest son. The name Erasmus was borne by the poet's father, the third son of Sir Erasmus Dryden. The leanings and connections of the family were Puritan and anti-monarchical. Sir Erasmus Dryden went to prison rather than pay loan money to Charles I.; the poet's uncle, Sir John Dryden, and his father Erasmus, served on Government commissions during the Commonwealth. His mother's family, the Pickerings, were still more prominent on the Puritan side. Sir Gilbert Pickering, his cousin, was chamberlain to the Protector, and was made a peer in 1658.

Dryden's education was such as became a scion of these respectable families of squires and rectors, among whom the chance contact with Erasmus had left a certain tradition of scholarship. His father, whose own fortune, added to his wife's, the daughter of the rector of Aldwinkle All Saints, was not large, and whose family, of whom the poet was the eldest, amounted to fourteen, procured him admission to Westminster School as a king's scholar, under the famous Dr Busby. Some elegiac verses which Dryden wrote there on the death of a young Lord Hastings, in 1649, had the distinction of being published in a volume called *Lacrymæ Musarum*, among other elegies by "divers persons of nobility and worth" in commemoration of the same event. He appeared soon after again in print, among writers of commendatory verses to a friend of his, John Hoddesdon, who published a little volume of religious poetry in 1650. Dryden's contribution is signed "John Dryden of Trinity C.," he having gone up from Westminster to Cambridge in May 1650. He was elected a scholar of Trinity on the Westminster foundation in October of the same year, and took his degree of B.A. in 1654. The only recorded incident of his college residence is some unexplained act of contumacy to the vice-master, for which he was "put out of commons" and "gated" for a fortnight. No inference can be built upon this as to Dryden's habits at the university. Contumacy to authorities was not a feature in his later life. His father died in 1654, leaving him master of two-thirds of a small estate near Blakesley, worth about £60 a year. The next three years he is said to have spent at Cambridge. It was then probably that he laid the foundation of that habit of learned discussion of literary methods which is so remarkable a feature in the prefaces to his plays and poems. Not content with doing a thing, like writers who are suddenly placed under the necessity of writing, Dryden must always be arguing as to how it ought to be done, pushing on argumentative justification in advance of execution. Whether or not he spent the three years before 1657 at Cambridge, there can be little doubt, judging from internal evidence, that he spent them somewhere in study; for his first considerable poem bears indisputable marks of scholarly habits, as well as of a command of verse that could not have been acquired without practice.

The middle of 1657 is given as the date of his leaving the university to take up his residence in London. In one of his many subsequent literary quarrels, it was said by Shadwell that he had been clerk to Sir Gilbert Pickering, his cousin, the favourite of Cromwell; and nothing could be more likely than that he obtained some employment under his powerful cousin when he came to London. He first emerged from obscurity with his *Heroic Stanzas* to the memory of the Protector, who died September 3, 1658. That these stanzas should have made him a name as a poet does not appear surprising when we compare them with Waller's verses on the same occasion. Dryden took some time to consider them, and it was impossible that they should not give an impression of his intellectual strength. Donne was his model; it is obvious that both his ear and his imagination were saturated with Donne's elegiac strains when he wrote; yet when we look beneath the surface, we find unmistakable traces that the pupil was not without decided theories that ran counter to the practice of the master. It is plainly not by accident that each stanza contains one clear-cut brilliant point. The poem is an academic exercise, and it seems to be animated by an undercurrent of strong contumacious protest against the irregularities tolerated by the authorities. Dryden had studied the ancient classics for himself, and their method of uniformity and elaborate finish commended itself to his robust and orderly mind. In itself the poem is a magnificent tribute to the memory of Cromwell. Now that the glittering style of the so-called "metaphysical poets" has gone very far out of fashion, it requires an effort, a deliberate dismissal of prejudice, to enjoy such a poem. A poet writing now on such a man would present his grandeur in a much more direct and simple way. Yet judged in the spirit of its own style, Dryden's is a noble poem. The recognition of Cromwell's greatness is full and ample. The thought in each stanza, the inclosing design of each of the parts of the edifice, is massive and imposing, although the massiveness is not presented in its naked simplicity, so as to hold the foremost place in the eye—the gaze being arrested by glittering accidents, so that the essential grandeur of the mass is disguised and diminished. We are not invited to dwell upon the grand outline; we are not called upon to surrender ourselves to its simple impressiveness; but it is there, although the author does not insist upon it, and rather deprecates it, waves it off, and challenges our admiration of some artificial centre of attraction. It is the ornamental centre upon which the art of the poet has laboured, not the effect of the massive whole; still there is loftiness and nobility in the scope of the work, if our prejudices in favour of a less adorned workmanship permit us to feel it.

From a moral point of view, Dryden's next appearance as a poet is not creditable. To those who regard the poet as a seer with a sacred mission, and refuse the name altogether to a literary manufacturer to order, it comes with a certain shock to find Dryden, the hereditary Puritan, the panegyrist of Cromwell, hailing the return of King Charles in *Astræa Redux*, deploring his long absence, and proclaiming the despair with which he had seen "the rebel thrive, the loyal crost." From a literary point of view also, *Astræa Redux* is very inferior to the *Heroic Stanzas*; Dryden had need of Waller's clever excuse that it is easier to praise a bad man than a good, because the essence of poetry is fiction. And it was not merely in this hastening to welcome the coming guest, and recant all praise of his rival, that Dryden showed a shamelessly accommodating spirit, and placed himself in such unpleasant contrast to the greater poet who was waiting his fate in all but friendless blindness. It might have been expected of one with his Puritan connections and scholarly training that, if he purposed making a living by the stage, which was restored with Charles, his literary as well as his moral conscience would have required him to make some effort to raise or at least not to lower its tone. But Dryden seems to have had no higher ambition than to make some money by his pen. He naturally first thought of tragedy,—his own genius, as he has informed us, inclining him rather to that species of composition; and in the first year of the Restoration he wrote a tragedy on the fate of the duke of Guise. But some friends advised him that its construction was not suited to the requirements of the stage, so he put it aside, and used only one scene of the original play later on, when he again attempted the subject with a more practised hand. Having failed to write a suitable tragedy, he next turned his attention to comedy, although, as he admitted, he had little natural turn for it. He was very frank afterwards in explaining his reasons for writing comedy. "I confess," he said, in a short essay in his own defence, printed before *The Indian Emperor*, "my chief endeavours are to delight the age in which I live. If the humour of this be for low comedy, small accidents, and raillery, I will force my genius to obey it, though with more reputation I could write in verse. I know I am not so fitted by nature to write comedy; I want that gaiety of humour which is required to it. My conversation is slow and dull; my humour saturnine and reserved; in short, I am none of those who endeavour to break jests in company or make repartees. So that those who decry my comedies do me no injury, except it be in point of profit; reputation in them is the last thing to which I shall pretend." This, of course, was said by Dryden standing at bay; there was some bravado, but also a great deal of frank truth in it. He was really as well as ostentatiously a playwright; the age demanded comedies, and he endeavoured to supply the kind of comedy that the age demanded. His first attempt was unsuccessful. Bustle, intrigue, and coarsely humorous dialogue seemed to him to be part of the popular demand; and, looking about for a plot, he found something to suit him in a Spanish source, and wrote *The Wild Gallant*. The play was acted in February 1663, by Killigrew's company in Vere Street. It was not a success, although the most farcical incident received a certain interest and probability from a story which was current at the time. That a student, fresh from his library, trying to hit the taste of the groundlings with ribald farce, should make the ingredients too strong even for their palates, was but natural. Pepys showed good judgment in pronouncing the play "so poor a thing as ever I saw in my life." That such a play should be written by Dryden, and acted in by one of the daughters of Stephen Marshall, must have been a bitter thought for Puritanism at the time. Dryden never learned moderation in his humour; there is a student's clumsiness and extravagance in his indecency; the plays of Etherege, a man of the world, have not the uncouth riotousness of Dryden's. Of this he seems to have been conscious, for when the play was revived, in 1667, he complained in the epilogue of the difficulty of comic wit, and admitted the right of a common audience to judge of the wit's success. Dryden, indeed, took a lesson from the failure of *The Wild Gallant*; his next comedy, *The Rival Ladies*, also founded on a Spanish plot, produced before the end of 1663, was correctly described by Pepys as "a very innocent and most pretty witty play," though there was much in it which the taste of our time would consider indelicate. But he never quite conquered his tendency to extravagance. *The Wild Gallant* was not the only victim. *The Assignation, or Love in a Nunnery*, produced in 1673, shared the same fate; and even as late as 1680, when he had had twenty years' experience to guide him, *Limberham, or the Kind Keeper*, was prohibited, after three representations, as being too indecent for the stage. Dislike to indecency we are apt to think a somewhat ludicrous pretext to be made by Restoration playgoers, and probably there was some other reason for the sacrifice of *Limberham*; still there is a certain savageness in the spirit of Dryden's indecency which we do not find in his most licentious contemporaries. The undisciplined force of the man carried him to an excess from which more dexterous writers held back.

After the production of *The Rival Ladies* in 1663, Dryden assisted Sir Robert Howard in the composition of a tragedy in heroic verse, *The Indian Queen*, produced with great splendour in January 1664. It was probably through this collaboration that Dryden made the acquaintance of Lady Elizabeth Howard, Sir Robert's sister, whom he married on the 1st of December 1663. Lady Elizabeth's reputation was somewhat compromised before this union, and, though she brought some small addition to the poet's income, she does not seem to have added to his happiness. *The Indian Queen* was a great success, one of the greatest since the reopening of the theatres. This was in all likelihood due much less to the heroic verse and the exclusion of comic scenes from the tragedy than to the magnificent scenic accessories—the battles and sacrifices on the stage, the aerial demons singing in the air, and the god of dreams ascending through a trap. The novelty of these Indian spectacles, as well as of the Indian characters, with the splendid Queen Zempoalla, acted by Mrs Marshall in a real Indian dress of feathers presented to her by Mrs Aphra Behn, as the centre of the play, was the chief secret of the success of *The Indian Queen*. These melodramatic properties were so marked a novelty that they could not fail to draw the town. The heroic verse formed but a small ingredient in the play; still, being also a novelty which had just been introduced by Davenant in *The Siege of Rhodes*, it interested the scholarly part of the audience, and so helped to consolidate the success of the stage carpenter. Dryden was tempted to return to tragedy: he followed up *The Indian Queen* with *The Indian Emperor*, which was acted in 1665, and also proved a success.

But Dryden was not content with writing tragedies in rhymed verse. Taking it up with enthusiasm as the only thing which the Elizabethan dramatists had left for their successors to excel in, he propounded the propriety of rhyme in serious plays as a thesis for discussion, and made it the prominent question of the day among men of letters. He took up the question immediately after the success of *The Indian Queen*, in the preface to an edition of *The Rival Ladies*. In that first statement of his case, he considered the chief objection to the use of rhyme, and urged his chief argument in its favour. Rhyme was not natural, some people had said; to which he answers that it is as natural as blank verse, and that much of its unnaturalness is not the fault of the rhyme but of the writer, who has not sufficient command of language to rhyme easily. In favour of rhyme he has to say that it at once stimulates the imagination, and prevents it from being too discursive in its flights. During the Great Plague, when the theatres were closed, and Dryden was living in the country at the house of his father-in-law, the earl of Berkshire, he occupied a considerable part of his time in thinking over the principles of dramatic composition, and threw his meditations and conclusions into the form of a dialogue, which he called an *Essay of Dramatic Poetry*, and published in 1668. One of the main topics of the essay was the admissibility of rhyme in serious plays, Dryden making Neander, the interlocutor who represents himself, repeat with fresh illustrations all that he had said in its favour. By this time, however, Sir R. Howard, his brother-in-law, whom he had joined in writing the rhymed *Indian Queen*, had changed his mind about the heroic couplet, and made some offensive comments on Dryden's essay in a heity-toity preface to *The Duke of Lerma*. Dryden at once replied to his brother-in-law in a master-piece of sarcastic retort and vigorous reasoning, publishing his reply as a preface to *The Indian Emperor*. It is the ablest and most complete statement of his views about the employment of rhymed couplets in tragedy.

Before his return to town at the end of 1666, when the theatres were reopened, Dryden wrote a poem on the Dutch war and the Great Fire, entitled *Annus Mirabilis.* The poem is in quatrains, the metre of his *Heroic Stanzas* in praise of Cromwell, which Dryden chose, he tells us, "because he had ever judged it more noble and of greater dignity both for the sound and number than any other verse in use amongst us." The preface to the poem contains an interesting discussion of what he calls "wit-writing," introduced by the remark that "the composition of all poems is or ought to be of wit." His description of the Fire is a famous specimen of this wit-writing, much more careless and daring, and much more difficult to sympathize with, than the graver conceits in his panegyric of the Protector. In *Annus Mirabilis* the poet apostrophizes the newly founded Royal Society, of which he had been elected a member in 1662, more probably through personal connection than on the ground of scientific attainments.

From the reopening of the theatres in 1666, till November 1681, the date of his *Absalom and Achitophel*, Dryden produced nothing but plays. The stage was his chief source of income. *Secret Love, or the Maiden Queen*, a tragicomedy, produced in March 1667, does not come up to our expectations as the first-fruit of the author's rest from composition and prolonged study of dramatic art. The prologue claims that it is written with pains and thought, by the exactest rules, with strict observance of the unities, and "a mingled chime of Jonson's humour and of Corneille's rhyme;" but it owed its success chiefly to the charm of Nell Gwynne's acting in the part of Florimel. It is noticeable that only the more passionate parts of the dialogue are rhymed, Dryden's theory apparently being that rhyme is then demanded for the elevation of the style. His next play, *Sir Martin Marall*, an adaptation from Molière's *L'Etourdi*, was produced at the Duke's Theatre, in the name of the duke of Newcastle. It was about this time that Dryden became a retained writer under contract for the King's Theatre, receiving from it £300 or £400 a year, till it was burnt down in 1672, and about £200 for six years more till the beginning of 1678. If *Sir Martin Marall* was written but not produced before this contract was entered into, one can understand why it was announced as the duke of Newcastle's. His co-operation with Davenant in a new version of Shakespeare's *Tempest*—for his share in which Dryden can hardly be pardoned on the ground that the chief alterations were happy thoughts of Davenant's, seeing that he affirms he never worked at anything with more delight—must also be supposed to be anterior to the completion of his contract with the Theatre Royal. The existence of the contract came to light from Dryden's non-fulfilment of its terms. He was engaged to write three plays a year, and he contributed only ten plays during the ten years of his engagement, finally exhausting the patience of his partners by joining in the composition of a play for the rival house. In adapting *L'Etourdi*, Dryden did not catch Molière's lightness of touch; his alterations go towards making the comedy into a farce. Perhaps all the more on this account *Sir Martin Marall* had a great run at the theatre in Lincoln's Inn Fields. As we have said, there is always a certain coarseness in Dryden's humour, apart from the coarseness of his age,—a certain forcible roughness of touch which belongs to the character of the man. His *An Evening's Love, or the Mock Astrologer*, an adaptation from the younger Corneille, produced at the King's Theatre in 1668, seemed to Pepys "very smutty, and nothing so good as *The Maiden Queen* or *The Indian Emperor* of Dryden's making." Evelyn thought it foolish and profane, and was grieved "to see how the stage was degenerated and polluted by the licentious times." *Ladies à la Mode*, another of Dryden's contract comedies, produced in 1668, was "so mean a thing," Pepys says, that it was only once acted, and Dryden never published it. Of his other comedies, *Marriage à la Mode* (produced 1672), *Love in a Nunnery* (1672), *Limberham, or the Kind Keeper*, only the first was moderately successful. The failure was not due to want of ribaldry.

While Dryden met with such indifferent success in his willing efforts to supply the demand of the age for low comedy, he struck upon a really popular and profitable vein in heroic tragedy. *Tyrannic Love, or the Royal Martyr*, a Roman play, in which St Catherine is introduced, and with her some striking supernatural machinery, was produced in 1669. It is in rhymed couplets, but the author again did not trust solely for success to them; for, besides the magic incantations, the singing angels, and the view of Paradise, he made Nell Gwynne, who had stabbed herself as Valeria, start to life again as she was being carried off the stage, and speak a riotously funny epilogue, in violent contrast to the serious character of the play. *Almanzor and Almahide, or the Conquest of Granada*, a tragedy in two parts, appeared in 1670. It seems to have given the crowning touch of provocation to the wits, who had never ceased to ridicule the popular taste for these extravagant heroic plays. Dryden almost invited burlesque in his epilogue to *The Conquest of Granada*, in which he charged the comedy of the Elizabethan age with coarseness and mechanical humour, and its conceptions of love and honour with meanness, and claimed for his own time and his own plays an advance in these respects. *The Rehearsal*, written by the duke of Buckingham, with the assistance, it was said, of Clifford, Sprat, and others, and produced in 1671, was a severe and just punishment for this boast. Dryden is here unmercifully ridiculed under the name of Bayes, he having obtained the laureateship from the king (with a pension of £300 a year and a butt of canary wine) in 1670. It is said that *The Rehearsal* was begun in 1663 and ready for representation before the Plague. But this probably only means that Buckingham and his friends were so tickled with the absurdities of Davenant's operatic heroes in *The Siege of Rhodes*, and the extravagant heroics of *The Indian Queen*, that they resolved to burlesque them. Materials accumulated upon them as the fashion continued, and by the time Dryden had produced his *Tyrannic Love*, and his *Conquest of Granada*, he had so established himself as the chief offender as to naturally become the centre of the burlesque. It is commonly said that Dryden passed over the attack on himself without reply, either because he admitted its justice or because he feared to offend the king's favourite. But this is not strictly so; his reply is contained in the dedication and preface to his *Conquest of Granada;* and his prose defence of the epilogue was published in 1672, in which, so far from laughing with his censors, he addresses them from the eminence of success, saying that "with the common good fortune of prosperous gamesters he can be content to sit quietly." Heroic verse, he assures them, is so established that few tragedies are likely henceforward to be written in any other metre, and he retorts upon their exposure of improbabilities in his plays, by criticizing the ridiculous incoherent stories and mean writing of Shakespeare and Jonson. Dignified reassertion of his positions was Dryden's way of meeting the ridicule of *The Rehearsal.* In the course of a year or two, *The Conquest of Granada* being attacked also by Settle, a rival playwright who had obtained considerable success, he had an opportunity of taking revenge in a style more suited to his sharp temper and power of severe writing.

Dryden's reply to *The Rehearsal* was lofty and firm. But though he put a bold face on a practice which it is but fair to suppose that he adopted only to supply a popular demand, he did not write many more heroic plays in rhyme. Perhaps the ridicule of *The Rehearsal* had destroyed their popularity. His next tragedy, *Amboyna*, an exhibition of certain atrocities committed by the Dutch on English merchants in the East Indies, put on the stage to inflame the public mind in view of the Dutch war, was written, with the exception of a few passages, in prose, and those passages in blank verse. An opera which he wrote in rhymed couplets, called *The State of Innocence, or the Fall of Man*, an attempt to turn part of *Paradise Lost* into rhyme, as a proof of its superiority to blank verse, was prefaced by an apology for heroic poetry and poetic licence, and published in 1674, but it was never acted. The redeeming circumstance about the performance is the admiration professed by the adapter for his original, which he pronounces "undoubtedly one of the greatest, most noble, and most sublime poems which either this age or nation has produced." Dryden is said to have had the elder poet's leave "to tag his verses." *Aurengzebe* was Dryden's last rhymed tragedy. In the prologue he confessed that he had grown weary of his long-loved mistress rhyme. But the stings of *The Rehearsal* had stimulated him to do his utmost to justify his devotion to his mistress. He claims that *Aurengzebe* is "the most correct" of his plays, and it is certainly superior, both in versification and in moderation of language, to its predecessors. It was acted in 1675, and published in the following year.

If Dryden had died in 1676, at the age of forty-five, he would have left a very inconsiderable name behind him. The fray between him and Settle might have been looked upon as a passage at arms between equals. After the production of *Aurengzebe* he seems to have rested for an interval from writing, enabled to do so, probably, by an additional pension of £100 granted to him by the king. During this interval he would seem to have reconsidered the principles of dramatic composition, and to have made a particular study of the works of Shakespeare. The fruits of this appeared in *All for Love, or the World Well Lost*, a version of the story of Antony and Cleopatra, produced in 1678, which must be regarded as a new departure in his dramatic career, a very remarkable departure for a man of his age, and a wonderful proof of undiminished openness and plasticity of mind. In his previous writings on dramatic theory, Dryden, while admiring the rhyme of the French dramatists as an advance in art, did not give the same praise to the regularity of their plots; he was disposed to give the preference to the irregular structure of the Elizabethan dramatists, as being more favourable to variety both of action and of character. But now he abandoned rhyme, and, if we might judge from *All for Love*, and the precepts laid down in his *Grounds of Criticism in Tragedy*, the chief point in which he aimed at excelling the Elizabethans was in giving greater unity to his plot. He upheld still the superiority of Shakespeare to the French dramatists in the delineation of character, but he thought that the scope of the action might be restricted, and the parts bound more closely together with advantage. *All for Love* and *Antony and Cleopatra* are two excellent plays for the comparison of the two methods. Dryden gave all his strength to *All for Love*, writing the play for himself, as he said, and not for the public. Carrying out the idea expressed in the title, he represents the two lovers as being more entirely under the dominion of love than Shakespeare's Antony and Cleopatra. Shakespeare's Antony is moved by other impulses than the passion for Cleopatra; it is his master motive, but it has to maintain a struggle for supremacy; "Roman thoughts" strike in upon him even in the very height of the enjoyment of his mistress's love, he chafes under the yoke, and breaks away from her of his own impulse at the call of spontaneously reawakened ambition. Dryden's Antony is so deeply sunk in love that no other impulse has power to stir him; it takes much persuasion and skilful artifice to detach him from Cleopatra even in thought, and his soul returns to her violently before the rupture has been completed. On the other hand, Dryden's Cleopatra is so completely enslaved by love for Antony that she is incapable of using the calculated caprices and meretricious coquetries which Shakespeare's Cleopatra deliberately practises as the highest art of love, the surest way of maintaining her empire over her great captain's heart. It is with difficulty that Dryden's Cleopatra will agree, on the earnest solicitation of a wily counsellor, to feign a liking for Dolabella to excite Antony's jealousy, and she cannot keep up the pretence through a few sentences. The characters of the two lovers are thus very much contracted, indeed almost overwhelmed, beneath the pressure of the one ruling motive. And as Dryden thus introduces a greater regularity of character into the drama, so he also very much contracts the action, in order to give probability to this temporary subjugation of individual character. The action of Dryden's play takes place wholly in Alexandria, within the compass of a few days; it does not, like Shakespeare's, extend over several years, and present incessant changes of scene. Dryden chooses, as it were, a fragment of an historical action, a single moment during which motives play within a narrow circle, the culminating point in the relations between his two personages. He devotes his whole play, also, to those relations; only what bears upon them is admitted. In Shakespeare's play we get a certain historical perspective, in which the love of Antony and Cleopatra appears in its true proportions beneath the firmament that overhangs human affairs. In Dryden's play this love is our universe; all the other concerns of the world retire into a shadowy, indistinct background. If we rise from a comparison of the plays with an impression that the Elizabethan drama is a higher type of drama, taking Dryden's own definition of the word as "a just and lively image of human nature," we rise also with an impression of Dryden's power such as we get from nothing else that he had written since his *Heroic Stanzas*, twenty years before.

It was twelve years before Dryden produced another tragedy worthy of the power shown in *All for Love*. *Don Sebastian* was acted and published in 1690. In the interval, to sum up briefly Dryden's work as a dramatist, he wrote *Œdipus* (1678) and *The Duke of Guise* (1683) in conjunction with Lee; *Troilus and Cressida*, 1679; *The Spanish Friar*, 1681; *Albion and Albanius*, an opera, 1685; *Amphitryon*, 1690. In *Troilus and Cressida* he follows Shakespeare closely in the plot, but the dialogue is rewritten throughout, and not for the better. The versification and the language of the first and the third acts of *Œdipus*, which with the general plan of the play were Dryden's contribution to the joint work, bear marked evidence of his recent study of Shakespeare. The plot of *Don Sebastian* is more intricate than that of *All for Love*. It has also more of the characteristics of his heroic dramas; the extravagance of sentiment and the suddenness of impulse remind us occasionally of *The Indian Emperor;* but the characters are much more elaborately studied than in Dryden's earlier plays, and the verse is sinewy and powerful. It would be difficult to say whether *Don Sebastian* or *All for Love* is his best play; they share the palm between them. Dryden's subsequent plays are not remarkable. Their titles and dates are—*King Arthur*, an opera, 1691; *Cleomenes*, 1692; *Love Triumphant*, 1694.

Soon after Dryden's abandonment of heroic couplets in tragedy, he found new and more congenial work for his favourite instrument in satire. As usual the idea was not original to Dryden, though he struck in with his majestic step and energy divine, and immediately took the lead.

His pioneer was Mulgrave's *Essay on Satire*, an attack on Rochester and the court, circulated in 1679. Dryden himself was suspected of the authorship, and cudgelled by hired ruffians as the author; but it is not likely that he attacked the king on whom he was dependent for the greater part of his income. In the same year Oldham's satire on the Jesuits had immense popularity, chiefly owing to the excitement about the Popish plot. Dryden took the field a a satirist towards the close of 1681, on the side of the court, at the moment when Shaftesbury, baffled in his efforts to exclude the duke of York from the throne as a papist, and secure the succession of the duke of Monmouth, was waiting his trial for high treason. *Absalom and Achitophel* produced a great stir. Nine editions were sold in rapid succession in the course of a year. It was a new thing for the public to have the leading men of the day held up to laughter, contempt, and indignation under disguises which a little trouble enabled them to penetrate. There was no compunction in Dryden's ridicule and invective. Delicate wit was not one of Dryden's gifts; the motions of his weapon were sweeping, and the blows hard and trenchant. The advantage he had gained by his recent studies of character was fully used in his portraits of Shaftesbury and Buckingham, Achitophel and Zimri. In these portraits he shows considerable art in the introduction of redeeming traits to the general outline of malignity and depravity. Against Buckingham Dryden had old scores to pay off, but he was too practised in the language of eulogy and invective to need any personal stimulus. "Glorious John" had a mind superior to petty hatreds, as well as, it must be admitted, to petty friendships, and it is not impossible that the fact that his pension had not been paid since the beginning of 1680 weighed with him in writing this satire to gain the favour of the court. In a play produced in 1681, *The Spanish Friar*, he had written on the other side, gratifying the popular feeling by attacking the Papists. Three other satires, with which he followed up *Absalom and Achitophel*, dealt with smaller game than this master-piece, though one of them was hardly inferior in point of literary power. *The Medal* was written in ridicule of the medal struck to commemorate Shaftesbury's acquittal. Then Dryden had to take vengeance on the literary champions of the Whig party, who had opened upon him with all their artillery. Their leader, Shadwell, he essayed to demolish under the nickname of "MacFlecknoe." Besides a separate poem under that title, he contributed a long passage to a second part of *Absalom and Achitophel*, written chiefly by Nahum Tate, in which Ferguson, Forbes, Settle, and Shadwell were victims of his strident lash. *Religio Laici*, which came immediately after, in November 1682, though nominally an exposition of a layman's creed, and deservedly admired as such, was not without a political purpose. It attacked the Papists, but declared the "fanatics" to be still more dangerous, which fitted in with Charles's policy of conciliating the church by persecuting the Nonconformists.

Dryden's next poem in heroic couplets was in a different strain. On the accession of James, in 1685, he became a Roman Catholic. There has been much discussion as to whether this conversion was or was not sincere. It can only be said that the coincidence between his change of faith and his change of patron was suspicious, and that Dryden's character for consistency is certainly not of a kind to quench suspicion. The force of the coincidence cannot be removed by such pleas as that his wife had been a Roman Catholic for several years, or that he was converted by his son, who was converted at Cambridge, even if there were any evidence for these statements. Scott defended Dryden's conversion, as Macaulay denounced it, from party motives; on any other grounds, it is not worth discussing. Nothing can be clearer than that Dryden all his life through regarded his literary powers as a means of subsistence, and had little scruple about accepting a brief on any side. *The Hind and Panther*, published in 1687, is an ingenious argument for Roman Catholicism, put into the mouth of "a milk-white hind, immortal and unchanged." There is considerable beauty in the picture of this tender creature, and its enemies in the forest are not spared. One can understand the admiration that the poem received when such allegories were in fashion. It was the chief cause of the veneration with which Dryden was regarded by Pope, who, himself educated in the Roman Catholic faith, was taken as a boy of twelve to see the veteran poet in his chair of honour and authority at Will's coffee-house. It was also very open to ridicule, and was treated in this spirit by Prior and Montagu, the future earl of Halifax. Dryden's other literary services to James were a savage reply to Stillingfleet—who had attacked two papers published by the king immediately after his accession, one said to have been written by his late brother in advocacy of the Church of Rome, the other by his late wife explaining the reasons for her conversion—and a translation of a life of Xavier in prose. He had written also a panegyric of Charles, and a eulogy of James under the title of *Britannia Rediviva*, which it is interesting to compare with his other productions of the same kind.

Dryden did not abjure his new faith on the Revolution, and so lost his office and pension as laureate and historiographer royal. For this act of constancy he deserves credit, if the new powers would have considered his services worth having after his frequent apostasies. His rival Shadwell reigned in his stead. Dryden was once more thrown mainly upon his pen for support. He turned again to the stage and wrote the plays which we have enumerated. A great feature in the last decade of his life was his translations from the classics. A volume of miscellanies published in 1685 had contained some translations from Virgil, Horace, Lucretius, and Theocritus. He now produced translations more deliberately as a saleable commodity. A volume of miscellanies, which appeared in 1693, contained translations from Homer and Ovid. In the same year he published a translation of the satires of Juvenal and Persius, written with the assistance of his two elder sons. Johnson passes on this work the just criticism that "though, like all other productions of Dryden, it may have shining parts, it seems to have been written merely for wages, in an uniform mediocrity." When Dryden took his farewell of the stage in 1694, he announced his intention of devoting himself to a translation of the whole of Virgil. On this he seems really to have laboured, and great expectations were formed of it. It was published in 1697, and proved a great success. To judge it by its fidelity as a reproduction of the original would be to apply too high a standard, but it is an interesting rendering of Virgil into the style of Dryden, and as a poem was read with delight in its own age. Soon after its publication, Dryden wrote one of his master-pieces, the second Ode on St Cecilia's day. His next work was to render some of Chaucer's and Boccaccio's tales and Ovid's metamorphoses into his own verse. These translations appeared a few months before his death, and are known by the title of *Fables*. Thus a large portion of the closing years of Dryden's life were spent in translating for bread. He had a windfall of 500 guineas from Lord Abingdon for a poem on the death of his wife in 1691, but generally he was in considerable pecuniary straits. He is supposed to have received occasional presents from rich and powerful friends, but he never received anything from the court, and he was too proud to make advances. Besides, his three sons held various posts in the service of the Pope at Rome, and he could not well be on good terms with both courts. However, he was not molested in London by the Government, and in private he was treated with the respect due to his old age and his admitted position as the greatest of living English poets. His death took place on the 1st of May 1700.

Dryden's conversion to Catholicism had a great indirect influence on the preservation of his fame. It was this which gained him the discipleship and loving imitation of Pope. He thus became by accident, as it were, the literary father and chief model of the greatest poet of the next generation. If his fame had stood simply upon his merits as a poet, he would in all likelihood have been a much less imposing figure in literary history than he is now. The splendid force of his satire must always be admired, but there is surprisingly little of the vast mass of his writings that can be considered worthy of lasting remembrance. He showed little inventive genius. He was simply a masterly *littérateur* of immense intellectual energy, whose one lucky hit was the first splendid application of heroic couplets to satire and religious, moral, and political argument. Upon this lucky hit supervened another, the accidental discipleship of Pope. Dryden lent his gift of verse to the service of politics, and his fame profited by the connection. It would be unjust to say that his fame was due to this, but it was helped by this; apart from the attachment of Pope, he owed to party also something of the favour of Johnson and the personal championship and editorial zeal of Scott.

The standard edition of Dryden is Scott's. There is an admirable edition of his poetical works in the Globe series, by Mr W. D. Christie, enriched with an elaborately accurate memoir and painstaking notes. His two best plays, *All for Love* and *Don Sebastian*, have recently been republished by Mr. J. L. Seton. (W. M.)

DRY ROT, a disease in timber, apparently infectious, which occasions the destruction of its fibres, and reduces it eventually to a mass of dry dust. It is produced most readily in a warm, moist, stagnant atmosphere, while common or wet rot is the result of the exposure of wood to repeated changes of climatic conditions. In both diseases, however, a kind of spontaneous combustion or decomposition goes on in the wood; water, carbonic acid gas, and probably carburetted hydrogen are evolved, and a pulverulent substance, or humus, remains. Though the growth of fungi undoubtedly accelerates the progress of dry rot, it would seem that the true origin of the disease is the incipient decomposition of the sap in wood, and that by virtue of this decomposition the fungi obtain a nidus for their growth. The most formidable of the dry rot fungi is the species *Merulius lacrymans*, which is particularly destructive of coniferous wood; other species are *Polyporus hybridus*, which thrives in oak-built ships, and *P. destructor* and *Thelephora puteana*, found in a variety of wooden structures. The nature of ships' cargoes has a considerable influence on the duration of their timbers,—hemp, pepper, and cotton being highly favourable, and lime and coal unfavourable, to the development of dry rot. The commonest precaution against the occurrence of that disease is to deprive the wood of its moisture by exposure to the open air, or, in other words, to season it. Charring, steaming, boiling, and smoke-curing are other modes of desiccation which have been resorted to. At one time a Mr Lukin attempted the rapid seasoning of logs of green oak at Woolwich dockyard by heating them in pulverized charcoal; but the process, though it lessened the weight and dimensions of the wood, started its fibres from one another. He then sought to replace the moisture of heated wood by the products of the distillation of pitch-pine saw-dust; before, however, the operation was judged to be complete, an explosion took place, which proved fatal to eight workmen, and wounded twelve; the experiment, therefore, was not repeated. Davison and Symington's patent process of artificial drying, which has been found to yield good results, consists in exposing the wood to a current of air moving at the rate of about 48 miles an hour, and having a temperature of 110° to 112° Fahr.

The felling of trees when void of fresh sap, as a means of obviating the rotting of timber, is a practice of very ancient origin. Vitruvius directs (ii. cap. 9) that, to secure good timber, trees should be cut to the pith, so as to allow of the escape of their sap, which by dying in the wood would injure its quality; also that felling should take place only from early autumn until the end of winter. The supposed superior quality of wood cut in winter, and the early practice in England of felling oak timber at that season, may be inferred from a statute of James I., which enacted "that no person or persons shall fell, or cause to be felled, any oaken trees meet to be barked, when bark is worth 2s. a cart-load (timber for the needful building and reparation of houses, ships, or mills only excepted), but between the first day of April and last day of June, not even for the king's use, out of barking time, except for building or repairing his Majesty's houses or ships." In giving testimony before a committee of the House of Commons in March 1771, Mr Barnard of Deptford expressed it as his opinion that to secure durable timber for ship-building, trees should be barked in spring and not felled till the succeeding winter. In France, so long ago as 1669, a royal decree limited the felling of timber from the 1st October to the 15th April; and, in an order issued to the commissioners of forests, Napoleon I. directed that the felling of naval timber should take place only from November 1 to March 15, and during the decrease of the moon, on account of the rapid decay of timber, through the fermentation of its sap, if cut at other seasons. The burying of wood in water, which dissolves out or alters its putrescible constituents, has long been practised as a means of seasoning. The old "Resistance" frigate, which went down in Malta harbour, remained under water for some months, and on being raised was found to be entirely freed from the dry rot fungus that had previously covered her; similarly, in the ship "Eden," the progress of rot was completely arrested by 18 months' submergence in Plymouth Sound, so that after remaining a year at home in excellent condition she was sent out to the East Indies. It was an ancient practice in England to place timber for thrashing-floors and oak planks for wainscotting in running water to season them. Whale and other oils have been recommended for the preservation of wood; and in 1737 a patent for the employment of hot oil was taken out by a Mr Emerson. Common salt, but for the attraction of its impurities for moisture, might be advantageously used; indeed the Dutch ship-builders, having observed that the busses in which herrings were stowed away in pickle lasted longer than any other craft, adopted the practice of filling up with salt, not only the vacant spaces between the planks, but also holes bored for its reception in the large timbers.

Among the many processes for the prevention of dry and wet rot in wood by impregnating it with material capable of precipitating its coagulable constituents in a permanently insoluble and imputrescible form, the following may be enumerated:—Kyan's (1832), in which, according to Sir Humphry Davy's suggestion, a solution of corrosive sublimate is employed; Sir W. Burnett's (1836), M. Breant's (1837), Margary's (1837), and Payne's (1841), which consist respectively in the use of zinc chloride, copperas, copper sulphate, and copperas followed by sodium carbonate; and Bethell's (1838), for the treatment of the wood with crude creasote or oil of tar. The application of solution of copper sulphate, containing about a quarter of a pound of the salt to each gallon of water, according to Margary's patent, has been found very efficacious in the case of timber not liable to the solvent action of water; but of all processes the most satisfactory is Bethell's. In this the wood is injected with heavy tar-oil in cylinders 6 feet in diameter and 20 to 50 feet in length, at a temperature of 120° Fahr., and under a pressure of 150 ℔ to the square inch, so that ordinary fir timber absorbs on the average 8 to 10 ℔ of the liquid per cubic foot. Timber thus prepared has been found not only durable, but also exempt from the attacks of insects and other pests.

J. Papworth, *An Essay on the cause of the Dry Rot in Buildings*, 1806; Bowden, *A Treatise on the Dry Rot*, 1815; Wade, *A Treatise on the Dry Rot in Timber*, 1815; Chapman, *On the Prevention of Timber from Premature Decay*, 1817; M'Williams, *Essay on the Origin and Operation of the Dry Rot*, 1818; Burnell in *Journal of the Society of Arts*, June 1, 1860, vol. viii.

DU BARRY GOMARD DE VAUBERNIER, Marie Jeanne, Countess (1746–1793), mistress of Louis XV., was the daughter of Vaubernier, a clerk of the customs at Vaucouleurs, and was born there on the 19th August 1746. She received little or no education, and, coming to Paris while yet very young, she entered the house of a "marchande de modes." She soon fell a victim to the temptations which there beset her, and lived as a courtesan under the name of Mdlle. Lange. Her great and peculiar personal charms led Jean Count Du Barry to form the design of receiving her into his house, in order to make it more attractive to the dupes from whom by gambling he won money to furnish him with the means of dissipation. Her success surpassing his expectations, his hopes took a higher flight, and he presented her to Lebel, valet de chambre of Louis XV., with the intention that she should become the mistress of the king. In this she succeeded; but as the favour shown by Louis to a courtesan roused murmurs in the court and remonstrances from his ministers and the members of the royal family, Louis, who was too infatuated to remove her, met their wishes half-way by securing for her a nominal husband. Count Jean Du Barry was married himself, but his brother William offered himself for the ceremony, and after its performance the Countess Du Barry was presented at court on the 22d April 1769. Her influence over the monarch was absolute until his death, and courtiers and ministers were in favour or disgrace with him in exact accordance with her wishes. The Duc de Choiseul, who refused to acknowledge her, was disgraced in 1771; and the Duc d'Aiguillon, who had the reputation of being her lover, took his place, and in concert with her governed the monarch. The favour of Louis for the Countess Du Barry continued to estrange him from his children and from the most of the royal family, and this isolation induced him to build for her the magnificent mansion of Luciennes. At his death in 1774 an order of his successor banished her to L'Abbaye du Pont-aux-Dames, near Meaux, but the queen interceding for her, the king in the following year gave her permission to reside at Luciennes with a pension. Having gone to England in 1792 to endeavour to raise money on her jewels, she was on her return accused before the Revolutionary tribunal of having dissipated the treasures of the state, conspired against the republic, and worn, in London, "mourning for the tyrant." She was condemned to death December 7, 1793, and beheaded the same evening.

DUBLIN, a maritime county of Ireland, situated in the province of Leinster, and containing the Irish metropolis. It is bounded on the N. by the county Meath, E. by the Irish Sea, S. by Wicklow, and W. by Kildare and Meath. With the exception of Louth and Carlow, Dublin is the smallest county in Ireland. Its greatest length is 32 miles, its greatest breadth 18; and the area is 354 square miles, or 226,895 acres.

Geology.—The greater part of the county rests on the eastern extremity of the great bed of flotz limestone that extends over the middle of the island, widening as it spreads westward. It rises in its southern part into a range of mountains, which forms the verge of an elevated district, extending thence for more than thirty miles to the south through the county of Wicklow. Through this tract a large body of granite passes in a south-western direction, commencing at Blackrock and passing by Dundrum and Rathfarnham, and forming the loftiest summit in the county, bounded on its eastern and western sides by incumbent rocks of great variety of structure and relations; micaceous schist exists at Killiney and Rathfarnham, and argillaceous schist, on both sides of the granite and quartz rock, in the eastern side alone, forming the promontory of Bray Head, and reappearing in the more northern part of the county, where it forms the picturesque peninsula of Howth, and rises to the height of 567 feet above the level of the sea. The country near Bray presents, within a small space, an instructive series of rocks; and at Killiney schistose beds are to be seen, of considerable extent, reposing on granite. Near Booterstown, a mass of compact limestone is visible within a few fathoms of the granite. Calp, or "black quarry stone," a variety of limestone, is the prevailing rock in the immediate vicinity of Dublin, and is much used for building; and the granite of Dalkey and the neighbourhood is also much used for architectural purposes in the city and environs; quantities of it are exported to England. Petrifactions abound in many parts of the limestone country. In the peninsula of Howth gray ore of manganese, brown ironstone, and brown iron-ore occur in abundance.

Surface.—The northern portion of the county is flat, and the soil good, particularly on the borders of Meath; but on the southern side the land rises into elevations of considerable height. The mountains are chiefly covered with heath, except where a subsidence in the ground affords a nucleus for the formation of bog, with which about 2000 acres are covered. There are also a few small tracts of bog in the northern part of the county. The mountain district is well adapted for timber, to the growth of which some attention has lately been paid.

Coast.—The northern coast of the county from Balbriggan to Howth has generally a sandy shore, and affords only the small harbours of Balbriggan and Skerries. In the promontory of Howth, the coast suddenly assumes a bolder aspect; and between the town of Howth and the picturesque rocky islet of Ireland's Eye an artificial harbour has been constructed, at an expense of above one-third of a million sterling, which is useful only to vessels of small burthen, and those engaged in the fisheries. Soon after the harbour was finished it was discovered that a shifting sand-bank was likely to render the refuge quite useless; and the slow but certain filling up of the harbour is made apparent at low tide. Kingstown harbour, on the south side of Dublin Bay, is by far the best in the county. It was commenced in 1816, and was not quite finished until 1859,—at a total expenditure of £825,000. A quay runs out into the harbour to a distance of 500 feet, at which vessels drawing 24 feet of water may unload at any state of the tide. The petty harbours of Bullock and Coolamore are on this coast, the former being quite dry save at high tide, and the mouth of the latter being much higher than the bed. Balbriggan is little better, and that at Skerries is hardly to be mentioned. Opposite Coolamore harbour lies Dalkey Island, and the sound between the island and the shore is held to be dangerous in certain conditions of weather. The island is 22 acres in extent, and stands about midway between Kingstown harbour and the beautiful bay of Killiney. North of Howth lies Lambay Island

;00 acres in area, the property of Lord Talbot de le. Shell-fish, especially lobsters, are caught here in ice. Small islets lie not far off, the most interesting h is that known as Inispatrick, noted as the spot hich St Patrick first landed in Ireland, and where he s first church. Ireland's Eye, off Howth, is a very que rock standing on about 54 acres of grass land. fforded great room for geological disquisition.

ishery districts are Dublin and Howth. The chief are Howth and Skerries, the former of which is sed by the Manx and Cornish fishermen, who resort derable numbers to the harbour during the fishing Dublin Bay haddocks and herrings have long teemed, and justly, for their superior quality and

s and Mountains.—The chief river in the county is fey, which rises in the Wicklow Mountains about miles south-west of Dublin, and, after running ;0 miles, empties itself into Dublin Bay. The of the river is so tortuous that 40 miles may be d and only 10 gained in direction. The scenery along ks of the Liffey is remarkable for its beauty. The ins which occupy the southern border of the county extremities of the great group guarding the adjacent of Wicklow. The principal summits are the Three Iountain and Garry Castle, the former having an n of 1586 feet, and the latter of 1869; and the ormed by Kippure and the Seefin range, Kippure 527, and Seefin 2150 feet high. But the grandest of these hills are the great natural ravines which ı them, the most extraordinary being the Scalp, which the traveller passes from Dublin to Wick-

ulture.—Of the 226,895 acres which form the area county, 100,236 acres were returned in 1871 r tillage, 91,503 as pasture, 4716 wood, 15,700 in ınd 14,470 waste, bog, mountain, and water. The the county has indeed changed but little during the , and the statistics as to the treatment of the soil ex- . almost stationary result. The growth of the towns n to the city has made the only appreciable change, t change has been not inconsiderable. The farms general small. Near Dublin, particularly on the n side of the city, a very considerable portion of nty consists of ornamental grounds, and the rents portionately high.

produce of the crops is generally greater than in any ounty,—not so much on account of any natural ity in the soil, as by reason of the facilities afforded neighbourhood of a large city, and the greater ture of capital on the land. Of cereals the prin- ops are oats and wheat; and of green crops, potatoes. stock the county is particularly rich in proportion xtent. The following tables give the acreage of d numbers of stock in 1873 and 1876:—

	Oats	Wheat.	Potatoes.	Other Green Crops.	Meadow and Clover.
....	16,723	6392	10,107	6826	45,574
....	16,009	5646	9,863	6566	49,789

Iorses and Mules.	Cattle.	Sheep.	Pigs.	Goats.	Poultry
21,098	54,502	88,604	20,032	6245	194,880
20,015	52,770	64,263	17,273	5878	213,531

gards the division of the land, the number of hold- the county has somewhat diminished within recent In 1853, there were 9016 separate holdings, while there were only 8792. According to the Owners' of 1876, the county was divided in 1874 1100 proprietors, of whom 2526, or 61½ per cent., s than one acre of ground, a proportion almost with the average of Leinster. From the same authority it appears that the total area held amounted to 217,457 acres, giving an average of 53 acres per holding (that of the province being 187); and the total valuation amounted to £686,794, giving an average of £3, 3s. 2d. per acre, as against 18s. 11½d. for the whole province. Fourteen proprietors held more than 2000 acres each, and 57,969 acres in all, or 26½ per cent. of the area, viz:—Charles Cobbe, 9662 acres; Earl of Howth, 7377; Sir C. C. W. Domville, 6252; George Woods, 4141; Sir Roger Palmer, 3991; Lord Langford, 3659; Ion Trant Hamilton, 3647; Mrs White, 3422; W. W. Hackett, 3198; Eyre Coote's representatives, 3107; R. Q. Alexander, 2973, Earl of Pembroke, 2269; Lord Annaly, 2139; Marquis of Lansdowne, 2132.

The *manufactures* of the county are mainly confined to the city of Dublin and its neighbourhood. There is, however, a manufactory of cotton hosiery at Balbriggan of some importance.

Administration, &c.—There are nine baronies in the county:—1 and 2. Balrothery East and West, containing Rush and Lusk (population 1800), Skerries (2236), and Balbriggan (2332); 3. Coolock, containing Clontarf (3442), and several minor villages; 4. Nethercross, containing the ancient parliamentary borough of Swords (1008), and the village of Glasnevin; 5. Newcastle, containing the village of Lucan, and Newcastle, which was represented in the Irish Parliament by two members; 6. Uppercross; 7. Rathdown, containing the towns of Dundrum (540), Blackrock (8089), Kingstown (16,378), Dalkey (2584), and Killiney (2290); 8. Castleknock, in which is situated the Phœnix Park; and 9. Dublin, containing the city and many outlying villages. The village of Donnybrook, famous for its fair and accompanying riotous pleasure, is now part of Pembroke township, one of the richest and most beautiful suburbs of the city.

The nine baronies, including the city, are divided into 99 parishes, all within the archdiocese of Dublin. The county proper, excluding the capital, contains 222,709 acres; the rateable property is valued at £700,854; the population at the last census (1871) was 158,936; and the number of houses, 28,803. Between 1841 and 1871 the increase of population was nearly 13·5 per cent., although between May 1851 and December 1871 there emigrated from the county 58,774 persons. In 1871, 70¼ per cent. of the total population were Roman Catholics. In the city that denomination forms 79 per cent. The numbers of the last religious census were—Catholics, 111,964; Episcopalians, 39,289; Presbyterians, 2995; and various, 4688. There are two poor-law unions, Balrothery and Rathdown, but portions of the county are in unions situated in adjacent counties. The average daily number of paupers in the county workhouses in 1875 was 674.

Dublin is the head-quarters of the military district, and of the general commanding-in-chief and staff of Ireland.

The total number of children receiving education in 1824–26 was reported in a parliamentary return to be 33,008. In 1853, there were 159 national schools in operation, attended by 28,799 children, and in 1876 there were 52,127 children attending the national schools.

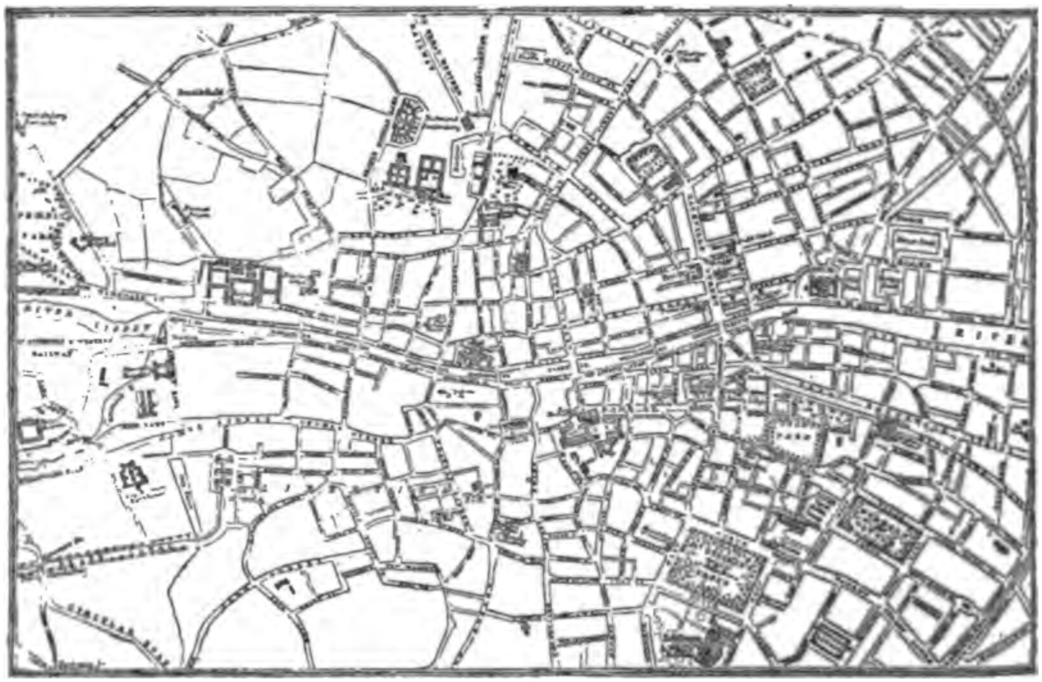
Previous to the union with Great Britain, this county returned ten representatives to the Irish Parliament,—two for the county, two for the city, two for the university, and two for each of the boroughs of Swords and Newcastle. The number of representatives was reduced to five by the Act of Union, one member being withdrawn from the university, and the boroughs of Swords and Newcastle disfranchised. The Reform Act of 1832 restored the second member to the university, leaving the representation in other respects unchanged.

History.—It is stated by Ptolemy that the county Dublin was inhabited by the tribe of the Eblani, who dwelt for the most part in Meath county, but on their settling in Dublin founded the city Eblana, now presumed to be Dublin. Later writers affirm that the Eblani were driven out by the Danes, who held sway until the battle of Clontarf (1014) resulted in the overturn of their power. When the English landed, the people to the north of the Liffey were known among the Irish as *Fingall*, or white foreigners, and those living south of the river were called *Dubhgall*, or black foreigners. The Rev. Cæsar Otway professed to be able to discern signs of the different races even as late as his day; but the modern observer will fail to catch any marks whereby different portions of the community may be distinguished.

In 1210, King John formed this district into a county, comprising the chief portion of country within the English pale. The limits of the county were, however, uncertain, and underwent many changes before they were fixed. Although so near the seat of government, 67,142 acres of profitable land were forfeited in the Rebellion of 1641, and 34,536 acres in the Revolution of 1688. In 1606 the boundaries were definitely marked, the country inhabited by the O'Tooles and the O'Byrnes being formed into the county of Wicklow. The absence of any considerable towns decreases the interest in Dublin county, and it has no historic fields to boast of. In 1867 the most formidable of the Fenian risings took place near the village of Tallaght, about seven miles from the city. The rebels, who numbered from 500 to 700, were found wandering at dawn, some by a small force of constabulary who, having in vain called upon them to yield, fired and wounded five of them; but the great bulk of them were overtaken by the troops under Lord Strathnairn, who captured them with ease and marched them into the city.

Sir John Forbes, a distinguished Scotch physician, who visited Ireland in 1852, speaks thus of the county in his *Memoranda*:—"Without leaving the county of Dublin, the antiquary would have no difficulty in finding numerous objects of interest and instruction, casting light upon the early history of the country. Among the ancient raths, duns, or forts constructed by the native Irish or the Danes, and more probably by both people, for defence or security in positions of natural strength, improved by art and labour, several remain in this county. One at Raheny, although much reduced in its proportions, is still traceable; several yet more imperfect are faintly visible at Coolock; one near Lucan is furnished with the subterranean vaults and passages not unusually found in connection with the larger specimens; and another at Shankhill or Rathmichael, near the remarkable natural pass through the mountain called the Scalp, is of greater extent than the others, more commanding in position, and in close proximity to the ancient church, and supposed fragment of a round tower. Numerous sepulchral mounds of the same period also exist scattered throughout the county, occasionally somewhat similar in appearance to the raths, but generally smaller in extent, altogether artificial, and of conical form. Among its most interesting antiquities this county reckons three of the ancient round towers almost peculiar to Ireland,—one at Swords, another at Lusk, forming one of the angles of the church steeple, and a third in the highest state of preservation at Clondalkin."

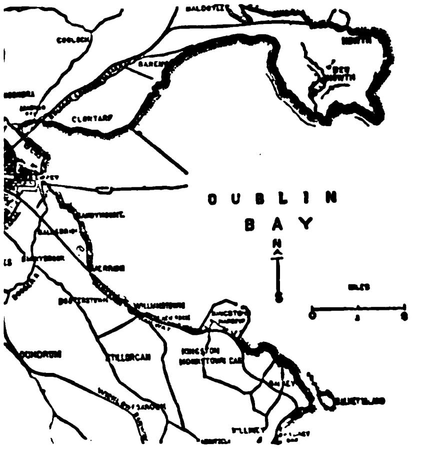
DUBLIN, the metropolis of Ireland, in the county of Dublin and province of Leinster, is a county in itself, and a municipal and parliamentary borough; the area of the former is 3808 acres. It is distant 292 miles W.N.W. from London, 138 miles W. from Liverpool, and 60 miles W. from Holyhead, in 53° 20′ 38″ N. lat. and 6° 17′ 13″ W. long., and is situated in the great central limestone district which stretches across the island from the Irish Sea to the Atlantic Ocean, on the River Liffey, extending to the junction of that river with the Bay of Dublin, the waters of which wash its south suburban shores.



Plan of Dublin.

In the reign of James II. the population of Dublin was [illegible]; in 17[illegible] it had more than doubled; in 1753 it was [illegible]; in 17[illegible] Whitelaw estimated it at 182,000; according to the first census (taken in 1821) it was [illegible]; it was [illegible],726 in 1841, 254,808 in 1861, and [illegible] in 1871. This last decrease is due to the recent increase in wealth and the consequent extra-city residence of the traders and merchants. The suburbs of Dublin have wonderfully improved within the past twenty years, and constitute at present the chief of the many attractions which the stranger is wont to admire. The outlying townships of Rathmines and Rathgar, Kingstown and Pembroke, Clontarf and Dalkey, are all inhabited by persons engaged in the commerce of the city. If we include these populations, the city may be said to contain about 330,000 souls. The parliamentary borough, whose limits are more extensive than those of the municipal borough, covers an area of 3601 acres, and contained in 1871 a population of 267.717 persons. It returns two members to the imperial parliament.

all is nearly 33 inches; rain or snow falls on er annum; and the wind blows from the N. or lays. The average death-rate is 27 per 1000. of the city is singularly simple. The Liffey ; through the centre from west to east, and the nect long lines of streets running north and communications between the two sides of the ple, there being 9 bridges in a distance of about a half, and ferries for the two miles of shipping e last bridge and the mouth of the river. treet is the finest avenue in Dublin; the houses, re not uniform, and the street is not long its width, while the Nelson Pillar, itself a beau- blocks the view and interrupts the traffic. The onsists of a fluted Doric column 120 feet high, massive pedestal, the four sides of which show openhagen, St Vincent, and Trafalgar. On the colossal statue of Nelson, surrounded by a balus- hich there is an ascent by a spiral stair. The monument, almost completed by Foley before is destined for the southern end of Sackville will cost about £12,000. On the other side of across Carlisle Bridge, is Westmoreland Street, ank of Ireland and Trinity College at its southern ght angles to Westmoreland Street is Dame Street, ably the best street in the city. The houses are nassive, and more than one of them colossal. At Dublin Castle, and at the other the great front k and of Trinity college. The chief drawback as a city is the sudden transition from ce to meanness, and in no part of it is there om this displeasing contrast. Close by its every lifice is a purlieu, with its unpleasant character- addition to this, the soil is so oozy that, after ht shower it is melted into far-spreading mud- fying the conjecture that Dublin was in old "Town of the Ford of Hurdles on the Black- he River Liffey, too, which ought to be a source is rendered offensive by receiving the drainage . There are numerous elegant houses in the irrounded by well-kept gardens. The slighter Tolka, the Dodder, and the Tongue, meander well-cultivated country; there is a noble supply r domestic purposes; and lines of tramway run heart of the city to every outlying district. Dublin was said to be bounded by the circular is nine miles in extent; but the growth of the city has far outrun that limit. There are about 820 miles of streets in the borough under the control of the corporation; the valuation of the borough in 1871 (excluding exemptions, Government buildings, religious houses, &c.) amounted to £596,000; the number of houses inhabited was 23,896, uninhabited 1059, and building 87. The want of a Building Act in Dublin has resulted in the absence in many places of anything like uniformity in the frontage, height, or character of its buildings.



Environs of Dublin.

The condition of the various orders of the community is perhaps best shown by citing the census returns as to the number of families occupying the four different classes of houses. There were 5035 families in houses of the 1st class, 10,523 families in the 2d class, 16,819 in the 3d class, and 25,733 in the 4th class. The 58,110 families thus hold 23,896 houses. Another way of estimating Dublin society is by taking the occupations of the people. In 1871 there were 331 clergymen in Dublin, 286 barristers, 370 attorneys, 49 architects, 215 accountants, 4000 bootmakers, 1660 tailors, 19,500 domestic servants, 83 photographers, 1000 coachmen and cabmen, 1600 drapers and mercers, 1280 carmen and carriers, 936 cabinetmakers, 3500 clerks, 177 civil engineers, 394 fishmongers, 38 glovemakers, 1867 grocers, 11,530 labourers, 4590 milliners, 1477 printers, 31 sculptors, 223 watch and clock makers, 458 wine and spirit merchants.

Judges, lawyers, and doctors may be said to constitute the higher society of Dublin; of the 182 peers of Ireland only two have residences in the capital.

The lord lieutenant lives in Dublin Castle in winter, and in the Viceregal Lodge, Phœnix Park, in summer. He is assisted in the executive by a privy council, nominated by the Crown, and his chief secretary, who must have a seat in the House of Commons. Lords justices govern in the temporary absence of the lord-lieutenant—the lord chancellor, the commander-in-chief, and another privy councillor usually being appointed. Prior to the Act of 1869 disendowing and disestablishing the Irish branch of the Established Church, the archbishop of Dublin was invariably named a lord justice; but in future the archbishop may or may not have a seat at the Council Board.

Dublin is the seat of the Irish courts of law and equity, from which appeal lies only to the House of Lords. The judicial functions are exercised by the lord chancellor, a lord justice of appeal, a vice-chancellor, the master of the rolls, and four judges in each of the courts of Queen's bench, common pleas, and exchequer. There are also judges (1) in the court of admiralty, (2) in the bankruptcy court, and (3) in the landed estates court for the sale and transfer of estates in Ireland. The recorder's court determines civil bills and city criminal cases.

Local Government.—The municipality is under the government of the lord mayor and corporation. Previous to the Municipal Reform Act of 1840 the corporation consisted of the lord mayor, 2 sheriffs, 24 aldermen, 124 common councilmen, 28 sheriffmen, and 96 representatives of the 25 civic guilds. At present the corporation consists of 15 aldermen and 45 councillors, there being one alderman and 3 councillors for each of the 15 wards into which the city is divided. An alderman or councillor is annually elected lord mayor. The income of the body arises from rents on property, customs, and taxes. The yield in 1875 was £286,804, the expenditure £255,944, and the debt £337,476. Under an Act passed in 1875 the corporation have the right to forward every year three names of persons suitable for the office of high sheriff to the viceroy, one of which shall be selected by him. The lord mayor holds a weekly court for debts above 40s. and under £10, and for the settlement of cases between masters and servants. He is also clerk of the markets, and supervises weights and measures and deals with cases of adulteration. A court of conscience determines debts under 40s. and is presided over by the last ex-mayor. A competent fire-brigade is maintained by the corporation. The average number of fires per annum is between 50 and 60; 15 lives have been lost in ten years; and property to the value of £485,800 saved in the same period. The city coroner is a corporate officer. There were 292 inquests in 1875. Under an Act applicable only to Dublin the local rates are collected by a collector-general, and are distributed by him to the different authorities concerned.

Police.—The Dublin metropolitan police is a force peculiar to the city. The remainder of Ireland is protected civilly by the Royal

Irish Constabulary. The police are under the control of two commissioners, and consist of 7 superintendents, 76 inspectors, 641 sergeants, and 840 constables. A local police rate of 8d. in the £1 produces about £30,000 a year: and the taxes on hackney cars, drivers' licences, pawnbrokers' licences, and publicans' certificates, and fines in the police courts, average about £16,000. These two sums (£46,000), together with a Treasury grant averaging £95,000 a year, maintain the force, and pay the commissioners and superior officers and the four police magistrates. The police are inspectors of the hackney carriages, which number nearly 2000. They carry out the laws affecting the sale of liquor, and the number of public houses in Dublin is 1012. A fair notion of the crime and offences committed in the city is afforded by the following statistics taken from official sources:—Number of persons arrested (1876), 42,439; number convicted either summarily or after trial before a superior judge, 39,580; of those convicted 13,346 (8627 males and 4719 females) were charged with drunkenness; 88 persons were sentenced to penal servitude (68 for five years); and 400 were sent to jail. Quarter sessions are held in the city by the recorder; and a commission of oyer and terminer is held twice a year by two of the superior judges.

Military.—A large military force is usually maintained in the city of Dublin which is the headquarters of the military district of Dublin and of the staff of Ireland, consisting of the commander of the forces, adjutant-general, and quartermaster-general. The troops are accommodated in several barracks, the most extensive of which is the Royal Barracks, consisting of five squares, affording quarters for 10 field officers, 83 officers, 2000 non-commissioned officers and privates, and 460 horses, together with a hospital for 260 patients. Richmond Barracks, for infantry, occupies an elevated healthy situation, on the banks of the Grand Canal, beyond Kilmainham, forming a substantial fabric, with extensive courts and yards, covering altogether an area of 18 acres, and furnishing accommodation for 76 officers and 1600 non-commissioned officers and privates, stabling for 25 horses, and a hospital for 100 patients. Portobello barracks, for cavalry and artillery, is on the bank of the same canal, near Harold's Cross, and can accommodate 30 officers and 520 men; it has stabling for 540 horses, and a large hospital. At Island Bridge, near Kilmainham, there is an extensive artillery barrack, and there is another for artillery at the Pigeon House Fort in the bay. Besides these, there are barracks for infantry in Great Ship Street, near the castle; at Aldborough House, a fine massive building erected in 1765 at a cost of £45,000; and at Beggar's Bush, on the South Circular Road. In the Phœnix Park is Mackenzie's Fort and magazine. The magazine is surrounded by a dry ditch, and is entered by a drawbridge. It is defended by a dozen 24-pounders.

Poor Law.—There are two poor law unions in the city—North and South, governed by two boards of guardians. The average daily number of paupers in both is 4832, and the annual expenditure of both £75,250.

Religion.—The following table shows the population of the different parishes in 1841, 1851, 1861, and 1871, and the number of Roman Catholics and Protestants of the Episcopal church in each parish (when part is mentioned, the rest of the parish is in Dublin county).—

Parishes.	Population in 1841.	Population in 1851.	Population in 1861.	Population in 1871.	Religious Profession in 1871.	
					Roman Catholics.	Episcopalian Protestants.
Christ Church (Liberties of)	15	50	28	10	1	9
Grangegorman, part of	4,857	4,330	5,312	5,677	4,412	[illegible]
St Andrew's	7,634	7,625	6,916	[illegible]	[illegible]	1,129
St Anne's	6,569	[illegible]	6,265	7,074	4,016	[illegible]
St Audoen's	3,966	[illegible]	[illegible]	3,950	3,617	[illegible]
St Bridget's	10,629	10,784	10,919	9,311	[illegible]	1,[illegible]
St Catherine's, part of	19,871	20,539	[illegible]	17,198	[illegible]	[illegible]
St George's, part of	15,048	[illegible]	[illegible]	19,421	[illegible]	[illegible]
St James's, part of	10,661	8,364	[illegible]	[illegible]	[illegible]	[illegible]
St John's	[illegible]	3,463	[illegible]	2,715	2,279	[illegible]
St Luke's	[illegible]	4,419	[illegible]	[illegible]	[illegible]	[illegible]
St Mark's, part of	[illegible]	[illegible]	[illegible]	[illegible]	16,120	[illegible]
St Mary's	23,904	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
St Michael's	1,271	1,317	[illegible]	[illegible]	[illegible]	[illegible]
St Michan's	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
St Nicholas Within	1,691	[illegible]	[illegible]	1,670	1,499	156
St Nicholas Without, part of	11,955	12,238	[illegible]	10,218	[illegible]	[illegible]
St Patrick's (Liberties of)	2,041	1,977	1,967	1,718	[illegible]	[illegible]
St Paul's	[illegible]	[illegible]	[illegible]	9,764	[illegible]	[illegible]
St Peter's, part of	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
St Thomas's	[illegible]	27,637	[illegible]	[illegible]	[illegible]	[illegible]
St Werburgh's	2,969	2,928	3,174	2,501	[illegible]	531
Total	232,726	217,111	254,808	246,326	196,180	39,897

Besides the above mentioned religious denominations there were 4517 Presbyterians, 1828 Methodists, 159 Jews, and 4904 of "all other persuasions." The proportion of Catholics to the total population was equal to 79 per cent.

Education.—The means of education in Dublin are ample. The incessant contests between the various religious denominations have had the effect of imparting energy to all engaged in teaching.

Trinity College, founded by Queen Elizabeth, is the greatest foundation in the country. The corporation now consists of a provost, 7 senior fellows, 26 junior fellows, and 70 scholars. Two studentships, one mathematical and one classical, have been recently added to the honour list. The successful competitor is entitled to £100 a year for seven years; there are no duties to be fulfilled and no residence is required. A vacancy among the fellows is filled up by the provost and a select number of the fellows, after a very severe examination for ten days in metaphysics, mathematics, natural philosophy, ethics, history, chronology, Latin, Greek, and Hebrew. Fellowships are held for life. Until the year 1840 the fellows were bound to celibacy, but that restriction was then removed. The scholars are chosen from among the undergraduates, after an examination in mathematics or Greek and Latin. The pecuniary advantages attaching to scholarship lasts for four years. Students, after an examination, are admitted as fellow-commoners, pensioners, or sizars; the last class is limited to thirty, and is partially maintained out of the College funds. Noblemen, noblemen's sons, and baronets have the privilege of forming a separate order with peculiar advantages, on the payment of additional charges. The course of general instruction extends over four years, the principal studies of each year being successively mathematics, logic, natural philosophy and astronomy, classics, and ethics; and four commencements are held every year for the purpose of conferring degrees. A medical school is attached to the university, and also a school of civil engineering; and diplomas in surgery and civil engineering are granted by the board on the completion of the prescribed courses. The library, which is one of the four scheduled in the Copyright Act, consists of about 190,000 printed volumes and 1500 manuscripts; and the number is increased annually by about 2000 volumes, partly purchased and partly obtained free under the Act. There are also a botanic garden and a museum. The funds of the College, arising from lands and the fees of the students, are managed solely by the provost and seven senior fellows, who form a board, to which and to the Academic Council the whole government of the university, both in its executive and its legislative branches, is committed. The buildings, which include a large extent of ground, now nearly in the middle of the city, consist of one very large and two smaller squares. In these are the chapel, the hall for examinations, the museum, the library, the dining hall, the printing office, and chambers for the fellows and students. Attached to the buildings is a large park for the recreation of the students, and a smaller enclosure for the provost and fellows. The provost's residence and the medical school are apart from the main body of the buildings. The college observatory is at Dunsink, about five miles north-west of Dublin; it is amply furnished with astronomical instruments. It was endowed by Dr Francis Andrews, provost of Trinity College, was erected in 1785, and in 1791 was placed by statute under the management of the Royal Astronomer of Ireland, an appointment first filled by Dr Henry Ussher, and subsequently by Dr Brinkley, bishop of Cloyne. The Magnetical Observatory of Dublin was erected in the years 1837–8, in the gardens attached to Trinity College, and at the expense of the university. A series of observations was begun in 1838, and has been continued ever since. The annual income of ity College is set down as about £65,000 a year. The age number of students on the books is about 1300. an Act passed in 1873, known as Fawcett's Act, all were abolished, and the prizes and honours of all es hitherto reserved for Protestants of the Established rch were thrown open to all. Examinations for women now held under the direction of the College.

ie Queen's University, founded in 1850, has quarters Dublin Castle; but the three colleges are in Cork, ist, and Galway. Dublin has no share in the advan- of the university, which are considerable.

ie Roman Catholic University derives its entire support voluntary contributions. There is an annual collection certain Sunday in November, and this realizes about 00. The management is in the hands of the Catholic ops. The medical school in connection with the uni- ty has attained great repute in Ireland.

ie Royal College of Science, controlled by the Science Art Department, is conducted by ten professors. The ber of students is seldom greater than 30, amongst n four royal scholarships and nine royal exhibitions e £50 for two and three years respectively) are divided. Parliamentary grant is £6903 per annum. The Royal in Society and the Royal Irish Academy are devoted ience and art. The one receives £7500 a year, and the £2480. The Royal Hibernian Academy has £300, the National Gallery £2340 a year. The Zoological ty, having its gardens in the Phœnix Park, has £500 r.

ools.—In 1871 there were in the city 336 schools—257 primary 9 superior. In attendance at the primary were 19,782 Roman lics, 4602 Episcopalians, and 842 Presbyterians and others; endance at the superior are 1491 Roman Catholics, 2334 stants, and 566 Presbyterians and others. This gives a general of 29,617

education of all classes in Dublin is shown in the following s:—in 1871, 150,581 of seven years and upwards could read write, 24,224 could read but could not write, and 35,633 illiterate.

rities.—Dublin can boast a goodly number of charities. There 13 charitable institutions, some for the deaf and dumb, the the destitute, the distressed, the unemployed; some for the tion of the reduced, and for the sons and daughters of clergy- and some for orphans, for idiots, for convalescent patients. Drummond Institution, for the orphan daughters of soldiers, established in 1864 by a Scotch gentleman named Drum- who left £20,000 to found the asylum. The Hospital and School of King Charles I., commonly called the Blue Coat l, was founded 1670. The school buildings are very handsome, cost £21,000. The annual income is £4000 a year. The tion afforded to 120 boys is of a very superior character. Be- he Irish Parliament Houses were erected the parliament met e school building. Molyneux Asylum for the blind, a lid building near the city boundary, affords refuge and ction to 70 females. There are 30 hospitals, of which the are—The Westmoreland Lock, parliamentary grant £2600; ns, parliamentary grant £1300, donations, &c., £4177; the , parliamentary grant £600, city grant £750, donations ; Cork Street Fever, parliamentary grant £2500, donations ; House of Industry Hospitals (3), parliamentary grant £7472, ions £693; Rotundo Lying-in, parliamentary grant, £700, 300, donations £2342; Coombe Lying-in, parliamentary grant city £260, donations £2167; Incurables, parliamentary grant city £150, donations £6000; St Mark's Eye and Ear, parlia- ry grant £100, city £100, donations £735. These 11 hospitals 75 admitted 9645 patients, and received from Parliament 22, from the city authorities £1560, from subscriptions £19,353. income of all £36,635. Of the houses supported by voluntary butions the Adelaide (Protestant), the Mater Misericordiæ, St nt's, and the City of Dublin hospitals are the most important. ics are maintained in St Patrick's Hospital, founded in 1745, nt to the will of Dean Swift, and conducted by governors ted under the charter of incorporation. The Richmond ic Asylum, erected near the House of Industry, and placed the care of officers appointed by Government, receives ts from a district consisting of the counties of Dublin, Louth, , and Wicklow, each of these contributing towards its es in proportion to the number of patients sent in. Besides public establishments for the recovery and safe custody of s, there are in the vicinity of Dublin various private asylums. The principal institution for the blind is Simpson's Hospital, founded by a merchant of Dublin. The income is upwards of £2500 per annum, by which fifty patients are maintained in a large plain edifice situate in Great Britain Street. The apartment can accommodate a hundred inmates. The Richmond National Institution in Sackville Street was founded in order to instruct the blind in some of the more useful handicraft occupations. The principal branches taught are weaving, netting, and basket-making. An institution for the maintenance and education of children born deaf and dumb is maintained at Claremont, near Glasnevin. The plan of the Royal Hospital, for decayed and maimed soldiers, was first suggested by the earl of Essex, when lord lieutenant, and carried into effect through the repeated applications of the duke of Ormond to Charles II. The site chosen for it was that of the ancient priory of Kilmainham, founded by Strongbow for Knights Templars. The building, completed in 1684, according to a plan of Sir Christopher Wren, is an oblong 306 feet by 288, three sides of which are dwelling-rooms, connected by covered corridors. The fourth contains the chapel, the dining hall, and the apartments of the master, who is always the commander of the forces for the time being. The Roman Catholic Church has charge of a number of special charities, some of them educational and some of them for the relief of suffering.

Libraries, &c.—The principal library in Dublin, for the number and value of its books, is that of Trinity College. It is open of right only to graduates of that university, but admission is obtainable by others by special favour. It contains about 190,000 printed volumes, and 1500 manuscripts. The King's Inns Library is next in value. The right of reading in it is confined to the members of the King's Inns Society,—that is, to barristers, attorneys, and law students. Marsh's Library, attached to St Patrick's Cathedral by the munificent bequest of Primate Marsh, archbishop of Armagh, and incorporated in 1707, contains a good collection of theological works, and is open to the public; but, from the very small portion of its funds appropriated to purchase, it is very deficient in modern publications. It possesses some valuable manuscripts. The want of a library easily accessible, and provided with the works most in request, was attempted to be supplied by a society formed in 1791 (the Dublin Library Society), which collected a large number of books in a handsome and well-arranged building in D'Olier Street. Attached to the library is a fine reading-room, well supplied with newspapers. The Library of the Royal Dublin Society contains upwards of 12,000 volumes. It is particularly rich in works on botany, and in those relating to Ireland. It has likewise a gallery of statuary, in which are casts from the Elgin marbles. The library, museum, and gallery are open to the public,—in happy contravention of the rules, which have been strained in the laudable direction of popularizing self-instruction. The Royal Irish Academy's Library is valuable of its kind. It contains many ancient manuscripts, and works dealing with science and antiquities.

Public Buildings.—Dublin has several noble edifices. The first and greatest is the Bank of Ireland, formerly the House of Parliament, which occupies five acres. There are three fronts. The principal, towards College Green, a colonnade of the Ionic order, formed of a façade and two projecting wings, is much admired for the noble simplicity of its elevation. The western front, a portico of four Ionic columns, is connected with the other by a colonnade of the same order, forming the quadrant of a circle. The eastern front, which was the entrance of the House of Lords, was, by their special wish, a colonnade of the Corinthian order, which the architect found great difficulty in uniting with the other parts. The apartment for the lords, a fine room, is hung with tapestry. That of the commons, having been burned in 1792, was reconstructed after a more elegant design, in the form of a circle surrounded by pillars, between which was a gallery for hearers. This fine hall was taken down by the bank directors, and converted into a square room, now the cash-office. The House of Lords remains in its original condition, and is but seldom used.

Trinity College is in itself a source of legitimate pride to the city. The front is plain and massive. The inner courts are large and well proportioned. On the left is the examination hall, containing full length portraits of the queen founder, of Molyneux, of Edmund Burke, Bishop Berkeley, and other celebrities. On the right stand the chapel and the dining hall, side by side, the former having a very handsome interior, and the latter having portraits of

Grattan, Flood, Yelverton, Lord Ross, Lord Kilwarden, and other famous Irishmen. In the centre of the court stands a beautiful campanile. The library contains a gallery 210 feet in length, 41 in breadth, and 40 in height. There are also new buildings in the inner court, in character with the general splendour of the place. The provost's house close by is one of the finest in the city.

Dublin Castle presents a rather motley appearance. The greater portion of it is dingy, being built of brick; but the chapel and tower are very handsome. The castle stands on ten acres, but the apartments are small, with the exception of St Patrick's Hall, which is used on the occasion of investing knights of the order of St Patrick.

The custom-house is considered one of the chief ornaments of the city. It was erected at a cost of about £400,000, and opened in 1791. It stands on the north side of the river below Carlisle Bridge, and presents four fronts, three of which may be seen to advantage. The south front, facing the river, 375 feet in length, is built of Portland stone, finished in the Doric order, with an entablature and bold projecting cornice. The other three fronts are composed of granite, and from the centre rises a dome to the height of 125 feet, surmounted by a figure of Hope.

The Four Courts, in which the superior courts are held, stands on the site of the ancient Dominican monastery of St Saviour, on King's Inn Quay. It is an extensive and imposing structure, erected between the years 1786 and 1800, at a cost of £200,000.

The city hall, formerly the royal exchange, is a handsome building. It is in possession of the corporation, and is used for municipal purposes. The centre hall contains statues of George III., of Grattan by Chantrey (a superb work), of O'Connell by Hogan, of Lucas, and of Drummond.

The post-office stands in Sackville Street. It is built of granite, and is about 120 feet high, 225 in length, and 150 in depth. The centre of the front consists of a boldly projecting portico of six fluted Ionic columns, supporting an entablature and cornice; on the apex is a figure of Hibernia, and Mercury and Fidelity at the sides. The first stone was laid in 1815, and the cost of the pile was £50,000.

Churches.—St Patrick's Cathedral, a noble edifice, was restored by the late Sir Benjamin L. Guinness, Bart., at a cost of £130,000; Christ Church Cathedral is now in course of restoration by Mr Henry Roe, and the estimated cost is much over £100,000; Mr Roe has also presented a synod house to the Church of Ireland at a cost of £27,000; the late Mr Findlater gave the Presbyterian body a beautiful church which he erected at a cost of £16,000; the Roman Catholics have raised about 16 magnificent edifices in the last twenty years; most of the Protestant parish churches have been either rebuilt or restored; the Unitarians have two houses, one of them of noble aspect; and the Methodists, the Moravians, the Friends, the Baptists, and the Jews have all provided themselves with suitable places of worship. There are no less than 93 churches of all denominations and a synagogue in Dublin, and at least 70 of these are beautiful modern buildings.

The two cathedral churches of St Patrick and Christ Church are superior to all other edifices in character and interest. The foundation of Christ Church, the older building of the two, is attributed to the Danes in 1038; but it owes its elevation to a deanery and chapter from 1541. The entire length of the nave and choir is 260 feet, that of the transept 110 feet, and the extreme breadth of either 80 feet. Christ Church does not contain many monuments. Among the most interesting is that of Strongbow, the invader of Ireland, whose tomb was long the place at which the tenants of the church lands were accustomed to pay their rents. The monument was injured by the fall of one of the cathedral walls; but it was afterwards repaired, and is still to be seen in good preservation, with a smaller tomb by its side, supposed to be that of Strongbow's son, who was killed by his father. Synods were occasionally held in this church, and parliaments also, before the Commons' Hall was destroyed in 1566 by the accidental explosion of 144 barrels of gunpowder in a neighbouring street. Here also the impostor Lambert Simnel was crowned.

The cathedral of St Patrick was founded in 1190 by John Comyn, archbishop of Dublin. It was burnt about a hundred years after its first erection, but was again raised from its ruins in increased splendour. At the Reformation it was dissolved, and the building was used for some of the purposes of the courts of justice. Edward VI. contemplated its change into a university, but the project was defeated and a university established elsewhere. In the succeeding reign of Mary, St Patrick's Cathedral was restored to its primary destination. The installations of the knights of St Patrick, the first of which took place in 1783, were originally held here. This cathedral contains the monuments of several illustrious persons, among which the most celebrated are those of Dean Swift; of Mrs Hester Johnson, immortalized under the name of "Stella:" of Archbishop Marsh; of the first earl of Cork; and of Duke Schomberg, who fell at the battle of the Boyne. The tablet over Schomberg's grave contains what Lord Macaulay calls a "furious libel." In the cathedral may be seen the chain ball which killed St Ruth at the battle of Aughrim, and the spurs which he wore when shot. A fine statue of Sir Benjamin Lee Guinness, Bart., the restorer of the cathedral, stands in the aisle.

The Roman Catholic churches are for the most part old and in poor localities. The new churches are, however, of greater proportions and of considerable beauty. The principal is the church of the Augustinians in Thomas Street. This is perhaps the loftiest building in the city. The pro-cathedral in Marlborough Street is a building of great dimensions, highly ornamented internally in the Grecian style, and having a fine Doric portico forming the principal front. The building was commenced in 1816, at an estimated cost of £52,000. St Paul's, on Arran Quay, is an elegant building in the Ionic style. The church of St Francis Xavier was erected at a cost of £18,000, from a Roman Ionic design.

Places of Amusement, &c.—Dublin has a winter palace, on the plan of the London Crystal Palace. The scheme advancing public entertainment failed, and Sir Arthur Guinness, Bart., purchased it from the shareholders for £13,000. It is used now for various purposes. There are three theatres—the Royal (second in size only to Drury Lane and Covent Garden), the Gaiety, and the Queen's Theatre. There are two or three musical societies, which are supported by the middle classes; but very little music of a superior character is afforded to the citizens at large.

The Phœnix Park, just touching the north-west boundary, is seven miles in circumference, and includes an area of 1759 acres. The park is in itself beautiful, and the nearness of the Dublin and Wicklow mountains adds greatly to its attractions. The Viceregal Lodge and the Chief Secretary's Lodge are the only buildings inside the gates. They have little pretension beyond their size.

Monuments.—There are nine of Foley's best statues in Dublin—the Prince Consort, Grattan, Burke, Goldsmith, Guinness, Stokes, Corrigan, and Lord Carlisle; and that to O'Connell may be added. Three of the Georges have memorials; Wellington's monument stands in the Phœnix Park, an obelisk 200 feet high, bearing on the sides the names of his victories, and scenes in relief from the greater battles on the pedestal. There are statues to King William,

O'Brien, to Lord Eglinton, to William Dargan,
(already noticed), and to Thomas Moore.
rce.—Dublin has little of the bustle which should
arge a city, and as a matter of fact Belfast is said
t a greater general trade. There is, too, a spirit
pride which seeks to disown trade; and the
to be poor and genteel in the civil service, at the
e. constabulary, in the army, in professional life,
an prosperous in business, is one of the most
ite and strongly marked characteristics of Dublin
That this is attributable to the lingering yet
fluence of an unhappy past is held by some; while
tribute the weakness to the viceregal office and
ts of a sham court. About the time of the
n, the woollen trade flourished in Dublin, and
uce attained a great celebrity. The cheapness
r attracted capitalists, who started extensive
in that quarter of the town known even now as
rties. This quarter was inhabited altogether by
in wool, and, as the city was small, the aristocracy
e by in noble mansions which are now miserable
s of past prosperity. About 1700 the English
e prevailed on William III. to assent to laws which
crushed the Irish trade. All exportation except
nd was peremptorily forbidden, and the woollen
ure soon decayed. But even 100 years ago there
0 persons at work in the looms of the Liberties,
w there are not a score. About 1715 Parliament
the manufacture of linen, and the Linen Hall,
empty wreck, was built. The cotton trade was
r introduced; and silk manufacture was begun by
uenots, who had settled in Dublin in considerable
after the revocation of the Edict of Nantes. Acts
le to these enterprises were passed, and they
d apace. But the old jealousy arose in the reign
e I., and in the reign of George III. an Act was
hich tended directly to the ruin of the manufac-
he linen trade shared the same fate. Commerce
reased during the past few generations; but
produces nothing for exportation save whisky
er. The whisky trade has been greatly extended.
2 distillers and 45 rectifiers in Ireland, the prin-
in Dublin; the three houses of Jameson and Roe
er may be specially mentioned. In 1874, when
was at 10s. per gallon, £322,950 was received by
ome. The porter trade is also very large. The
in 1875 were 361,465 hogsheads.
locks in the river have been improved consider-
thin the last quarter of a century. The river
n deepened, wharves have been built, new docks
en constructed; and a basin now almost com-
at a cost of £276,000, will add greatly to the
dation. The two great lines of railway, the
and the Great Southern, have extended their ways
ver's edge, so that traffic is much easier and swifter
the provinces and the boats for England than in
times. In 1875, 544 British and foreign vessels
and 213 cleared the port of Dublin; while 6850
ngaged in the coasting trade entered. The customs
eived in the same year amounted to £1,030,000;
ve remained almost stationary for ten years.
total value of all exported articles from Dublin
was £44,157; while the exports from Belfast
ued at £253,340. The exports of grain from the
d not be set down, inasmuch as they are intended
r parts of Ireland, and are sent by water. In the
g returns for 1868 and 1875, a very remarkable
in the exports of provisions will be observed,
e exportation of live stock has remained pretty
y:—

	1868.	1875.
Butter, firkins	245,419	25,481
Bacon, bales, and boxes	2,893	1.016
Hams, hogsheads, &c.	976	175
Beef, do.	2,174	1.540
Pork, barrels	4,265	914
Lard, do.	9,542	1,940
Cattle	191,981	192,055
Sheep	166,307	313,000
Calves	1,606	1,665
Pigs	210,263	138,046

The exports in wool and in horses have declined in recent years.

History.—The early history of Dublin is, like the early history of Ireland generally, made up chiefly of legends. It is recorded that the inhabitants of Leinster were defeated by the people of Dublin in the year 291; but what so bare a fact can signify is not easy to discover. Christianity was introduced by St Patrick, about 450. We may pass on to the 9th century, when we find the Danes attacking Dublin and taking it. When Tor-Magnus, the Danish king, was slain by Malachy the king of Ireland, the Danes were swept out of Dublin by the Irish from Meath. Then the Danes regained their power, and the contests were incessant until, in 1014, Brian Boroihme, king of Munster, attacked the enemy and fought the battle of Clontarf, in which he and his son and 11,000 of his followers fell. The Irish, however, won the battle, but the Danes re-occupied the city and held footing in Ireland until 1170. Then came the Anglo-Normans. In 1172 Henry II. landed at Waterford, and came to Dublin and held his court there in a pavilion of wicker-work made "after the country manner," where the Irish chiefs were entertained with great pomp, and alliances entered into with them,—"the plenty of the English table and the goodly courtesy of the attendants" having done much to reconcile them to their new allies. Previous to his departure for England, Henry bestowed the government on Hugh de Lacy, having granted by charter "to his subjects of Bristol his city of Dublin to inhabit, and to hold of him and his heirs for ever, with all the liberties and free customs which his subjects of Bristol then enjoyed at Bristol and through all England." In 1177 Strongbow, earl of Pembroke, and the chief leader of the Anglo-Norman forces, died in Dublin of a mortification in one of his feet, and was buried in Christ Church Cathedral, where his monument still remains well preserved. A fresh charter was granted in 1207 by King John to the inhabitants of Dublin, who had not yet made their peace with the neighbourhood, but, like the settlers in other towns, were at constant feud with the native Irish; so that two years after the date of this charter, whilst the citizens of Dublin were celebrating Easter at Cullenswood, they were set upon by the Irish of the neighbouring mountains, and 500 of them killed. The scene of slaughter is still called the Bloody Fields, and Easter Monday denominated Black Monday. On each succeeding anniversary of that day, with the desire unfortunately so prevalent of perpetuating a feud, the citizens marched out to Cullenswood with banners displayed—"a terror to the native Irish." In 1216 Magna Charta, a copy of which is to be found in the Red Book of the Exchequer, was granted to the Irish by Henry III. In 1217 the fee farm of the city was granted to the citizens at a rent of 200 marks per annum; and about this period many monastic buildings were founded. In 1227 the same monarch confirmed the charter of John fixing the city boundaries and the jurisdiction of its magistrates.

During the invasion of Ireland by Edward Bruce, who landed at Carrickfergus with 6000 men, in the commencement of the reign of Edward II., some of the suburbs were burnt to prevent them from falling into his hand. The inroad of Bruce had been countenanced by the native Irish ecclesiastics, whose sentiments were recorded in a statement addressed to Pope John XXII. Some notion of the defence made against Bruce's invasion may be gained from the fact that the churches were torn down to supply stones for the building of the city walls. Bruce had seized Greencastle on his march; but the natives re-took the town, and brought to Dublin the governor who had yielded to Bruce. He was starved to death.

Richard II. erected Dublin into a marquisate in favour of Robert de Vere, whom he also created duke of Ireland. The same monarch entered Dublin in 1394 with 30,000 bowmen and 4000 cavalry, bringing with him the crown jewels; but after holding a parliament and making much courtly display before the native chieftains, on several of whom he conferred knighthood, he returned to England. Five years later, enriched with the spoils of his uncle, John of Gaunt, Richard returned to Ireland, landing at Waterford, whence he marched through the counties of Kilkenny and Wicklow, and subsequently arrived in Dublin, where he remained a fortnight, sumptuously entertained by the provost, as the chief magistrate of the city was then called, till intelligence of the invasion of his kingdom by Bolingbroke recalled him to England.

In 1534 Lord Thomas Fitzgerald, better known as Silken Thomas (so called because of a fantastic fringe worn in the helmet of his followers), a young man of rash courage and good abilities, son of the Lord Deputy Kildare, believing his father, who was imprisoned in the Tower of London, to have been beheaded, organized a rebellion against the English Government, and marched with his followers from the mansion of the earls of Kildare in Thomas Court, through Dame's Gate to St Mary's Abbey, where, in the council chamber, he proclaimed himself a rebel. On his appearing before the wall with a powerful force, the citizens were induced through fear to give admission to a detachment of his troops to besiege the castle; but, on hearing that he had met with a reverse in another quarter, they suddenly closed their gates and detained his men as prisoners. He then attacked the city itself; but, finding it too strong to be seized by a *coup de main*, he raised the siege on condition of having his captured soldiers exchanged for the children of some of the principal citizens who had fallen into his hands. After much vicissitude of fortune, Lord Thomas and others concerned in this rebellion were executed at Tyburn in 1536.

At the breaking out of the civil war in 1641, a conspiracy of the Irish septs, under the direction of Roger Moore, to seize Dublin Castle, was disclosed by one Owen Connolly on the eve of the day on which the attempt was to have been made, and the city was thus preserved for the king's party; but the Irish without commenced an indiscriminate extermination of the Protestant population. In 1646 Dublin was besieged, but without success, by the Irish army of 16,000 foot and 1600 horse, under the guidance of the Pope's nuncio Rinuccini and others, banded together "to restore and establish in Ireland the exercise of the Roman Catholic religion." The city had been put in an efficient state of defence by the marquis of Ormond, then lord-lieutenant; but in the following year, to prevent it falling into the hands of the Irish, he surrendered it on conditions to Colonel Jones, commander of the Parliamentary forces. In 1649 Ormond was totally defeated at the battle of Baggotrath, near Old Rathmines, in an attempt to recover possession. The same year Cromwell landed in Dublin, as commander-in-chief under the Parliament, with 9000 foot and 4000 horse, and proceeded thence on his career of conquest.

When James II. landed in Ireland in 1689, to assert his right to the British throne, he held a parliament in Dublin, which passed acts of attainder against upwards of 3000 Protestants. The governor of the city, Colonel Luttrell, at the same time issued a proclamation ordering all Protestants not housekeepers, excepting those following some trade, to depart from the city within 24 hours, under pain of death or imprisonment, and restricting those who were allowed to remain in various ways. In the hope of relieving his financial difficulties, the king erected a mint, where money was coined of the "worst kind of old brass, guns, and the refuse of metals, melted down together," of the nominal value of £1,556,800, with which his troops were paid, and tradesmen were compelled to receive it under penalty of being hanged in case of refusal. Under these regulations the entire coinage was put into circulation. After his defeat at the battle of the Boyne, James returned to Dublin, but left it again before daybreak the next day; and William III. advancing by slow marches, on his arrival encamped at Finglas, with upwards of 30,000 men, and the following day proceeded in state to St Patrick's Cathedral to return thanks for his victory.

In 1783 a convention of delegates from all the volunteer corps in Ireland assembled in Dublin for the purpose of procuring a reform in parliament; but the House of Commons refused to entertain the proposition, and the convention separated without coming to any practical result. In May 1798 the breaking out of a conspiracy planned by the United Irishmen to seize the city was prevented by the capture of Lord Edward Fitzgerald, son of the duke of Leinster and husband of the celebrated "Pamela." Lord Edward died in prison of the wounds received in the encounter which preceded his capture.

In 1800 the Act of Union between Great Britain and Ireland was passed in both parliaments, and on the 1st January following the imperial standard of the United Kingdom was hoisted on Dublin Castle.

In 1803 an insurrection, headed by Robert Emmett, a young barrister of much promise, broke out, but was immediately quelled, with the loss of some lives in the tumult, and the death of its leaders on the scaffold. In 1848 William Smith O'Brien, M.P. for Limerick, raised a rebellion in Tipperary, and the lower classes in Dublin were greatly agitated. Owing, however, to timely and judicious disposition of the military and police forces the city was saved from much bloodshed. In 1867 the most extended modern conspiracy, that known as the Fenian organization, came to light. The reality of it was proved by a ship being found [illegible] gunpowder in the Liverpool docks, and another with [illegible] pike heads in Dublin. The Habeas Corpus Act was suspended at one sitting by both Houses of Parliament and about [illegible] arrests were made in Dublin in a few hours. Dublin castle was fortified, and the citizens lived in a state of terror for several weeks together.

Thom's *Irish Almanac*; Lewis's *Topographical Dictionary*; D'Alton's *History of the Co. Dublin*; Gilbert's *History of the City of Dublin*, 3 vols. 1854-59; *History of the City of Dublin*, by Rev. J. Whitelaw and Rev. R. Walsh, 2 vols. 4to. Lond. 1818. (E. T. L.)

DUBNO, a town in European Russia, at the head of a department in the government of Volhynia, 154 miles west of Zhitomir, in 50° 25′ N. lat. and 25° 44′ E. long. Occupying a peninsula formed by the River Ivka, it is almost surrounded by water and marsh; and in its eastern corner it is defended by a somewhat dilapidated citadel separated by dry ditches from the rest of the town. It also possesses five Greek churches, of which two—the Transfiguration and the Exaltation of the Holy Rood—were formerly monasteries; it has also a Roman Catholic church and convent, a Jewish synagogue, a hospital for poor Jews, and various other Jewish institutions. Beer, mead, tobacco, bricks, and leather are all manufactured in the town; but a large number of the inhabitants, who are mainly of Jewish blood, obtain their living in other places.

Dubno is first mentioned in the chronicles under the name of Dubno in 1100, when it formed one of the towns offered to David of Vladimir in compensation for the loss of his principality. In 1498 it received a charter from the grand duke of Lithuania, which was afterwards changed about 1507 for the Magdeburg rights. The Tatars, against whose attacks it had been fortified in the beginning of the century, laid waste the neighbourhood in 1577, but were gallantly repulsed from the town by Yanush of Ostrog. In 1793 it passed into the possession of the Liubomir family, to whom the most of the ground-rent is still due; in 1795 it was incorporated with Russia, and in 1796 it received its present rank. Population, 7660.

DUBOFKA, a burgh in European Russia, in the government of Saratoff, about 32½ miles to the N.N.W. of Tsaritzin, on the right bank of the Volga, near its reception of the river Dubofka, and on the post-road to Astrakhan. With the exception of about 200, all its houses are built of wood; but among its public buildings it numbers four Greek churches, a prison, a large public school, and a hospital capable of containing several hundred patients. Besides leather, tallow, soap, and tobacco, its inhabitants manufacture mustard on a large scale, obtaining the seed partly from their own fields and partly from other districts. They had formerly a very extensive share in the transport trade between the Volga and the Don, which was largely carried on by means of oxen, and supported a number of auxiliary crafts; but the opening of the railway about 1860 struck a sudden and fatal blow at the whole traffic. A great fair, lasting for a whole month, is held in the town every year, and produces a circulation of about 1,000,000 rubles, or upwards of £141,000. Dubofka, already in existence at an earlier date, was colonized by Cossacks in 1743, and became their chief settlement on the Volga, the residence of their ataman, and the seat of their military chancery. In 1770 it was fortified with wooden ramparts by Falk. Having given its support to the insurrection of Pugacheff, it was punished by the removal of 517 of its inhabitants to the Caucasus, where they formed a separate *polk*, or regiment. Their place was supplied by immigrants from the neighbouring governments and the country of the Little Russians, who were soon led by the advantages of their position to devote themselves exclusively to trade. Population in 1873, 12,737.

DUBOIS, Guillaume (1656–1723), cardinal, archbishop of Cambray, and first minister of France, was born at Brives-la-Gaillarde, in Limousin, September 6, 1656. He was the son of an apothecary, and at twelve years of age was sent to Paris to study in the college of St Michel, where he at the same time served in the household of the principal. He then engaged himself as a private tutor, and at length was appointed preceptor to the young duke of Chartres, afterwards the regent duke of Orleans. Astute, ambitious, and unrestrained by conscience, Dubois ingratiated himself with his pupil, and, while he gave him formal school lessons, at the same time pandered to his evil passions, and encouraged him in their indulgence. He gained the favour of Louis XIV. by bringing about the marriage of his pupil with Mademoiselle de Blois, a natural but legitimated daughter of the king; and for this service he was rewarded with the gift of the abbey of St Just in Picardy. He was present with his pupil at the battle of Steinkirk, and "faced fire," says Marshal Luxembourg, "like a grenadier." Sent to join the French embassy in London, he made himself so active that by the request of the ambassador he was recalled. When the duke of Orleans became regent (1715), Dubois, who had for some years acted as his secretary, was made councillor of state, and the chief power passed gradually into his hands. His ambition grew with what it fed on. To counteract the intrigues of Cardinal Alberoni, first minister of Spain, he suggested an alliance with England, and succeeded in negotiating the Triple Alliance (1717). He was now made minister of foreign affairs. But he coveted the chief dignities of the church no less than political offices; and he impudently prayed the regent to give him the archbishopric of Cambray, the richest in France. His demand was supported by George I., and the regent yielded. In one day all the usual orders were conferred on him, and even the great preacher Massillon consented to take part in the ceremonies. His next aim was the cardinalate, and, after long opposition on the part of the Pope, Clement XI., the red hat was given to him by Innocent XIII. (1721). In the following year he was named first minister of France (August). He was soon after received at the French Academy; and, to the disgrace of the French clergy, he was named president of their assembly. While the projects of Law were bringing financial ruin upon the kingdom, Dubois was accumulating from various sources an immense private fortune. In addition to his see he possessed the revenues of seven abbeys. He was, however, a prey to the most terrible pains of body and agony of mind. His health was ruined by his debaucheries, and a surgical operation became necessary. This was almost immediately followed by his death, at Versailles, August 10, 1723. His portrait was thus drawn by the duke of St Simon:—"He was a little, pitiful, wizened, herring-gutted man, in a flaxen wig, with a weasel's face, brightened by some intellect. All the vices—perfidy, avarice, debauchery, ambition, flattery—fought within him for the mastery. He was so consummate a liar that, when taken in the fact, he could brazenly deny it. Even his wit and knowledge of the world were spoiled, and his affected gaiety was touched with sadness, by the odour of falsehood which escaped through every pore of his body." In 1789 appeared *Vie privée du Cardinal Dubois*, attributed to one of his secretaries, and in 1815 his *Mémoires secrets et correspondance inédite*, edited by L. de Sevelinges

DUBOS, Jean Baptiste (1670–1742), an eminent French author, was born at Beauvais in December 1670. After studying for the church he renounced theology for the study of public law and politics. He was employed by M. de Torcy, minister of foreign affairs, and by the regent and Cardinal Dubois in several secret missions, in which he acquitted himself with great success. He was rewarded with a pension and several benefices. Having obtained these, he retired from political life, and devoted himself to history and literature. He gained such distinction as an author that in 1720 he was elected a member of the French Academy, of which, in 1722, he was appointed perpetual secretary in the room of M. Dacier. He died at Paris on the 23d of March 1742, at the age of seventy-two, repeating as he expired the well-known remark of an ancient, "Death is a law, not a punishment." His first work was *L'Histoire des quatre Gordiens prouvée et illustrée par des Médailles* (Paris, 1695, 12mo), which, in spite of its ingenuity, did not succeed in altering the common opinion, which only admits three emperors of this name. About the commencement of the war of 1701, being charged with different negotiations both in Holland and in England, with the design to engage these powers if possible to adopt a pacific line of policy, he, in order to promote the objects of his mission, published a work entitled *Les Intérêts de l'Angleterre mal entendus dans la Guerre présente*, Amsterdam, 1703, 12mo. But as this work contained indiscreet disclosures, of which the enemy took advantage, and predictions which were not fulfilled, a wag took occasion to remark that the title ought to be read thus: *Les Intérêts de l'Angleterre mal entendus par l'Abbé Dubos.* It is remarkable as containing a distinct prophecy of the revolt of the American colonies from Great Britain. His next work was *L'Histoire de la Ligue de Cambray* (Paris, 1709, 1728, and 1785, 2 vols. 12mo), a full, clear, and interesting history, which obtained the commendation of Voltaire. In 1734 he published his *Histoire Critique de l'établissement de la Monarchie Française dans les Gaules*, 3 vols. 4to,—a work the object of which was to prove that the Franks had entered Gaul, not as conquerors, but at the request of the nation, which, according to him, had called them in to govern it. But this system, though unfolded with a degree of skill and ability which at first procured it many zealous partisans, was victoriously refuted by Montesquieu at the end of the thirtieth book of the *Esprit des Lois.* His *Réflexions critiques sur la Poésie et sur la Peinture*, published for the first time in 1719, 2 vols. 12mo, but often reprinted in three volumes, constitute one of the works in which the theory of the arts is explained with the utmost sagacity and discrimination. Like his history of the League of Cambray, it was highly praised by Voltaire. The work was rendered more remarkable by the fact that its author had no practical acquaintance with any one of the arts whose principles he discussed. Besides the works above enumerated, a manifesto of Maximilian, elector of Bavaria, against the emperor Leopold, relative to the succession in Spain, has been attributed to Dubos, chiefly, it appears, from the excellence of the style.

DUBOSSARI, or Novie Dubossari, a town of European Russia, in the government of Kherson, on the left bank of the Dniester, 101 miles from Odessa, in 47° 16′ N. lat. and 29° 9′ E. long. It occupies a picturesque position, is surrounded by fertile fields and gardens, has two churches, a synagogue, and a public hospital, and contains from 7000 to 8000 inhabitants—Moldavians, Malo-Russians, and Jews—who are mainly dependent on the trade in the local wine and tobacco, though they also deal in timber, cattle, and grain. Dubossari was founded in keeping with the terms of the Russian peace of 1795, and received the epithet Novie, or New, to distinguish it from the old town of Dubossar (Tombasari, or Tymbashari), on the right bank of the Dniester, in Bessarabia, which had been of considerable importance under the Tatar domination.

DUBROVNA, a town of European Russia, in the government of Mogileff, 11 miles east of Orsha, on the highway to Smolensk, in 54° 34′ N. lat. and 30° 41′ 9″ E. long. Its wooden houses are ranged for the most part along the left bank of the Dnieper, and in the neighbourhood of the two streams Dubrovenka and Svinka; and among its public buildings are six orthodox churches, a Roman Catholic chapel, a synagogue, a hospital, and a Jewish high school supported by Government. The town is mentioned at a pretty early date, and frequently appears in the history of the 16th century. In 1514 it requested to be received into allegiance by Vasili Ivanovitch of Moscow; but after his defeat near Orsha it returned to Lithuania. In 1535 it was burned by Vasili Shuiski;

and in 1562, 1563, and 1580 it suffered a similar fate. The population, which is predominantly Jewish, amounts to 7600.

DUBUQUE, a city of the United States, capital of a county of the same name in Iowa, situated on the right bank of the Mississippi, 155 miles west of Chicago. The business portion occupies a terrace at no great height above the river, and the rest of the city is picturesquely arranged on the bluffs behind. Several of its fourteen churches, besides a so called cathedral, are edifices of considerable pretensions; and the building erected by the United States for the custom-house, post-office, and other Government purposes is constructed of marble. The principal educational institutions are the high school and a theological seminary for German Presbyterians. As a port of delivery, a railway junction, and the centre of the lead region of Iowa, Dubuque has an extensive and varied trade, and engages in a large number of manufacturing industries; of lead alone it exports from 10,000,000 to 20,000,000 ℔ annually. The name of the city is derived from a French Canadian, who received permission from the Spanish Government to carry on mining in the vicinity, and settled on the spot in 1788. The first real settlement was in 1833; incorporation as a town was obtained in 1837, and a city charter in 1840. Population in 1850, 3108; in 1873, 22,151.

DUCANGE, CHARLES DUFRESNE, SEIGNEUR (1610–1688), a most learned historical and philological writer, was born at Amiens, December 18, 1610. His father, who was royal provost of Beauquesne, sent him at an early age to the Jesuits' College in Amiens, where he soon distinguished himself. Having completed the usual course at this seminary, he applied himself to the study of law at Orleans, and afterwards went to Paris, where he was received as advocate before the parliament in August 1631. Meeting with little success as a barrister, he returned to his native district, where he applied himself to the study of history. After the death of his father, Ducange married at Amiens, on 19th July 1638, Catherine Du Bois, daughter of a treasurer of France; and, in 1647, he purchased the office of his father-in-law, the duties of which in no degree interfered with the great literary works in which he had engaged. The plague, which in 1668 desolated Amiens, forced him to leave that city. He established himself at Paris, where he continued to reside until his death, which occurred on the 23d October 1688. In the archives of Paris he was enabled to consult charters, diplomas, titles, manuscripts, and a multitude of printed documents, which were not to be met with elsewhere. His industry was exemplary and unremitting; and the number of his literary works would be incredible, if the originals, all written in his own hand, were not still extant. He was distinguished above nearly all the writers of his time by his linguistic acquirements, his accurate and varied knowledge, and his critical sagacity. Of his numerous published works noted below the most important are the *Glossarium ad Scriptores mediæ et infimæ Latinitatis* and his *Glossarium ad Scriptores mediæ et infimæ Græcitatis*, which are indispensable aids to the student of the history and literature of the Middle Ages. To the three volumes of Ducange's Latin glossary three supplementary volumes were added by the Benedictines of St Maur (1733), and a further addition of four volumes was made by Carpentier, a Benedictine, in 1766. The edition published at Paris in that year accordingly consisted of ten volumes. The edition by G. A. L. Henschel (8 vols., Paris, 1840–46) includes these supplements and further additions by the editor.

Ducange published the following works:—1. Histoire de l'Empire de Constantinople sous les Empereurs François. Paris, 1657, folio. 2. Traité Historique du Chef de S. Jean-Baptiste. Paris,
1666, 4to. 3. Histoire de S. Louis, Roi de France, ecrit
sire de Joinville. Paris, 1668, folio. 4. Joannis Cinn
riarum de rebus gestis a Joanne et Manuele Comneni
Græce et Latine, cum Notis historicis et philologicis.
folio. 5. Mémoire sur le projet d'un nouveau Recueil
riens de France, avec le plan général de ce Recueil, inse
Bibliothèque Historique de la France, by Père Lelong.
rium ad Scriptores mediæ et infimæ Latinitatis. Par
vols. fol. 7. Lettre du Sieur N., Conseiller du Roi, a
Ant. Wion d'Herouval, au sujet des Libelles qui de temp
se publient en Flandres contre les RR. PP. Henschen
broch, Jésuites. Paris, 1682. 4to. 8. Historia Byzanti
Commentario illustrata. Paris, 1680, fol. 9. Joannis Z
nales ab exordio Mundi ad mortem Alexii Comneni, Gr
tine, cum Notis. Paris, 1686, 2 vols. fol. 10. Glos
Scriptores mediæ et infimæ Græcitatis. Paris, 2 vols.
Chronicon Paschale a Mundo condito ad Heraclii Impe
num vigesimum. Paris, 1689. fol. The last work w
through the press when Ducange died; and, on his dec
edited by Baluze, and published with an eloge of the a
fixed." "His autograph manuscripts, and his extensive an
library, passed to his eldest son, Philippe Dufresne,
unmarried, four years after. François Dufresne, the se
and two sisters, then received the succession and sold t
when the greater part of the manuscripts was purchas
Abbé Du Champs, who handed them over to a booksel
Mariette, who re-sold part of them to Baron Hohendorf.
maining part was acquired by D'Hozier, the genealogist.
French Government, aware of the importance of all th
of Ducange, succeeded, after much trouble, in collecting t
portion of these manuscripts, which were preserved in the
library of Paris. Among these manuscripts was one entitl
a work of great erudition, being a history of France, div
seven epochs, with a number of dissertations.

See Feugère's *Essai sur la vie et les ouvrages de Ducan*
1852).

DUCAS, MICHAEL, a Greek historian who f
under Constantine XII., about 1450. The dat
birth and death are unknown. He belonged to t
trious family of his name that gave several em
Constantinople, and he is supposed to have hel
office at the court of Constantine XII. After th
Constantinople, he was employed in various di
missions by the princes of Lesbos, where he had take
He was successful in securing a semi-independ
Lesbos until 1462, when it was taken and an
Turkey by Sultan Mahomet II. It is known th
survived this event, but there is no record of his su
life. He is the author of a history beginning
death of John Palæologus I., and extending as f
capture of Lesbos in 1462. There is a preliminary
of chronology from Adam to John Palæologus I.,
almost certainly by a later hand. Although bar
style, the history of Ducas is both judicious and tru
and it is the most valuable source for the close of t
empire. The author seems to have possessed an
knowledge of the Turkish language.

The *editio princeps* was issued by Bullialdus at Paris in
a Latin version and notes. This edition was reprinted at
1729. The work was edited by Bekker for the Bonn se
Byzantine historians (Bonn, 1834). A French transl
incorporated by President Cousin in his *Histoire de Cons*
(Paris, 1672). An early Italian translation, discovered
Ranke at Venice, is appended to the Bonn edition.

DUCHESNE, ANDRÉ (Latin, DUCHENIUS or
TANUS) (1584–1640), a French geographer and h
generally styled the father of French history, was bo
Bouchard, in the province of Touraine, in May 15
was educated at Loudun and afterwards at Paris,
studied under Julius Cæsar Boulanger. From hi
years he devoted himself to historical and geogra
search, and his first work, *Egregiarum seu Se*
Lectionum et Antiquitatum Liber, dedicated to B
and published in his eighteenth year, displayed gr
tion. He enjoyed the patronage of Cardinal Ri
native of the same district with himself, throug
influence he was appointed historiographer and ge
to the king. He died in 1640, in consequence o

een run over by a carriage when on his way from Paris to is country house at Verrière. Duchesne's works were very umerous and varied, and some idea of his industry may e gathered from the fact that, in addition to what he ublished, he left behind him more than 100 folio volumes f manuscript extracts. Several of his larger works were ontinued by his only son François Duchesne (1616–1693), ho succeeded him in the office of historiographer to the ing. The principal works of Andre Duchesne are—*Les Antiquités et Recherches de la Grandeur et Majesté des Rois le France* (Paris, 1608), *Les Antiquités et Recherches des Villes, Châteaux, &c., de toute la France* (Paris, 1610), *Histoire d'Angleterre, d'Écosse, et d'Irelande* (Paris, 1614), *Histoire des Papes jusqu'à Paul V.* (Paris, 1619), *Histoire des Rois, Ducs, et Comtes de Bourgogne* (1634, 2 vols. fol.), *Historiæ Normanorum Scriptores Antiqui* (1619, fol.), and *Historiæ Francorum Scriptores* (5 vols. fol., 1636–49). Besides these Duchesne published a great number of genealogical histories of illustrious French families, of which the best is said to be that of the house of Montmorency. His *Lives of the French Cardinals and of the Saints of France* have been published by the Bollandists, Mabillon, and others. He published a translation of the *Satires* of Juvenal, and editions of the works of Abelard, Alain Chartier, and Étienne Pasquier.

DUCIS, Jean François (August 22, 1733–March 31, 1816), a French dramatic poet, famous more especially for his adaptations of Shakespeare to the Parisian stage of the 18th century. He was born and brought up at Versailles, where his father, originally from Savoy, held the position of a respectable linen-draper; and all through life he retained the simple tastes and straightforward independence fostered by his bourgeois education. The friendship of Marshal Belleisle procured him an appointment as clerk, and even after he ceased to discharge the duties of his post secured the continuance of his salary. In 1768 the passion for the theatre which had been growing within him during the previous years found vent in the tragedy of *Amélise*; and the failure of this first attempt was fully compensated by the success of his *Hamlet* in 1767, and of *Romeo and Juliette* in 1772. *Œdipe chez Admète*, imitated partly from Euripides and partly from Sophocles, appeared in 1778, and secured him in the following year the chair in the Academy eft vacant by the death of Voltaire. Equally successful was *Le Roi Lear* in 1783, at the representation of which the author received what was then the rare honour of being alled before the curtain. *Macbeth* in 1783 did not take so well, and *Jean sans Peur* in 1791 was almost a failure; ut *Othello* in 1792, supported by the acting of Talma, btained immense applause. The next appearance of the uthor was no longer as an adapter or imitator of foreign odels, but as a dramatist with a plot and characters of his wn contrivance and invention; and though his contrivance roduced nothing more original than the old story of nlawful love between brother and sister ultimately obtaing sanction by their supposed kinship being disproved, the etic charm of the verse and its vivid picturing of desert e secured for *Abufar, ou la famille arabe*, a flattering ception. On the failure of a similar piece, *Phédor et aldemar, ou la famille de Sibérie*, Ducis ceased to write r the stage; and the rest of his life was spent in quiet reement at Versailles. He had been named a member of the uncil of the Ancients in 1798, but he never discharged functions of the office; and, when at a later date poleon wished him to accept some post of honour under empire, he escaped from his solicitations by a happy *usquerie*.—"General, do you like wild duck shooting? m something of a wild duck myself." Amiable, religious, l bucolic, he had little sympathy with the fierce, sceptical, l tragic times in which his lot was cast. "Alas!" he said in the midst of the Revolution, "tragedy is abroad in the streets; if I step outside of my door, I have blood to my very ankles. I have too often seen Atreus in clogs, to venture to bring an Atreus on the stage." Though actuated by what seems to have been an honest and ardent admiration of the great English dramatist, Ducis is not in any deep sense of the word Shakespearian. His ignorance of the English language left him at the mercy of such translators as Letourneur and La Place; and even this modified Shakespeare had still to undergo a process of purification and correction before he could be presented to the fastidious criticism of French taste. That such was the case was not, however, the fault of Ducis; and his works, defective as they were, did good service in modifying the judgment of his fellow countrymen. He did not pretend to reproduce, but to excerpt and refashion; and consequently the French play sometimes differs from its English namesake in everything almost but the name. The plot is different, the characters are different, the *motif* different, and the scenic arrangement different. The result is really a new play, and a new play, be it said, with undoubted merits of its own. *Le banquet de l'amitié*, a poem in four cantos, 1771, *Au Roi de Sardaigne*, 1775, *Discours de réception à l'académie française*, 1779, *Épître à l'amitié*, 1786, and a *Recueil de Poésies*, 1809, complete the list of Ducis's publications. An edition of his works in three volumes appeared in 1813; *Œuvres posthumes* were edited by Campenon in 1826; and *Hamlet*, *Œdipe chez Admète*, *Macbeth*, and *Abufar* are reprinted in vol. ii. of Didot's *Chefs d'œuvre tragiques*.

See Campenon, *Essai de mémoires sur Ducis*, 1824; Onésime Leroy, *Étude sur la personne et les écrits de Ducis*, 1832, based on Ducis's own memoirs preserved in the library at Versailles; Sainte-Beuve, *Causeries du lundi*, t. vi., and *Nouveaux lundis*, t. iv.; Villemain, *Tableau de la litt. au XVIIIe siècle*.

DUCK, a word cognate with the Dutch *Duycker* (Germ. *Tauch-ente*—and in Bavaria *Duck-antl*), the general English name for a large number of birds forming the greater part of the Family *Anatidæ* of modern ornithologists. Technically the term Duck is restricted to the female, the male being called Drake, and in one species Mallard (Fr. *Malart*).

The *Anatidæ* may be at once divided into six more or less well marked Subfamilies—(1) the *Cygninæ* or Swans, (2) the *Anserinæ* or Geese—which are each very distinct, (3) the *Anatinæ* or Freshwater-Ducks, (4) those commonly called *Fuligulinæ* or Sea-Ducks, (5) the *Erismaturinæ* or Spiny-tailed Ducks, and (6) the *Merginæ* or Mergansers. Of the *Anatinæ*, which may be considered the typical group, we propose to treat here only, and especially of the *Anas boschas* of Linnæus, the common Wild Duck, which from every point of view is by far the most important species, as it is the most plentiful, the most widely distributed, and the best known—being indeed the origin of all our domestic breeds. It inhabits the greater part of the northern hemisphere, reaching in winter so far as the Isthmus of Panama in the New World, and in the Old being abundant at the same season in Egypt and India, while in summer it ranges throughout the Fur-Countries, Greenland, Iceland, Lapland, and Siberia. Most of those which fill our markets are no doubt bred in more northern climes, but a considerable proportion of them are yet produced in the British Islands, though not in anything like the numbers that used to be supplied before the draining of the great Fen-country and other marshy places. The Wild Duck pairs very early in the year—the period being somewhat delayed by hard weather, and the ceremonies of courtship, which require some little time. Soon after these are performed, the respective couples separate in search of suitable nesting-places, which are generally found, by those that remain with us, about the middle of March. The spot chosen is sometimes near a river or pond, but often very far removed from water, and it may be under a furze-bush, on a dry heath, at the bottom of a thick hedge-row, or even in any convenient hole in a tree. A little dry grass is generally collected, and on it the eggs, from 9 to 11 in number, are laid. So soon as incubation commences the mother begins to divest herself of the down which grows thickly beneath her breast-feathers, and adds it to the nest-furniture, so that the eggs are deeply imbedded in this heat-retaining substance—a portion of which she is always careful to pull, as a coverlet, over her treasures when she quits them for food. She is seldom absent from the nest, however, but once, or at most twice, a day, and then she dares not leave it until her mate after several circling flights of observation has assured her she may do so unobserved. Joining him the pair betake themselves to some quiet spot where she may bathe and otherwise refresh herself. Then they return to the nest, and after cautiously reconnoitring the neighbourhood, she loses no time in reseating herself on her eggs, while he, when she is settled, repairs again to the waters, and passes his day listlessly in the company of his brethren, who have the same duties, hopes, and cares. Short and infrequent as are the absences of the Duck when incubation begins, they become shorter and more infrequent towards its close, and for the last day or two of the 28 necessary to develop the young it is probable that she will not stir from the nest at all. When all the fertile eggs are hatched her next care is to get the brood safely to the water. This, when the distance is great, necessarily demands great caution, and so cunningly is it done that but few persons have encountered the mother and offspring as they make the dangerous journey.[1] If disturbed the young instantly hide as they best can, while the mother quacks loudly, feigns lameness, and flutters off to divert the attention of the intruder from her brood, who lie motionless at her warning notes. Once arrived at the water they are comparatively free from harm, though other perils present themselves from its inmates in the form of Pike and other voracious fishes, which seize the Ducklings as they disport in quest of insects on the surface or dive beneath it. Throughout the summer the Duck continues her care unremittingly, until the young are full grown and feathered; but it is no part of the Mallard's duty to look after his offspring, and indeed he speedily becomes incapable of helping them, for towards the end of May he begins to undergo that extraordinary additional moult which has already been mentioned (BIRDS, vol. iii. p. 776), loses the power of flight, and does not regain his full plumage till autumn. About harvest-time the young are well able to shift for themselves, and then resort to the corn-fields at evening, where they fatten on the scattered grain. Towards the end of September or beginning of October both old and young unite in large flocks and betake themselves to the larger waters, many of which are fitted with the ingenious appliances for catching them known as Decoys. These are worked on all favourable occasions during the winter, but the numbers taken vary greatly—success depending so much on the state of the weather. If long-continued frost prevail, most of the Ducks resort to the estuaries and tidal rivers, or even leave these islands almost entirely. Soon after Christmas the return-flight commences, and then begins anew the course of life already described.

The domestication of the Duck is doubtless very ancient, but evidence on this head is exceedingly imperfect. Several distinct breeds have been established, of which the most esteemed from an economical point of view are those known as the Rouen and Aylesbury; but perhaps the most remarkable deviation from the normal form is the so-called Penguin-Duck, in which the bird assumes an upright attitude and its wings are much diminished in size. A remarkable breed also is that often named (though quite fancifully) the "Buenos-Ayres" Duck, wherein the whole plumage is of a deep black, beautifully glossed or bronzed. But this saturation, so to speak, of colour only lasts in the individual for a few years, and as the birds grow older they become mottled with white, though as long as their reproductive power lasts they "breed true." The amount of variation in domestic Ducks, however, is not comparable to that found among Pigeons, no doubt from the absence of the competition which Pigeon-fanciers have so long exercised. One of the most curious effects of domestication in the Duck, however, is, that whereas the wild Mallard is not only strictly monogamous, but, as Waterton believed, a most faithful husband—remaining paired for life, the civilized Drake is notoriously polygamous.

Very nearly allied to the common Wild Duck are a considerable number of species found in various parts of the world in which there is little difference of plumage between the sexes—both being of a dusky hue—such as *Anas obscura* of North America, *A. superciliosa* of Australia, *A. pœcilorhyncha* of India, *A. melleri* of Madagascar, *A. xanthorhyncha* of South Africa, and some others.

It would be impossible here to enter upon the other genera of *Anatinæ*. We must content ourselves by saying that both in Europe and in North America there are the groups represented by the Shoveller, Garganey, Gadwall, Teal, Pintail, and Widgeon—each of which, according to some systematists, is the type of a distinct genus. Then there is the group *Aix* with its beautiful representatives the Wood-Duck (*A. sponsa*) in America and the Mandarin-Duck (*A. galericulata*) in Eastern Asia. Besides there are the Sheldrakes (*Tadorna*), confined to the Old World and remarkably developed in the Australian Region; the Musk-Duck (*Cairina*) of South America, which is often domesticated and in that condition will produce fertile hybrids with the common Duck; and finally the Tree-Ducks (*Dendrocygna*), which are almost limited to the Tropics. (A. N.)

DUCKWORTH, SIR JOHN THOMAS (1748-1817), admiral, was born at Leatherhead, in Surrey, on the 28th February 1748. He entered the navy in 1759, and obtained his commission as lieutenant in June 1770, when he was appointed to the "Princess Royal," the flagship of Admiral Byron, in which he sailed to the West Indies. While serving on board this vessel he took part in the engagement with the French fleet under Count D'Estaing. In July 1779 he became commander, and was appointed to the "Rover" sloop; in June of the following year he atttained the rank of post-captain. Soon afterwards he returned to England in charge of a convoy. The outbreak of the war with France gave him his first opportunity of obtaining marked distinction. Appointed first to the "Orion" and then to the "Queen" in the Channel Fleet, under the command of Lord Howe, he took part in the three days' naval engagement with the Brest fleet, which terminated in a glorious victory on the 1st June 1794. For his conduct on this occasion he received a gold medal and the thanks of Parliament. He next proceeded to the West Indies, where he was stationed for some time at St Domingo. In 1798 he commanded the "Leviathan" in the Mediterranean, and had charge of the naval detachment which, in conjunction with a military force, captured Minorca. Early in 1799 he was raised to the rank of rear-admiral, and sent to the West Indies to succeed Lord Hugh Seymour. During the voyage out he captured a valuable Spanish convoy of eleven merchantmen. In March 1801 he was the naval commander of the combined force which reduced the islands of St Bartholomew and St Martin, a vice for which he was rewarded with the order of the th and a pension of £1000 a year. Promoted to be e-admiral of the blue, he was appointed in 1804 to the naica station. Two years later, while cruising off Cadiz h Lord Collingwood, he was detached with his squadron pursue a French fleet that had been sent to the relief of Domingo. He came up with the enemy on the 6th bruary 1806, and, after two hours' fighting, inflicted a nal defeat upon them, capturing three of their five vessels l stranding the other two. For this, the most distin-shed service of his life, he received the thanks of the naica Assembly, with a sword of the value of a thousand neas, the thanks of the English Parliament, and the edom of the city of London. In 1807 he was again t to the Mediterranean to watch the movements of the rks. In command of the "Royal George" he forced the sage of the Dardanelles, but sustained considerable loss effecting his return, the Turks having strengthened their ition. He held the command of the Newfoundland t for four years from 1810, and at the close of that iod he was made a baronet. In 1815 he was appointed the chief command at Plymouth, which he held until his ith on the 14th April 1817. Sir John Duckworth sat Parliament for some time as member for New Romney.

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[1] When Ducks breed in trees the precise way in which the young get to the ground is still a matter of uncertainty. The mother is supposed to convey them in her bill, and most likely does so, but further observation on this point is required.

DUCLOS, Charles Pineau (1704–1772), a French hor, was born at Dinant, in Brittany, in 1704. At an ly age he was sent to study at Paris. After some time nt in dissipation he began to cultivate the society of the s of the time, and became a member of that club or ociation of young men who published their joint efforts ight literature under the titles of *Recueil de ces Messieurs*, *ennes de la St Jean*, *Œufs de Pâques*, &c. His romance *Acajou and Zirphile*, which was composed after a series plates which had been engraved for another work, was of the fruits of this association, and was produced in sequence of a sort of wager amongst its members. clos had previously written two other romances, which re more favourably received—*The Baroness de Lus*, l the *Confessions of the Count de ****. His first serious blication was the *History of Louis XI.*, which is dry l epigrammatical in style, but displays considerable wers of research and impartiality. The reputation of clos as an author was confirmed by the publication of *Considérations sur les Mœurs*, a work which is much d justly praised by Laharpe, as containing a great deal sound and ingenious reflection. It was translated o English and German. The *Mémoires pour servir à istoire du dix-huitième Siècle*, which were intended by author as a sort of sequel to the preceding work, are vertheless much inferior in respect of both style and tter, and are, in reality, little better than a kind of mance. In consequence of his *History of Louis XI.*, he s appointed historiographer of France, when that place came vacant on Voltaire's retirement to Prussia. His cret *Memoirs of the reigns of Louis XIV. and Louis XV.*, d his *Considerations on Italy*, were not published until er the Revolution. The former work is highly spoken by Chamfort. Duclos became a member of the Academy Inscriptions in 1739, and of the French Academy in 47. Of the latter he was appointed perpetual secretary in 55. Both academies were indebted to him not only for ny valuable contributions, but also for several useful reguions and improvements. As a member of the Academy of criptions, he composed several memoirs on the Druids, the origin and revolutions of the Celtic and French guages, on trial by battle and proof by ordeal, and on nic representations and the ancient drama. As a member the French Academy, he assisted in compiling the new tion of the *Dictionary*, which was published in 1762: l he made some just and philosophical remarks on the *Port Royal Grammar*. On several occasions he distinguished himself by vindicating the honour and prerogatives of the societies to which he belonged, and the dignity of the literary character in general. He used to say of himself, "I shall leave behind me a name dear to literary men." The citizens of Dinant, whose interests he always supported with zeal, appointed him mayor of their town in 1744, though he was resident at Paris. He was afterwards elected deputy from the commons to the assembly of the states of Brittany; and upon the requisition of this body the king granted him letters of nobility. In 1766 he was advised to retire from France for some time, having rendered himself obnoxious to the Government by the opinions he had expressed on the dispute between the Duc d'Aiguillon and M. de la Chalotais, the friend and countryman of Duclos. Accordingly he set out for Italy; and on his return he wrote an account of his travels, which is also praised by Chamfort. He died at Paris, March 26, 1772, in the sixty-ninth year of his age. The character of Duclos was singular in its union of impulsiveness and prudence. Rousseau described him very laconically as a man *droit et adroit*. In his manners he displayed a sort of bluntness in society, which frequently rendered him disagreeable; and his caustic wit on many occasions created enemies. To those who knew him, however, he was a pleasant companion. A considerable number of his *bon mots* have been preserved by his biographers. A complete edition of the works of Duclos, including an unfinished autobiography, was published by Desessarts, at Paris, in 10 vols. 8vo, 1806.

DUDEVANT, Armantine Lucile Aurore (1804–1876), known to all the world as the second, if not the greatest, of French novelists, by her assumed name of George Sand, was born at Paris 5th July 1804, and died 8th June 1876. Her life is as fantastic and eventful as any of her fictions, and the main secret of her success has been her power to clothe in artistic form her varied experiences of men and places.

It is no easy task to set down in a short space the outward events of her life, and to trace the development of her genius, not only because of the abundance of materials she has left behind her, but still more from the subtle way in which she has interwoven fact and fiction. In the *History of her Life*, which covers half a century, the omissions are no less surprising than the revelations, and though she never indulges in the self-illusions of *Dichtung und Wahrheit*, which perplex or mystify the biographers of Goethe, yet she wisely refuses to satisfy the curiosity of the public on the most delicate episodes of her life. If, to fill up the blanks, we turn to her novels, George Sand justly warns us that in trying to raise the mask and identify her with any one of her characters, we shall not only lose our pains, but show that we mistake the fundamental conditions of art. Yet by the help of critics to supply the missing clue (and no writer of this century has so provoked criticism), it is possible to decipher the chief lineaments of the most remarkable woman of this age, and the greatest authoress in the world's history.

Aurore was the daughter of Lieutenant Dupin and of his newly-married mistress Sophie Delaborde, the daughter of a Paris bird-fancier. Her paternal grandfather was M. Dupin de Francueil, a farmer-general of the revenue, who had married Mdlle. Rinteau, widow of Count Horn (a natural son of Louis XV.), and natural daughter of Marshal Saxe, the most famous of the many illegitimate children of Augustus the Strong by the lovely countess of Königsmarck. This strange pedigree has been traced in detail by George Sand, and she recognizes it as one of the elements which went to mould her character. She boasts of the royal blood which she inherited through her father, and, disregarding the bar sinister, claims relationship with Charles X and Louis XVIII., and she proclaims herself as frankly a daughter of the people, endowed by nature with the instincts of her class. Her birth itself was romantic. Her father was playing a country dance at the house of a fellow officer, the future husband of Sophie's sister, when he was told that his wife, who had not long left the room, had borne him a daughter. "She will be fortunate," said the aunt, "she was born among the roses to the sound of music."

Passing by her infantine recollections, which go back further than even those of Dickens, we find her at the age of three crossing the Pyrennees to join her father who was on Murat's staff, occupying with her parents a suite of rooms in the royal palace, adopted as the child of the regiment, nursed by rough old sergeants, and dressed in a complete suit of uniform to please the general.

For the next ten years she lived at Nohant, near Le Châtre in Berri, the country house of her grandmother. Here her character was shaped; here she imbibed that passionate love of country scenes and country life which neither absence, politics, nor dissipation could uproot; here she learnt to understand the ways and thoughts of the peasants, and laid up that rich store of scenes and characters which a marvellously retentive memory enabled her to draw upon at will. The progress of her mind during these early years well deserves to be recorded. Education, in the strict sense of the word, she had none. A few months after her return from Spain her father was killed by a fall from his horse. He was a man of remarkable literary gifts as well as a good soldier, and his letters, which are included in her life, show in a less degree the vivid fórce of description and clear insight into character which he bequeathed to his daughter. "Character," says George Sand, "is in a great measure hereditary: if my readers wish to know me they must know my father." On his death the mother resigned, though not without a struggle, the care of Aurore to her grandmother, Mme. Dupin de Francueil, a good representative of the *ancien régime*. Though her husband was a patron of Rousseau, she herself had narrowly escaped the guillotine, and had only half-imbibed the ideas of the Revolution. In her son's lifetime she had, for his sake, condoned the *mésalliance*, but it was impossible for the stately châtelaine and her low-born daughter-in-law to live in peace under the same roof. She was jealous as a lover of the child's affection, and the struggle between the mother and grandmother was one of the bitterest of Aurore's childish troubles.

Next to the grandmother, the most important person in the household at Nohant was Deschatre. He was an ex-abbé who had shown his devotion to his mistress when her life was threatened, and henceforward was installed at Nohant as factotum. He was maire of the village, he managed the estate, doctored the neighbourhood, played picquet with Madame, was tutor to Aurore's half-brother, and, in addition to his other duties, undertook the education of the girl. The tutor was no more eager to teach than the pupil to learn. He, too, was a disciple of Rousseau, believed in the education of nature, and allowed his Émile to wander at her own sweet will. At odd hours of lessons she picked up a smattering of Latin, music, and natural science, but most days were holidays and spent in country rambles and games with village children. Yet even then, though she passed for an ordinary child, somewhat more wayward and less instructed than the average, her special powers had begun to show themselves. Her favourite books were Tasso, *Atala*, and *Paul et Virginie*. A simple refrain of a childish song or the monotonous chaunt of the ploughman touched a hidden chord and thrilled her to tears. Like Blake she fell into involuntary trances, saw visions and heard voices, though, unlike Blake, she never mistook her day-dreams for realities. She invented a deity of her own, a mysterious Corambé, half pagan and half Christian and like Goethe erected to him a rustic altar of the greenest grass, the softest moss, and the brightest pebbles.

From the free out-door life at Nohant she passed at thirteen to the convent of the English Augustinians at Paris, where for the first two years she never went outside the walls. Nothing better shows the plasticity of her character than the ease with which she adapted herself to this sudden change. The volume which describes her conventual life is as graphic as Miss Bronte's *Villette*, but we can only dwell on one passage of it. Tired of mad pranks, in a fit of home-sickness, she found herself one evening in the convent chapel. In a strange reverie she sat through vespers. Time passed unnoticed, the prayers were over, the chapel was being closed.

> "I had forgotten all; I knew not what was passing in me; with my soul rather than my senses, I breathed an air of ineffable sweetness. All at once a sudden shock passed through my whole being, my eyes swam, and I seemed wrapped in a dazzling white mist. I heard a voice murmur in my ear, '*Tolle, lege.*' I turned round thinking that it was one of the sisters talking to me—I was alone. I indulged in no vain illusion; I believed in no miracle; I was quite sensible of the sort of hallucination into which I had fallen; I neither sought to intensify it nor to escape from it. Only I felt that faith was laying hold of me—by the heart, as I had wished it. I was so filled with gratitude and joy that the tears rolled down my cheeks. I felt as before that I loved God, that my mind embraced and accepted that ideal of justice, tenderness, and holiness which I had never doubted, but with which I had never held direct communion, and now at last I felt that this communion was consummated, as though an invincible barrier had been broken down between the source of infinite light and the smouldering fire of my heart. An endless vista stretched before me, and I panted to start upon my way. There was no more doubt or lukewarmness. That I should repent on the morrow and rally myself on my over-wrought ecstasy never once entered my thoughts. I was like one who never casts a look behind, who hesitates before some Rubicon to be crossed, but having touched the further bank sees no more the shore he has just left."

Such is the story of her conversion as told by herself. It reads more like a chapter from the life of Ste Thérèse or Madame Guyon than of the author of *Lélia*. Yet no one can doubt the sincerity of her narrative, or even the permanence of her religious feelings under all her many phases of faith and aberrations of conduct. A recent critic has sought in religion the clue to her character and the mainspring of her genius. But, except we take religion in the vague sense of the vision and the faculty divine, this is a one-sided view. "Half poet and half mystic" is the verdict she pronounces on herself, and we may add that her element of mysticism was always subordinate to the poetic. "Je fus toujours tourmentée des choses divines," ever stirred and stimulated, but never possessed by things divine.

Again in 1820 Aurore exchanged the restraint of a convent for freedom, being recalled to Nohant by Mme de Francueil, who had no intention of letting her granddaughter grow up a *dévote*. She rode across country with her brother, she went out shooting with Deschatre, she sat by the cottage doors on the long summer evenings and heard the flax-dressers tell their tales of witches and warlocks. She read widely though unsystematically Aristotle, Leibnitz, Locke, Condillac, and fed her imagination with *René* and *Childe Harold*. Her confessor lent her the *Genius of Christianity*, and to this book she ascribes the first change in her religious views. She renounced once for all the asceticism and isolation of the *De Imitatione* for the more genial and sympathetic Christianity of Chateaubriand. Yet she still clung to old associations, and on her grandmother's death was about to return to her convent, but was dissuaded by her friends, who found her a husband in the person of M. Dudevant, a retired officer who had turned farmer. About her husband and her married life George Sand is discreetly reticent. It was a marriage, if not of love, yet of inclination, and the first years of her married life, during which her son and daughter, Maurice and Solange, were born, were at least calm and peaceful. Soon differences arose. Her husband seems to have been neither better nor worse than the Berrichon squires around him; but she found herself mated, if not to a clown, yet to a *hobereau* whose heart was in his farm and cattle. After nine years of passive endurance she determined to put an end to a connection which had grown intolerable, and in 1831 an amicable separation was agreed upon. Nohant was surrendered to the husband, and, taking her daughter with her, she went to seek her fortune in Paris with no provision but an allowance of £60 a year. After vain attempts to support herself by some of those expedients to which reduced gentlewomen are driven, as a last resource she tried literature. At this period she was living in a garret, often unable to afford the luxury of a fire. Repulsed by Balzac and Kératry, she found an employer in Delatouche, the editor of *Figaro*, and, like herself, a native of Berri. In her life she has done full justice to the rough honesty and jealous affection of her first critic, who treated her much as Dr Johnson treated Fanny Burney. George Sand had neither the wit nor the piquancy to succeed as a writer in *Figaro*, and at the end of a month her earnings amounted to fifteen francs. But there was on the same staff a young law student already known to her as a visitor at Nohant. With Jules Sandeau she entered into literary partnership, and under the name of Jules Sand there appeared a novel, their joint work, called *Rose et Blanche*. Her second novel was written independently, and the famous pseudonym, George Sand, was a compromise between Madame Dudevant, who wished to preserve the joint authorship, and Jules Sandeau, who disclaimed any share in the work. Nothing like *Indiana* had appeared before in French fiction. The public were wearied with the unreality of the fashionable historical novel, and the realistic humour of Paul de Kock. Balzac's earliest novels gave little promise of his future greatness. In the unknown writer they found one who combined the absorbing passion of Rousseau, the delicate picturesqueness of St Pierre, and the wild grandeur of Chateaubriand, in a living picture of present times and manners. Like Byron she awoke one morning and found herself famous. Delatouche was the first to throw himself at her feet and bid her forget all the hard things he had said of her. Sainte-Beuve expressed the approval of the learned, and the public eagerly canvassed the secret of her name, sex, and history. *Valentine*, which appeared two months afterwards, proved that *Indiana* was not, like so many first novels, a graphic rescript merely of the author's own emotions, but the beginning of an inexhaustible series, in which experience was the raw material woven by imagination and coloured by fancy. In *Valentine*, written during a visit to Nohant, she draws her inspiration from her native soil, and nowhere has she better described the quiet beauty and pastoral melancholy of the Vallée Noire and the banks of the Indra. Her Bohemian life at Paris—her *vie de gamin*, as she calls it—in which she adopted not only the dress but the life of a college student, and made the acquaintance of the whole Paris world between the artist and the artisan, is sketched by her in an allegory which is worth quoting if only as a specimen of the simple perfection of her style.

> "I care little about growing old; I care far more not to grow old alone, but I have never met the being with whom I could have chosen to live and die, or if I ever met him I knew not how to keep him. Listen to a story and weep. There was a good artist called Watelet, the best acquafortis engraver of his day. He loved Marguerite Lecomte, and taught her to engrave as well as himself. She left husband and home to go and live with him. The world condemned them; then, as they were poor and modest, it forgot them. Forty years afterwards their retreat was discovered. In a cottage in the environs of Paris called *le moulin joli*, there sat at the same table an old man engraving and an old woman whom he called his *meunière* also engraving. The last design they were at work upon represented the *Moulin joli*, the house of Marguerite, with the device *Cur valle permutem Sabina divitias operosiores*. It hangs in my room over a portrait the original of which no one here has seen. For a year the person who gave me this portrait sat with me every night at a little table and lived by the same work. At daybreak we consulted together on our work for the day, and at night we supped at the same little table, chatting the while on art, on sentiment, on the future. The future broke faith with us. ay for me, O Marguerite Lecomte!"

Her third novel, *Lélie*, marks the climax of her rebellion against society. It was written in a fit of deep depression, religious and political, and is a wild dithyramb, the passionate wail of a woman whose affections have been blighted, and whose jaundiced eyes see nothing but a lifeless, loveless, godless world. But like Goethe in his *Werther* she "rid her bosom of that perilous stuff," and, though once and again she inveighed against society, she never more lost faith in the moral government of the world.

Of her unfortunate relations with A. de Musset, and her voyage to Italy in his company, which followed the publication of *Lélie*, nothing need be said except as they affected her literary career. As the motives of *Indiana* and *Valentine* are an unhappy marriage, so the novels of this period (1833–1835), *Jacques*, *André*, and *Leone Leoni*, are the outcome of an unhappy liaison. Her creed, the opposite of Shakespeare's, is, that love must alter as it alteration finds, and that no ties are binding but the mutual passion of the hour. *Elle et lui* is a woman's version of the quarrel between a man and woman, and if true it ought never to have been told. The moral of the tale is worth giving in George Sand's own words, "God makes certain men of genius to wander in the tempest and to create in pain. I studied you in your light and in your darkness, and know that you are not to be weighed in the balance like other men." The measure she here metes to De Musset we may fairly measure to her again.

To this Italian journey we owe some of her most charming pictures of scenery. Venice was the only town she loved for itself, and it exercised over her the same fascination as over Byron, Shelley, and Goethe. The opening scenes of *Consuelo* are worthy to take rank with "Otway, Radcliffe, Schiller, Shakespeare's Art," with the 4th canto of *Childe Harold*, Shelley's *Lyrics*, and Goethe's *Venetian Epigrams*. The *Lettres d'un Voyageur* mark the calm which succeeded this Sturm und Drang period. They are specially valuable to the student of George Sand, as they give her views of men and things, not refracted and distorted by the exigencies of a novel. In *Michel de Bourges* (the "Edouard" of the letters) we make the acquaintance of another of those celebrated men who influenced for a time her life and writings. He conducted the suit which ended in a judicial separation from her husband (1836), and sought to convert her to the extreme republicanism of which he was the foremost advocate and defender. This Lovelace of politics laid siege to her intellect as persistently as Richardson's hero (for nine mortal hours he declaimed to her, pacing to and fro before her hotel at Bourges, and at Paris he locked her into her own room that she might reflect at leisure on his suit), but though she coquetted with his communistic theories, her artist nature rebelled against his extravagant radicalism. She sought safety in flight, but *Mauprat*, which she published this year, bears marks of his influence. The *Lettres à Marcie*, of 1837, are a tribute to the broad and noble Catholicism of Lamennais, and an eloquent exposition of the doctrine of Christian resignation; but in *Spiridion* (1838) she returns to her proper creed, a philosophical theism founded on sentiment and unfettered by dogma. *Consuelo* (1844) and *Lucretia Floriani* (1847) were inspired by Chopin, whose declining health she tended for more than six years with motherly care. *Le Compagnon du Tour de France* (1840) and *Le meunier* *d'Angibault* (1845) are echoes of the socialism of Pierre Leroux. She threw herself heart and soul into the republican struggle of 1848, composed manifestoes for her friends, addressed letters to the people, and even started a newspaper. But her political ardour was short-lived; she cared little about forms of government, and, when the days of June dashed to the ground her hopes of social regeneration, she quitted once for all the field of politics and returned to her quiet country ways and her true vocation as an interpreter of nature, a spiritualizer of the commonest sights of earth and the homeliest household affections. In 1849 she writes from Berri to a political friend,—"You thought that I was drinking blood from the skulls of aristocrats. No, I am studying Virgil and learning Latin!"

To a youth of storm and stress succeeded an old age so calm and happy that it has no history. For more than a quarter of a century she continued year by year to gladden the world by some new creation, and the last of her works, the posthumous *Contes d'une Grand'mère*, is as fresh and vigorous and far more beautiful than *Indiana*. Only once was the serenity of her life troubled. The *Journal of a Traveller during the War* will be quoted by future historians not only as a record of that agonizing crisis through which the French nation passed, but also as a prophecy of its recovery, which, by the indomitable spirit it expressed, brought its own fulfilment.

In writing the life of Madame Dudevant we have glanced at some of the most important of her works. To chronicle the titles only of all her novels would require an Homeric catalogue. It is only possible to give a general estimate of her style and of her place in French literature. But first we must call attention to her latest group of novels, which we omitted in the life as deserving a separate notice. With *Joanne* (1852) began that series of pastorals, or stories of village life, by which George Sand is best known to the English public, and by which, we believe, she will be longest remembered. No description is needed of works so well known as *La petite Fadette*, *La mare au diable*, *Les Maîtres Sonneurs*, *Le meunier d'Angibault*, *Nanon*, and *François le Champi*. With these may be classed the fairy-stories which she wrote for her grandchildren in the last years of her life, *Le géant Yéous*, *La reine Coax*, *Le nuage rose*, *Les ailes de courage*. They are too recent to be much known in England, but we may safely predict that they will be as familiar to our grandchildren as *La petite Fadette* is to us. Without attempting to analyze, we may shortly indicate the peculiar charm and originality of her idyllic novels.

1. Like Wordsworth, with the inward eye she sees into the life of things; she seizes with her pencil the visionary gleam; she shows the mystical influences which emanate from the world of sense, the witchery of the sky, the quiet soul of the river, the beauty born of murmuring sound, the grey *landes* stretching far away to the blue horizon, the deep-meadowed champaigns with orchard lawns and bowery hollows.

2. Like Wordsworth, too, she had found love in huts where poor men dwell, and like him she is "a leader in that greatest movement of modern times, care for our humbler brethren,—her part being to make us reverence them for what they are, what they have in common with us, or in greater measure than ourselves."

3. To interpret for her readers these pictures of primitive life she has invented a style of her own,—not that, like Fontenelle, she makes her shepherds talk the language of the court, but she expresses the feelings of peasants in words so simple that a peasant might have used them, and yet so pure that they would pass muster with the Académie. Like Courier she is archaic, but her archaisms are not extracted from books, but relics of classical French which still lingered on in the quiet nooks of central France.

In conclusion, a few words must be said of her style, though much of its delicate harmony must elude a foreign critic, for it is by her style that she will chiefly live. It is simple and unaffected, yet full of subtle turns and picturesque expressions. Her dialogue is sparkling, her narrative clear and flowing, her descriptions exact, and her eloquence grandiose yet never meretricious. Topin is reminded of "the language of Rousseau, with something more of ease and finesse, the grace of Bernadin St Pierre, without his over-refinement, the warmth and eloquence of our greatest orators, and that without effort or straining." Nisard pronounces George Sand the master of French prose writers. To Thackeray her diction recalled the sound of country bells falling sweetly and sadly on the ear; it stirred the nerves of Mill like a symphony of Haydn or Mozart.

One of the greatest of English novelists seems by the name she has adopted to provoke comparison with George Sand. In psychological analysis and insight into the problems of modern life, she is at least her equal; in her range of knowledge, in self-control, and in practical common sense she is greatly her superior; but in unity of design, in harmony of treatment, in that purity and simplicity of language so felicitous and yet so unstudied, in all those qualities which make the best of George Sand's novels master pieces of art, she is as much her inferior. George Eliot is a great moralist, a great teacher; George Sand, whatever we may think of her doctrine and her morality, is by universal consent a supreme artist.

She has stayed in many camps, and lent her pen to many causes, she has had many friends and many lovers, but to one cause only has she remained constant—the cause of human progress; and the only master in whose service she has never wearied is art. (F. S.)

DUDLEY, a parliamentary and municipal borough of England, in a detached portion of the county of Worcestershire surrounded by the county of Stafford. It lies in the centre of the "Black Country," about eight miles W.N.W. of Birmingham, at a junction on the Great Western railway. The town is generally well-built, its streets are well-paved, and there is a fair supply of water. The principal buildings are the parish church of St Thomas, rebuilt in 1819 at a cost of £23,000, and restored in 1862; several other churches, of which the most recent is St Luke's, erected in 1876; the town-hall, the county court, the Guest hospital (formerly the blind asylum), endowed (1868) by Joseph Guest, with a legacy of £20,000 (1861), the school of art, the new dispensary (1868), and the mechanics' institute (1861). Among the educational establishments are a free grammar-school, a subscription library, and a geological society with a small scientific museum. On a hill to the north are the extensive remains of an ancient castle, surrounded by beautiful grounds; and in the market-place stands a fountain, erected by the earl of Dudley at a cost of £3000, on the occasion of his marriage. The presence of coal, iron-ore, and limestone gives its peculiar character to the industries of the place. According to the census of 1871, 5442 men were engaged in the iron manufacture, 1040 as makers of engines or machines, and 3501 in the coal-mines; while the nail manufacture alone gave employment to 1267 males and 3019 females. Among the various articles produced are fire-irons, stoves, shovels, edge tools, chains, anchors, and especially anvils and vices. The glass-works, brass foundries, and brickworks are also of importance; and tanning, brewing, and malting are extensively carried on. The parliamentary borough has an area of 7715 acres, and returns one member to Parliament. In 1871 the population of the municipal borough, which has an area of 3680 acres, was 43,782; that of the parliamentary borough was 82,249.

y castle, according to an unfounded tradition preserved by
, was first built about 700 by a Mercian prince called Dodo.
ntioned in Domesday book as belonging after the conquest
iam Fitz Ansculf. Being held in 1138 for the empress
y Ralphe Paganel, it was burnt by Stephen. In 1161
Ralphe's son, founded a priory for Cluniac monks, about
r of a mile to the west of the castle, at a spot still dis-
ed by a few ruins. The lordship was afterwards held by
erys, and the Suttons; and from the latter family it was
red by marriage to the Wards of Bixley. John Ward, sixth
Dudley, was in 1763 created Viscount Dudley and Ward;
1827 John William, the fourth viscount, was created Earl
The title died with him in 1833, but was restored in
favour of William, his second cousin. The description
as Pawlet gives of the town in 1585 is—"one of the poorest
have seen in my life." On its surrender to the Parliament
-7 the fortifications of the castle were demolished, but it
ed habitable to 1750, when a fire broke out which reduced
present ruinous state. Dudley was enfranchised in 1832 by
IV. c. 45; and it received incorporation in 1865. See
History of Dudley, and Twamley's *History of Dudley Castle*
ry, 1867.

DLEY, Earls of. See Northumberland.

EL, a deadly combat between two persons. The
s used in two distinct senses—(1) the judicial
, a form of trial which prevailed in the Middle
rdained by law as a proof of guilt or innocence; and
modern duel, a pre-arranged combat with deadly
s between two private persons to settle some private

gh duelling is in England obsolete, and in other
es fast obsolescent, yet it must still command our
n as the latest survival of feudalism, and its history
ays be studied as one of the most curious develop-
of mediæval society.

the origin of the duel a vast amount of perverse
ty has been spent. Writers of the 16th and 17th
es commonly begin their treatises with an account
combats between David and Goliath, Hector and
, the Horatii and Curiatii. By etymology it is true
ellum is the same word as *bellum*, and in this sense
in of the duel must be traced to the earliest condi-
society, when every man's hand was against his
ur. But, in the specialized sense which the word
ars, the duel was a peculiar institution of compara-
recent origin, a local custom which never spread
the limits of civilized Europe. It is easily distin-
both from the casual affrays of savages and the
tles of the champions of contending nations. An
of the judicial duel will clearly show that it is the
parent of the modern duel. In the year 501
ald, king of the Burgundians, passed a law authoriz-
wager of battle, and in the preamble he gives his
for introducing this new form of trial. It is that
jects may no longer take oaths upon uncertain
, or forswear themselves upon certain. Here is one
mong many that the judicial duel was introduced to
the abuses of compurgation by oath. Like the
deals which it superseded, it was a direct appeal to
to vindicate truth and punish falsehood. Like
was founded on the superstitious spirit of the age,
ike them it addressed itself to the martial temper
sonal prowess of the nobles. Other ordeals, such
ross, the corsned, and the oath on the gospels, were
ands of the clergy, and were manipulated by them
interest of the church or of themselves. In the
battle each man felt that his cause was in his own
and, though might was right, yet even this was
han the jugglery of priests. Nor, as Montesquieu
ted out, was the trial so irrational as it would seem
n eyes. Among a warlike people cowardice is a
other vices, vices which are most hateful and most
ial to a simple community, of meanness, lying, and
It shows an indifference to public opinion, a neglect of the education of the day, which consisted mainly in the use of arms and warlike exercises. In a word, the law was neither better nor worse than the received morality of the time. From this jurisdiction none was exempt; women, minors, and ecclesiastics were required to appear by proxy; and adverse witnesses, and even the judge himself, were liable to be challenged to make good their words by force of arms. Those who are curious to observe the formalities and legal rules of a judicial combat will find them described at length in the 28th book of Montesquieu's *Esprit des Lois*. On these regulations he well remarks that, as there are an infinity of wise things conducted in a very foolish manner, so there are some foolish things conducted in a very wise manner. For our present purpose it is sufficient to observe the development of the idea of personal honour from which the modern duel directly sprang. In the ancient laws of the Swedes we find that if any man shall say to another, "You are not a man equal to other men," or "You have not the heart of a man," and the other shall reply, "I am a man as good as you," they shall meet on the highway, and then follow the regulations for the combat. What is this but the modern challenge? By the law of the Lombards if one man call another *arga*, the insulted party might defy the other to mortal combat. What is *arga* but the *dummer Junger* of the German student? Beaumanoir thus describes a legal process under Louis le Débonnaire:—The appellant begins by a declaration before the judge that the appellee is guilty of a certain crime; if the appellee answers that his accuser lies, the judge then ordains the duel. Is not this the modern point of honour, by which to be given the lie is an insult which can only be wiped out by blood?

From Germany the trial by judicial combat rapidly spread to every country of Europe. In France it was first confined to criminal causes, but this restriction was removed by Louis IX., who made it legal in civil matters as well, with the one proviso that in cases of debt the amount must exceed twelve deniers. By Philippe le Bel it was again confined in civil cases to questions of disputed inheritance, and forbidden altogether during the war between England and France. In 1385 a duel was fought, the result of which was so preposterous that even the most superstitious began to lose faith in the efficacy of such a judgment of God. A certain Jacques Legris was accused by the wife of Jean Carrouge of having introduced himself by night in the guise of her husband, and thus abused her. A duel was ordained by the Parliament, which was fought in the presence of Charles VI. Legris was defeated and hanged on the spot. Not long after a criminal arrested for some other offence confessed himself to be the author of the outrage. No institution could long survive so open a confutation. Henceforward the duel in France ceases to be an appeal to Heaven, and becomes merely a satisfaction of wounded honour. The last instance of a duel authorized by the magistrates, and conducted according to the forms of law, was the famous one between François de Vivonne de la Châtaignerie and Guy Chabot de Jarnac. The duel was fought on the 10th of July 1547 in the court-yard of the château of St Germain-en-Laye, in the presence of the king and a large assembly of courtiers. It was memorable in two ways. It enriched the French language with a new phrase; a sly and unforeseen blow, such as that by which De Jarnac worsted La Châtaignerie has since been called a *coup de Jarnac*. And Henry, grieved at the death of his favourite, swore a solemn oath that he would never again permit a duel to be fought. This led to the first of the many royal edicts against duelling.

In England, it is now generally agreed that the wager of battle did not exist before the time of the Norman Conquest. Some previous examples have been adduced, but mination they will be seen to belong rather to the of single combats between the champions of two ng armies. One such instance is worth quoting as a a illustration of the superstition of the time. It s in a rare tract printed in London, 1610, *The Duello, ngle Combat*. "Danish irruptions and the bad aspects ars having drencht the common mother earth with her es' blood streames, under the reigne of Edmund, a on monarch, *misso in compendium* (so worthy Camden resseth it) *bello utriusque gentis fata Edmundo Anglorum Canuto Danorum regibus commissa fuerunt, qui singulari tamine de summa imperij in hac insula* (that is, the Eight Glostershire) *depugnarunt*." By the laws of William e Conqueror the trial by battle was only compulsory when he opposite parties were both Normans, in other cases it was optional. As the two nations were gradually merged into one, this form of trial spread, and until the reign of Henry II. it was the only mode for determining a suit for the recovery of land. The method of procedure is admirably described by Shakespeare in the opening scene in *Richard II.*, where Henry of Bolingbroke, duke of Hereford, challenges Thomas duke of Norfolk, and in the mock-heroic battle between Horner the Armourer and his man Peter in *Henry VI.*, and by Sir W. Scott in the *Fair Maid of Perth*, where Henry Gow appears before the king as the champion of Magdalen Proudfute. The judicial duel never took root in England as it did in France. In civil suits it was superseded by the grand assize of Henry II., and in cases of felony by indictment at the prosecution of the Crown. One of the latest instances occurred in the reign of Elizabeth, 1571, when the lists were actually prepared and the justices of the common pleas appeared at Tothill Fields as umpires of the combat. Fortunately the petitioner failed to put in an appearance, and was consequently nonsuited (See Spelman, *Glossary*, *s.v.* "Campus"). As late as 1817 Lord Ellenborough, in the case of Thornton v. Ashford, pronounced that "the general law of the land is that there shall be a trial by battle in cases of appeal unless the party brings himself within some of the exceptions." Thornton was accused of murdering Mary Ashford, and claimed his right to challenge the appellant, the brother of the murdered girl, to wager of battle. His suit was allowed, and, the challenge being refused, the accused escaped. Next year the law was abolished (59 Geo. III., c. 46).

In sketching the history of the judicial combat we have traced the parentage of the modern duel. Strip the former of its legality, and divest it of its religious sanction, and the latter remains. We are justified, then, in dating the commencement of duelling from the abolition of the wager of battle. To pursue its history we must return to France, the country where it first arose, and the soil on which it has most flourished. The causes which made it indigenous to France are sufficiently explained by the condition of society and the national character. As Buckle has pointed out, duelling is a special development of chivalry, and chivalry is one of the phases of the protective spirit which was predominant in France up to the time of the Revolution. Add to this the keen sense of personal honour, the susceptibility, and the pugnacity which distinguish the French race. Montaigne, when touching on this subject in his essays, says, "Put three Frenchmen together on the plains of Libya, and they will not be a month in company without scratching one another's eyes out." The third chapter of d'Audiguier's *Ancien usage des duels* is headed, "Pourquoi les seuls Français se battent en duel." English literature abounds with allusions to this characteristic of the French nation. Lord Herbert of Cherbury, who was ambassador at the court of Louis XIII., says, "There is no Frenchman worth looking on who has not killed his man in a duel." Ben Jonson, in his *Magnetic La* makes Compass, the scholar and soldier, thus describ France, "that garden of humanity":—

> There every gentleman professing arms
> Thinks he is bound in honour to embrace
> The bearing of a challenge for another,
> Without or questioning the cause or asking
> Least colour of a reason.

Duels were not common before the 16th century Hallam attributes their prevalence to the barbarous custo of wearing swords as a part of domestic dress, a fashio which was not introduced till the later part of the 15t century. In 1560 the states-general at Orleans supplicate Charles IX. to put a stop to duelling. Hence the famou ordinance of 1566, drawn up by the Chancellor de l'Hôpital which served as the basis of the successive ordinances the following kings. Under the frivolous and sanguina reign of Henry III., "who was as eager for excitement a woman," the rage for duels spread till it became alm an epidemic. In 1602 the combined remonstrances of church and the magistrates extorted from the king an e condemning to death whoever should give or accep challenge or act as second. But public opinion was revol by such rigour, and the statute remained a dead letter. A duel forms a fit conclusion to the reign. A hair-brained youth named L'Isle Marivaux swore that he would not survive his beloved king, and threw his cartel into the air. It was at once picked up, and Marivaux soon obtained the death he had courted. Henry IV. began his reign by an edict against duels, but he was known in private to favour them; and, when De Crequi asked leave to fight Don Philip of Savoy, he is reported to have said, "Go, and if I were not a king I would be your second." Fontenay-Mareuil says, in his *Mémoires*, that in the eight years between 1601 and 1609, 2000 men of noble birth fell in duels. In 1609 a more effective measure was taken at the instance of Sully by the establishment of a court of honour. The edict decrees that all aggrieved persons shall address themselves to the king, either directly or through the medium of the constables, marshals, &c.; that the king shall decide whether, if an accommodation could not be effected, permission to fight should be given; that the aggressor, if pronounced in the wrong, shall in any case be suspended from any public office or employment, and be mulcted of one third of his revenue till he has satisfied the aggrieved party that any one giving or receiving a challenge shall forfeit right of reparation and all his offices; that any one w kills his adversary in an unauthorized duel shall s death without burial, and his children shall be reduc villanage; that seconds, if they take part in a duel, suffer death, if not, shall be degraded from the prof of arms. This edict has been pronounced by Henri "the wisest decree of the ancient monarchy on a which involves so many delicate and profound ques morals, politics, and religion touching civil (*Histoire de France*, x. 466).

In the succeeding reign the mania for duel De Houssaye tells us that in Paris when friend first question was, "Who fought yesterday? who to-day?" They fought by night and day, by and by torch-light, in the public streets and hasty word, a misconceived gesture, a questio colour of a riband or an embroidered letter, commonest pretexts for a duel. The slight frivolous the dispute, the less were they incli them to the king for adjudication. Often, or prize-fighters, they fought for the pure lo A misunderstanding is cleared up on the gr porte," cry the principals, "puisque no battons-nous." Seconds, as Montaigne longer witnesses, but must take part themselves unless they would be thought wanting in affection or courage; and he goes on to complain that men are no longer contented with a single second, "c'était anciennement des duels, ce sont à cette heure rencontres et batailles." There is no more striking instance of Richelieu's firmness and power as a statesman than his conduct in the matter of duelling. In his *Testament Politique* he has assigned his reasons for disapproving it as a statesman and ecclesiastic. But this disapproval was turned to active detestation by a private cause. His elder brother, the head of the house, had fallen in a duel stabbed to the heart by an enemy of the cardinal. Already four edicts had been published under Louis XIII. with little or no effect, when in 1626 there was published a new edict condemning to death any one who had killed his adversary in a duel, or had been found guilty of sending a challenge a second time. Banishment and partial confiscation of goods were awarded for lesser offences. But this edict differed from preceding ones not so much in its severity as in the fact that it was the first which was actually enforced. The cardinal began by imposing the penalties of banishment and fines, but, these proving ineffectual to stay the evil, he determined to make a terrible example. To quote his own words to the king, "Il s'agit de couper la gorge aux duels ou aux édits de votre Majesté." The count de Boutteville, a renommist who had already been engaged in twenty-one affairs of honour, determined out of pure bravado to fight a twenty-second time. The duel took place at mid-day on the Place Royal. De Boutteville was arrested with his second, the count de Chapelles; they were tried by Parliament, condemned, and, in spite of all the influence of the powerful house of Montmorenci, of which De Boutteville was a branch, they were both beheaded at Grève, June 21, 1627. For a short time the ardour of duellists was cooled. But the lesson soon lost its effect. Only five years later we read in the *Mercure de France* that two gentlemen who had killed one another in a duel were, by the cardinal's orders, hanged on a gallows, stripped, and with their heads downwards, in the sight of all the people. This was a move in the right direction, since, for fashionable vices, ridicule and ignominy is a more drastic remedy than death. It was on this principle that Caraccioli, prince of Melfi, when viceroy of Piedmont, finding that his officers were being decimated by duelling, proclaimed that all duels should be fought on the parapet of the Ponte Vecchio, and if one of the combatants chanced to fall into the river he should on no account be pulled out.

Under the long reign of Louis XIV. many celebrated duels took place, of which the most remarkable were that between the duke of Guise and Count Coligny, the last fought on the Place Royal, and that between the dukes of Beaufort and Nemours, each attended by four friends. Of the ten combatants, Nemours and two others were killed on the spot, and none escaped without some wound. No less than eleven edicts against duelling were issued under le Grand Monarque. That of 1643 established a supreme court of honour composed of the marshals of France; but the most famous was that of 1679, which confirmed the enactments of his predecessors, Henry IV. and Louis XII. At the same time a solemn agreement was entered into by the principal nobility that they would never engage in a duel on any pretence whatever. A medal was struck to commemorate the occasion, and the firmness of the king, in refusing pardon to all offenders, contributed more to restrain this scourge of society than all the efforts of his predecessors.

The subsequent history of duelling in France may be more shortly treated. The two great Frenchmen whose writings preluded the French Revolution both set their faces against it. Voltaire had indeed, as a young man, in obedience to the dictates of society, once sought satisfaction from a nobleman for a brutal insult, and had reflected on his temerity in the solitude of the Bastille.[1] Henceforward he inveighed against the practice, not only for its absurdity, but also for its aristocratic exclusiveness. Rousseau had said of duelling, "It is not an institution of honour, but a horrible and barbarous custom, which a courageous man despises and a good man abhors." Then came the Revolution, which levelled at a blow the huge structure of feudalism, and with it the duel, its instrument and apanage. *Pauca tamen suberunt priscæ vestigia fraudis.* With each reaction against the revolutionary spirit and return to feudal ideas the duel reappears. Under the Directory it again became fashionable among the upper classes. Napoleon was a sworn foe to it. "Bon duelliste mauvais soldat" is one of his best known sayings; and, when the king of Sweden sent him a challenge, he replied that he would order a fencing-master to attend him as plenipotentiary. After the battle of Waterloo duels such as Lever loves to depict were frequent between disbanded French officers and those of the allies in occupation. The restoration of the Bourbons brought with it a fresh crop of duels. Since then they have been chiefly confined to military circles, and a small section of Parisian journalists. Yet a list of duels fought within the last fifty years in France would occupy no inconsiderable space, and would include some of the most famous names in literature and politics, Emile de Girardin, Armand Carrel, Lamartine, Alexandre Dumas, Ledru Rollin, Edmond About, Sainte-Beuve, and M. Thiers. Even at the present hour men like Paul de Cassagnac exercise a sinister power, and an editor of the *Pays* must be an adept with swords and pistols no less than a skilled writer.

As a complete history of duelling would far exceed the limits of this article, we have preferred to trace in some detail its rise and fall in the country where it has most prevailed. We are thus compelled to pass by other nations, and conclude with a brief epitome of its annals at home. Duelling did not begin in England till some hundred years after it had arisen in France. There is no instance of a private duel fought in this country before the 16th century, and they are rare before the reign of James I. A very fair notion of the comparative popularity of duelling, and of the feeling with which it was regarded at various periods, might be gathered by examining the part it plays in the novels and lighter literature of the times. The earliest duels we remember in fiction are that in the *Monastery* between Sir Piercie Shafton and Halbert Glendinning, and that in *Kenilworth* between Tressilian and Varney. (That in *Anne of Geierstein* either is an anachronism or must reckon as a wager by battle.) Under James I. we have the encounter between Nigel and Lord Dalgarno. The greater evil of war, as we observed in French history, expels the lesser, and the literature of the Commonwealth is in this respect a blank. With the Restoration there came a reaction against Puritan morality, and a return to the gallantry and loose manners of French society, which is best represented by the theatre of the day. The drama of the Restoration abounds in duels. Passing on to the reign of Queen Anne, we find the subject frequently discussed in the *Tatler* and the *Spectator*, and Addison points in his happiest way the moral to a contemporary duel between Mr Thornhill and Sir Cholmeley Dering. "I come not," says Spinomont to King Pharamond, "I come not to implore your pardon, I come to relate my sorrow, a sorrow too great for human life to support. Know that this morning I have killed in a duel the man whom of all men living I love best." No reader of *Esmond* can forget Thackeray's description of the doubly fatal duel between the duke of Hamilton and Lord Mohun, which is historical, or the no less life-like though fictitious duel between Lord Mohun and Lord Castlewood. Throughout the reigns of the Georges they are frequent. Richardson expresses his opinion on the subject in six voluminous letters to the *Literary Repositor.* Sheridan, like Farquhar in a previous generation, not only dramatized a duel, but fought two himself. Byron thus commemorates the bloodless duel between Tom Moore and Lord Jeffrey:—

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[1] Voltaire met the Chevalier Rohan-Chabot at the house of the Marquis of Suliy. The Chevalier, offended by Voltaire's free speech, insolently asked the Marquis, "Who is that young man?" "One," replied Voltaire, "who, if he does not parade a great name, honours that he bears." The Chevalier said nothing at the time, but, seizing his opportunity, inveigled Voltaire into his coach, and had him beaten by six of his footmen. Voltaire set to work to learn fencing, and then sought the Chevalier in the theatre, and publicly challenged him. A *bon-mot* at the Chevalier's expense was the only satisfaction that the philosopher could obtain. "Monsieur, si quelque affaire d'intérêt ne vous a point fait oublier l'outrage dont j'ai à me plaindre, j'espère que vous m'en rendres raison." The Chevalier was said to employ his capital in petty usury.

> Can none remember that eventful day,
> That ever glorious almost fatal fray,
> When Little's leadless pistols met the eye,
> And Bow Street myrmidons stood laughing by!

As we approach our own times they become rarer in fiction. Thackeray, indeed, who represents an older generation, and the worse side of aristocratical society, abounds in duels. His royal highness the late lamented commander-in-chief had the greatest respect for Major Macmurdo, as a man who had conducted scores of affairs for his acquaintance with the greatest prudence and skill; and Rawdon Crawley's duelling pistols, "the same which I shot Captain Marker," have become a household word. Dickens, on the other hand, who depicts contemporary English life, and mostly in the middle classes, in all his numerous works has only three; and George Eliot never once refers to a duel. Tennyson, using a poet's privilege, has laid the scene of a duel in the year of the Crimean war, but he echoes the spirit of the times when he stigmatizes "the Christless code that must have life for a blow."

To pass from fiction to fact, a list of the celebrated public men who in the last century have fought duels will suffice to show the magnitude of the evil:—Fox, Pitt, William Pulteney and Lord Hervey, Canning and Lord Castlereagh, the duke of York, the duke of Richmond, Wilkes, Sir Francis Burdett, Grattan, Daniel O'Connell. For particulars we must refer the reader to the respective names.

The year 1808 is memorable in the annals of duelling in England. Major Campbell was sentenced to death and executed for killing Captain Boyd in a duel. In this case it is true that there was a suspicion of foul play; but in the case of Lieutenant Blundell, who was killed in a duel in 1813, though all had been conducted with perfect fairness, the surviving principal and the seconds were all convicted of murder and sentenced to death, and, although the royal pardon was obtained, they were all cashiered. The next important date is the year 1843, when public attention was painfully called to the subject by a duel in which Colonel Fawcett was shot by his brother-in-law Lieutenant Monro. The survivor, whose career was thereby blasted, had, it was well known, gone out most reluctantly, in obedience to the then prevailing military code. A full account of the steps taken by the late Prince Consort, and of the correspondence which passed between him and the duke of Wellington, will be found in the *Life of the Prince* by Theodore Martin. The duke, unfortunately, was not an unprejudiced counsellor. Not only had he been out himself, but, in writing to Lord Londonderry on the occasion of the duel between the marquis and Ensign Battier in 1824, he had gone so far as to state that he considered the probability of the Hussars having to fight a duel or two a matter of no consequence. But though the proposal of the prince to establish courts of honour met with no favour, yet it led to an important amendment of the articles of war (April 1844). The 98th of the articles now in force ordains that "every person who shall fight or promote a duel, or take any steps thereto, or who shall not do his best to prevent a duel, shall, if an officer, be cashiered or suffer such other penalty as a general court-martial may award." By the same articles, to accept or to receive apologies for wrong or insult given or received is declared suitable to the character of honourable men. The effect has been that duels, which had already been banished from civil society, have been no less discredited in the English army. In the German army, on the contrary, the institution survives in full force, and is recognized by law. A full account of the courts of honour to regulate disputes and duels among German officers will be found in *The Armed Strength of the German Empire.*

Any formal discussion of the morality of duelling is, in England at least, happily superfluous. No fashionable vice has been so unanimously condemned both by moralists and divines, and in tracing its history we are reminded of the words of Tacitus, "in civitate nostra et vetabitur semper et retinebitur." Some, however, of the problems moral and social which it suggests may be shortly noticed. That duelling flourished so long in England the law is perhaps as much to blame as society. It was doubtless from the fact that duels were at first a form of legal procedure that English law has refused to take cognizance of private duels. A duel in the eye of the law differs nothing from an ordinary murder. Our greatest legal authorities, from the time of Elizabeth downwards, such as Coke, Bacon, and Hale, have all distinctly affirmed this interpretation of the law. But here as elsewhere the severity of the penalty defeated its own object. The public conscience revolted against a Draconian code which made no distinction between wilful murder and a deadly combat, wherein each party consented to his own death or submitted to the risk of it. No jury could be found to convict when conviction involved in the same penalty a Fox or a Pitt and a Turpin or a Brownrigg. Such, however, was the conservatism of English publicists that Bentham was the first to point out clearly this defect of the law, and propose a remedy. In his *Introduction to the Principles of Morals and Legislation,* published in 1789, Bentham discusses the subject with his usual boldness and logical precision. In his exposition of the absurdity of duelling considered as a branch of penal justice, and its inefficiency as a punishment, he only restates in a clearer form the arguments of Paley. So far there is nothing novel in his treatment of the subject. But he soon parts company with the Christian moralist and proceeds to show that duelling does, however rudely and imperfectly, correct and repress a real social evil. "It entirely effaces a blot which an insult imprints upon the honour. Vulgar moralists, by condemning public opinion upon this point, only confirm the fact." He then points out the true remedy for the evil. It is to extend the same legal protection to offences against honour as to offences against the person. The legal satisfactions which he suggests are some of them extremely grotesque. Thus for an insult to a woman, the man is to be dressed in a woman's clothes, and the retort to be inflicted by the hand of a woman. But the principle indicated is a sound one, that in offences against honour the punishment must be analogous to the injury. Doubtless, if Bentham were now alive, he would allow that the necessity for such a scheme of legislation had in a great measure passed away. That duels have since become extinct is no doubt principally owing to social changes, but it may

rt ascribed to improvements in legal remedies in
which Bentham indicated. A notable instance is
mpbell's Act of 1843, by which, in the case of a
er libel, a public apology coupled with a pecuniary
is allowed to bar a plea. In the Indian Code
special enactments concerning duelling, which is
le not as murder but as homicide.

stions have from time to time been made for the
ment of courts of honour, but the need of such
is doubtful, while the objections to them are
The present tendency of political philosophy is
ct rather than extend the province of law, and any
nce with social life is justly resented. Real
against reputation are sufficiently punished, and
of the lawyers, that mere scurrility or opprobrious
hich neither of themselves import nor are attended
hurtful effects, are not punishable, seems on the
wise one. What in a higher rank is looked upon
s insult may in a lower rank be regarded as a mere
y or a harmless joke. Among the lower orders
against honour can hardly be said to exist; the
professions have each its own tribunal to which its
are amenable; and the highest ranks of society,
imperfect their standard of morality may be, are
competent to enforce that standard by means of
nalties without resorting either to trial by law or
battle.

raphy.—Castillo, *Tractato de duello*, Turin, 1525; J. P.
duello, 1554; Muzio Girolamo, *Traité du duel*, Venice,
yssat. *Recherches sur les duels*, Lyons, 1610; J. Savaron,
ntre les duels, Paris, 1610; F. Bacon, *Charge concerning*
, 1614; D'Audiguier, *Le vray et ancien usage des duels*,
17; *His Majesties Edict and severe Censure against private*
ondon, 1618; Cockburn, *History of Duels*, London, 1720;
, *Histoire anecdotique du Duel*, Paris; Millingen, *History*
g, London, 1841; Sabine, *Notes on Duels*, Boston, 1859;
, *Romance of Duelling*, London, 1868. See also Larousse,
ire du xixe siècle, article "Duel;" Mackay, *History of*
Delusions, Duels, and Ordeals; and for a valuable list of
s, Buckle, *History of Civilization in England*, vol. ii. p.
71. (F. S.)

OUR, WILHELM HEINRICH (1787–1875), a Swiss
director of the topographical survey of Switzerland,
at Constance, of Genevese parents temporarily in
n the 15th September 1787. During his early
t Geneva he showed no special capacity, and he
low place in the entrance examination to the
olytechnique at Paris, to which he went in 1807.
years' close study he so greatly improved his posi-
he was ranked among the first in the exit examina-
mmediately on leaving the school he received a
ion in the engineers, and was sent to serve in
hich was blockaded by the English. During the
Days he attained the rank of captain, and was
d in raising fortifications at Grenoble for its defence
the Austrians. After the peace that followed
o he retired from the French army on half-pay, and
his status as a Swiss citizen. Refusing the offer
mmand at Briançon on condition that he would
lopt the French nationality, he devoted himself to
itary service of his native land. From 1819 to
e was chief instructor in the military school of
which had been founded mainly through his in-
tality. Among other distinguished foreign pupils
he honour of instructing Prince Louis Napoleon,
ds emperor of the French. In 1827 he was raised
nk of colonel, and commanded the Federal army
es of field manœuvres. In 1831 he became chief
aff, and soon afterwards he was appointed quarter-
eneral. The most important work of his life was
ced in 1833, when the Diet commissioned him to
end the execution of a trigonometrical survey of Switzerland. He had already proved his fitness for the task by making a cadastral survey of the canton of Geneva, and publishing a map of the canton in four sheets on the scale of $\frac{1}{25000}$. The larger work occupied thirty-two years, and was accomplished with complete success. The map in 25 sheets on the scale of $\frac{1}{100000}$ was published at intervals between 1842 and 1865, and is an admirable specimen of cartography. In recognition of the ability with which Dufour had carried out his task, the Federal Council in 1868 ordered the highest peak of Monte Rosa to be named Dufour Spitze. In 1847 Dufour received the command of the Federal Army, which was employed in reducing the revolted Catholic cantons to submission. The quickness and thoroughness with which he performed the painful task, and the wise moderation with which he treated his vanquished fellow-countrymen, were acknowledged by a gift of 60,000 francs from the Diet and various honours from different cities and cantons of the confederation. In politics he belonged to the moderate conservative party, and he consequently lost a good deal of his popularity in 1848. In 1864 he presided over the International Conference which framed the so-called Geneva Convention as to the treatment of the wounded in time of war, &c. He died on the 14th July 1875. Dufour was the author of a *Mémoire sur l'artillerie des anciens et sur celle du moyen-âge* (1840), *De la fortification permanente* (1850), *Manuel de tactique pour les officiers de toutes armes* (1842), and various other works in military science.

DUFRÉNOY, PIERRE ARMAND, geologist and mineralogist, was born at Sevran, in the department of Seine-et-Oise, in France, in 1792, and died March 20, 1857. After leaving the Imperial Lyceum in 1811, he studied till 1813 at the Polytechnic School, and then, at the age of twenty-one, entered the corps des mines. In conjunction with M. Élie de Beaumont he in 1841 published a great geological map of France, the result of investigations carried on during thirteen years (1823–1836). Five years (1836–41) were spent in writing the text to accompany the map. The two authors had already together published *Voyage métallurgique en Angleterre* (1827, 2d ed. 1837–39), *Mémoires pour servir à une description géologique de la France* (1830–38), and a *Mémoire* on Cantal and Mont-Dore (1833). Other literary productions of Dufrénoy are an account of the iron-mines of the eastern Pyrenees (1834), a treatise on mineralogy (1844, 2d ed. 1856–60), and numerous papers contributed to the *Annales des Mines* and other scientific publications, one of the most interesting of which is entitled *Des terrains volcaniques des environs de Naples.* Dufrenoy was a member of the Academy of Sciences, a commander of the Legion of Honour, an inspector-general of mines, and professor of geology at *L'École des Ponts et Chaussées*, and of mineralogy at the Imperial School of Mines, of which latter institution he was the director.

DUFRESNY, CHARLES RIVIÈRE (1648–1728), a French dramatist, better remembered by the comedy of his own life than by any of the numerous plays which he contributed to the Théâtre Italien and the Théâtre Français. The fact that his grandfather was an illegitimate son of Henry IV. procured him the liberal patronage of Louis XIV., who not only gave him the post of *valet de chambre*, but affixed his name now to one lucrative privilege and now to another. The *protégé*, however, appeared as eager to squander as the king was to bestow; and the pathetic confession of exhausted generosity—"I cannot enrich Dufresny"—was probably taken by the careless spendthrift as a signal compliment; though to one of his friends who consoled him with the remark that poverty is no sin, he replied, "*It is worse.*" On Louis's death he was almost as necessitous as if Louis had never lived; but he obtained 200,000 francs from the duke of Orleans in answer to an ingenious request that his highness for his own glory would leave Dufresny in his excessive indigence as a sole example of the condition of the whole kingdom before the golden days of his regency. As if to furnish a piquant commentary on the proverb that poverty makes us acquainted with strange bed-fellows, he married his washerwoman in discharge of her bill—a whimsicality which supplied Le Sage with an episode in the *Diable Boiteux*, and was made the subject of a comedy by J. M. Deschamps—*Charles Rivière Dufresny, ou le mariage impromptu*. Clever, versatile, and superficial, he obtained in his own day a considerable reputation not only as an author and a wit, but also as a landscape gardener and architectural designer: to his great patron he furnished plans for the park at Versailles, and was appointed in return overseer of the royal grounds. He died at Paris in 1728 in a house—*la maison de Pline*—which he had built with the regent's bounty. His plays, destitute for the most part of all higher qualities, but abounding in sprightly wit and pithy sayings, are no longer acted; though a few of the many in the six volumes of his *Théâtre* (Paris, 1731) are still read. *L'esprit de contradiction* (first acted in 1700), *Le double veuvage* (1702), *La coquette du village*, and *Le mariage fait et rompu* are reprinted in the second volume of Didot's *Chefs d'œuvre des auteurs comiques*; and his contributions to the Théâtre Italien, produced in collaboration with Regnard or Biancocolli, may be found in Gherardi's collection. A volume of *Poésies diverses*, two volumes of *Nouvelles historiques*, Leyde, 1692, and *Les amusements sérieux et comiques d'un Siamois*, 1807, a work to which Montesquieu was indebted for the idea of his *Lettres Persanes*, complete the list of Dufresny's writings. Two volumes of *Œuvres Choisies* were edited by Auger in 1801.

DUGDALE, Sir William (1605–1686), an eminent English antiquary, the only son of John Dugdale, who belonged to an old Lancashire family, but had sold his property in that county and bought the estate of Shustoke, near Coleshill, in Warwickshire, was born on the 12th September 1605. He received the early part of his education from Thomas Sibley, a curate near Shustoke, and attended from his tenth to his fifteenth year the Free School at Coventry, whence returning to his father, he read with him for some time law and history. In compliance with his father's wish, who was old and infirm, and desired to see him married before he died, he was married at the early age of seventeen to the daughter of a gentleman in the county of Stafford. He lived in his wife's father's house until the death of his own father in 1624, and soon thereafter went to reside at Fillongley, near Shustoke, an estate formerly purchased for him by his father. In 1625 he purchased the manor of Blyth, in the parish of Shustoke, and, preferring it as a place of residence, removed thither in 1626. His inclination to the study of antiquities manifested itself at an early age, and received its first encouragement from Samuel Roper, a barrister of Lincoln's Inn. After his settlement at Blyth Hall he made the acquaintance of some gentlemen interested in antiquities, who enabled him to obtain a sight of the old "deeds and evidences" of the county families of Warwickshire, and "divers antient writings of consequence," with the view of his writing a history of that county. In 1635 he accompanied Sir Simon Archer to London, and was by him introduced to Sir Henry Spelman, which led to his acquaintance with Thomas, earl of Arundell, then earl marshal of England, by whom he was, in 1638, created a pursuivant of arms extraordinary by the name of Bianche Lyon, and in 1639 rouge-croix pursuivant in ordinary. About this time he agreed to write his work on *Monastery Foundations*, and, having a lodging in the Herald's Office, he now spent much of his time in London in order to augment his collections out of the records of the Tower and other places in the city. In 1641 Sir Christopher Hatton, a member of the House of Commons, dreading the near approach of the revolutionary storm which soon thereafter broke over England, and the ruin that might then ensue, got him to make exact drafts of all the monuments in Westminster Abbey and the principal churches in England, including Peterborough, Ely, Norwich, Lincoln, Newark, Beverley, Southwell, Kingston-upon-Hull, York, Selby, Chester, Lichfield, Tamworth, and Warwick. He received and obeyed, in June 1642, the summons of Charles I. to attend him at York, whither, on the outbreak of the revolution, the king had betaken himself for the sake of greater security. Learning the spread of the revolution in Warwickshire, Charles deputed him to summon to surrender the castle of Banbury, in Oxford, and the castle of Warwick, which were being rapidly filled with ammunition and rebels. Banbury obeyed, but Warwick, being better prepared, contemned the summons and its inmates were proclaimed traitors. He also summoned the city of Coventry; and, accompanying Sir Richard Willys as guide, he was present at the battle of Cudworth Field, the result of which he communicated to the king. He remained at Oxford with the king till the surrender of the garrison in 1646, and witnessed the battle of Edgehill, of the field of which he made afterwards an exact survey, noting how the armies were drawn up, and where and in what direction the various movements took place, and marking the graves of the slain. In November 1642 he was admitted M.A. of the university, and in 1644 the king created him Chester-Herauld. While at Oxford he made a journey to Worcester, where—with the purpose of increasing his collections for his history of Warwickshire—he perused the registers of the bishop and of the dean and chapter; and during his Oxford leisure he applied himself also to the search for antiquities in the libraries and in the private houses. When Oxford surrendered he continued his antiquarian researches in London along with Richard Dodsworth for their joint work on the monasteries, which was published successively in single volumes in 1655, 1664, and 1673. At the Restoration he obtained the office of Norroy king-at-arms, and in 1677 was created garter principal king-at-arms, and was knighted. He died at Blyth Hall, 10th February 1686.

Besides the works on Warwickshire, published in 1656, and *Monasticon Anglicanum*, republished in 6 vols. in 1817–30, and again in 8 volumes in 1846, Sir William Dugdale is the author of *History of St Paul's Cathedral* (1658), the *Baronage of England* (3 vols. 1675–6), and other works of less importance. His life, written by himself up to 1678, with his diary and correspondence, and an index to his manuscript collections, was edited by William Hamper, and published in 1827.

DUGONG (*Halicore*), a genus of herbivorous Cetacea, forming, along which the Sea-Cows (*Manatus*), and the now extinct *Rhytina*, the sub-order Sirenia. In this genus the head is small, and is abruptly truncated in front, the snout being remarkably obtuse and furnished with bristles. The intermaxillary bones are enormously developed, and from these proceed two large incisor teeth or tusks, which are well developed in the male, but which in the female are arrested in their growth, and remain concealed beneath the surface. There are never more than five molar teeth on each side of either jaw, or twenty in all, and these are flat on the grinding surface. The flippers are unprovided with nails, and the tail is broad, and differs from that of the manatee in being crescent-shaped instead of rounded. The bones are very hard and firm, and take a polish equal to that of ivory. The dugongs frequent the shallow waters of the tropical seas, extending from the east coast of Africa north of the mouth of the Zambesi river, along the shores of the Indian, Malayan, and Australian seas, where they may be seen basking on the surface of the water, or browsing on submarine pastures of *Algæ* and *Fuci*, for which the thick obtuse lips and truncated snout preeminently fit them. They are gregarious, feeding in large numbers in localities where they are not often disturbed. The female produces a single young one at a birth, and is remarkable for the great affection it shows for its offspring, so that when the young dugong is caught there is no difficulty in capturing the mother with it. There are two species—the Indian Dugong (*Halicore indicus*) and the Australian Dugong (*Halicore australis*). The former is very abundant along the shores of the Indian Ocean, and is captured in large numbers by the Malayans, who esteem its flesh as a great delicacy; while the lean portions, especially of young specimens, are regarded by Europeans even as excellent eating. It is generally taken by spearing, the main object of the hunter being to raise the tail out of the water, when the animal becomes perfectly powerless. It seldom attains a length of more than 8 or 10 feet. The Australian Dugong is a larger species, attaining sometimes a length of 15 feet. It occurs along the Australian coast from Moreton Bay to Cape York, and is highly valued by the natives, who hunt for it with spears, and gorge themselves with its flesh, when they are fortunate enough to secure a carcase. In recent years the oil obtained from the blubber of this species has been largely used in Australia as a substitute for cod-liver oil. It does not contain iodine, but is said to possess all the therapeutic qualities of cod-liver oil without its nauseous taste. A full grown dugong yields from 10 to 12 gallons of oil, and this, according to Bennet, "forms in cold weather a thick mass, and requires to be melted before a fire previously to being used." According to the same authority, the flesh of the Australian dugong is easy of digestion, the muscular fibre when fresh resembling beef, and when salted having the flavour of excellent bacon. In the earliest Australian dugong fishery, natives were employed to harpoon these cetaceans; they soon, however, became too wary to allow themselves to be approached near enough for this purpose, and the harpoon was abandoned for the net. The latter is spread at night, and in its meshes dugongs are caught in considerable numbers. The skin is nearly half an inch thick, and can be made into gelatine or glue.

DUGUAY-TROUIN, René (1673-1736), a famous French admiral, was the son of a sea captain, and was born at St Malo on the 10th June 1673. He was originally intended for the church, and studied with that view at Rennes and Caen; but on the breaking out of the war with England and Holland in 1689 he obtained leave to enter the marine. Accordingly he embarked in the capacity of a volunteer on board a small vessel of 18 guns, equipped by his family, and during the first three months his courage was tried by a violent tempest, an imminent shipwreck, the boarding of an English ship, and the threatened destruction of his own vessel by fire. The following year, as a volunteer in a vessel of 28 guns, he carried off the honours in a bloody combat with an English fleet of five merchant vessels. The courage he then showed was so remarkable that in 1691, at the age of eighteen, he obtained the command of a frigate of 14 guns, when, having been thrown by a tempest on the coast of Ireland, he burned two English ships in the river Limerick. In 1694 his vessel of 40 guns was captured by the English, and, being taken prisoner, he was confined in the castle of Plymouth, where, however, he made love to the daughter of the jailer, and by her aid managed to escape. He then obtained command of a vessel of 48 guns, and made a capture of English vessels on the Irish coast. In 1696 he made a brilliant capture of Dutch vessels, and the king hearing an account of the affair raised him in 1697 to the rank of captain of a frigate. In 1704–5 he desolated the coasts of England. In 1706 he was raised to the rank of captain of a vessel of the line. In 1707 he was made chevalier of the order of St Louis, and captured the greater part of an English convoy of troops and munitions bound for Portugal. His most glorious action was the capture in 1711 of Rio Janeiro, on which he imposed a heavy contribution. In 1715 he was made chief of a squadron, and in 1728 commander of the order of St Louis and lieutenant-general. In 1731 he commanded a squadron for the protection of French commerce in the Levant. He died 27th September 1736.

DU GUESCLIN, Bertrand (c. 1314–1380), constable of France, the most famous French warrior of his age, was born of an ancient but undistinguished family, at the castle of La Motte-Broon, near Rennes, about 1314. The date is doubtful, the authorities varying between 1311 and 1324. The name is spelt in various ways in contemporary records, *e.g.*, Claquin, Klesquin, Guesequin, Glayaquin, &c. The familiar form is found on his monument at St Denis, and in some legal documents of the time. In his boyhood Bertrand was a dull learner, spending his time in open air sports and exercises, and could never read or write. He was remarkable for ugliness, and was an object of aversion to his parents. He first made himself a name as a soldier at the tournament held at Rennes in 1338 to celebrate the marriage of Charles of Blois with Jeanne de Penthièvre, at which he unseated the most famous competitors. But this playing at fighting was not enough for his ambition; and in the war which followed between Charles of Blois and John de Montfort, for the possession of the duchy of Brittany, he served his apprenticeship as a soldier. As he was not a great baron with a body of vassals at his command, he put himself at the head of a band of adventurers, and fought on the side of Charles and of France. He distinguished himself by a brilliant action at the siege of Vannes in 1342; and after that he disappears from history for some years. In 1351, having shortly before been made a knight, he was sent into England with the lords of Brittany to treat for the ransom of Charles of Blois, who had been defeated and captured by the English in 1347. When Rennes was besieged by the duke of Lancaster, in 1356, Du Guesclin forced his way with a handful of men into the town, and successfully defended it till June 1357, when the siege was raised in pursuance of the truce of Bordeaux. For this service he was rewarded with the lordship of Roche d'Airien. At the expiration of the truce he distinguished himself by the defence of Dinan, and here he engaged in single combat with Sir Thomas Canterbury. Shortly afterwards he married; and about the same time he passed into the service of France, and greatly distinguished himself at the siege of Melun (1359). In April 1364, in conjunction with Boucicaut, he recovered Mantes and Meulan from the king of Navarre; and in May he defeated the Navarrese under Captal de Buch at Cocherel, and took their leader prisoner. The king now created him marshal of Normandy and count of Longueville. At the battle of Auray, in September of the same year, Charles of Blois was defeated and killed, and Du Guesclin taken prisoner, by Sir John Chandos. The grand companies beginning, after the close of the war, to play the part of brigands in France, it was necessary to get rid of them. Du Guesclin was ransomed for 100,000 crowns, and was charged to lead them out of France. He marched with them into Spain, visiting Avignon on the way, and extorting from the Pope a large sum of money and his absolution. Du Guesclin now supported Henry of Trastamare against Peter the Cruel, set the former upon the throne of Castile (1366), and was made constable of Castile and count of Trastamare. In the following year he was defeated and captured by the Black Prince, ally of Peter the Cruel, at Najara, but was soon released for a heavy ransom. Once more he fought for Henry, reinstated him on the throne

(1369), and was created duke of Molinas. In May 1370, at the command of Charles V., who named him constable of France, he returned to France. War had just been declared against England, and Du Guesclin was called to take part in it. For nearly ten years he was engaged in fighting against the English in the south and the west of France, recovering from them the provinces of Poitou, Guienne, and Auvergne, and thus powerfully contributing to the establishment of a united France. In 1373, when the duke of Brittany sought English aid against a threatened invasion by Charles V., Du Guesclin was sent at the head of a powerful army to seize the duchy, which he did; and two years later he frustrated by a defensive policy the attempt of the duke with an English army to recover it. Finding in 1379 that the king entertained suspicions of his fidelity to him, he resolved to give up his constable's sword and retire to Spain. His resolution was at first proof against remonstrance; but ultimately he received back the sword, and continued in the service of France. In 1380 he was sent into Languedoc to suppress disturbances and brigandage, provoked by the harsh government of the duke of Anjou. His first act was to lay siege to the fortress of Châteauneuf-Randon, held by the English, strongly garrisoned and well provisioned. A day was fixed conditionally for capitulation. Meanwhile the great warrior was smitten with a mortal illness, and died, July 13, 1380. The commander led out the garrison and deposited the keys of the castle on the coffin of the hero. Du Guesclin lost his first wife in 1371, and married a second in 1373, but he left no legitimate children. His remains were interred, by order of the king, in the church of St Denis.

Of the numerous recent biographies of Du Guesclin, the most recent is the learned work by D. F. Jamison (Charleston, 1863), which was translated into French by J. Baissac by order of Marshal Count Randon, minister of war, and published in 1866.

DUHALDE, Jean Baptiste (1674–1743), geographical writer, was born at Paris, February 1, 1674. In 1708 he entered into the Society of Jesus, and some time afterwards he was appointed to succeed Father Legobien, who had been intrusted with the duty of collecting and arranging the letters which they received from their missionaries in different quarters of the globe. He was also for some time secretary to the famous Father Le Tellier, confessor to the king of France. He died August 18, 1743. Duhalde is represented as a man of mild and amiable character, and as remarkable alike for his unaffected piety and unwearied industry. He was the author of some Latin poems, which do not evince any superior degree of excellence. The productions for which he is principally distinguished are—(1) *Lettres Edifiantes et Curieuses écrites des Missions Etrangères*, which he edited with great ability from the ninth to the twenty-sixth volume inclusive, and which have been translated into English and German; and (2) *Description géographique, historique, chronologique, politique, et physique de l'Empire de la Chine et de la Tartarie Chinoise*, Paris, 1735, in four volumes large folio, with figures and an atlas by D'Anville. This work, the first in which China is described with so much exactness and detail, is a beautiful specimen of French typography. An English translation by Brookes was published in 1736 in 4 vols.

DUHAMEL, Jean Baptiste (1624–1706), a French astronomer and physician, was the son of an advocate, and was born at Vire, in Normandy, in 1624. He commenced his studies at Caen, and completed them at Paris. At the age of eighteen he wrote a treatise on the *Spherics* of Theodosius, and added to it a tract on trigonometry, designed as an introduction to astronomy. At the age of twenty-one he became curé of Neuilly-sur-Marne, but without neglecting the duties of his calling, he continued to cultivate the physical sciences with zeal. In 1656 he was named almoner of the king; in 1663 he obtained the dignity of chancellor of the church of Bayeux; and in 1666, when Louis XIV. established the Royal Academy of Sciences, he was appointed perpetual secretary. He was preparing a history of the Academy when he died, August 6, 1706. He published numerous works on philosophy, divinity, and physical science.

DUHAMEL DU MONCEAU, Henry Louis (1700–1782), a celebrated French botanist and agriculturist, was the son of Alexandre Duhamel, lord of Denainvilliers, and was born at Paris in 1700. He was placed at the Collége d'Harcourt, but made little progress in his studies, except that, notwithstanding the imperfect manner in which the natural sciences were there taught, he acquired such a taste for these branches of knowledge as led him to attend the lessons of Dufay and Bernard de Jussieu at the Jardin des Plantes. He now spent his time between the capital, where he pursued his botanical studies and held intercourse with scientists, and his estates at Gâtinais, where he employed his knowledge in arboricultural experiments. Having been requested by the Academy of Sciences to investigate the cause of the disease which was destroying the saffron plant in Gâtinais, he discovered that its destruction was owing to a parasitical fungus which attached itself to its roots. The work in which he demonstrated his discovery was judged worthy to appear in the transactions of the Academy, and gained him admission to that body in 1728. From then until his death he busied himself chiefly with making experiments in vegetable physiology, and recording and publishing his observations. Having learned from Sir Hans Sloane that madder possesses the property of giving colour to the bones, he fed animals successively on food mixed and unmixed with madder; and he found that their bones in general exhibited concentric strata of red and white, whilst the softer parts showed in the meantime signs of having been progressively extended. From a number of experiments he was led to believe himself able to explain the growth of bones, and to demonstrate a parallel between the manner of their growth and that of trees. Along with the celebrated naturalist Buffon, he made numerous experiments on the growth and strength of wood, one of the results of which was that he recommended the bark to be taken off the trees several years before they are cut down. He experimented also on the growth of the mistletoe, on layer planting, on smut in corn, and on the production of soda and potash by different vegetables. From the year 1740 he made meteorological observations, and kept records of the influence of the weather on agricultural production. Having been appointed inspector-general of marine, he applied his scientific acquirements to the improvement of nautical knowledge, subjecting everything to the test of facts and experiments. Duhamel's aim in his researches was rather to be useful than to gratify his own curiosity or to win fame. He made himself accessible to all who sought information from him, and his modesty was as great as his knowledge. He was scrupulous in the practice of his religious duties. He died August 13, 1782.

His works are generally of an elementary character, and from the minute details of their information are rather prolix. They number nearly 90 separate publications, the principal of which are—*Traité des arbres et arbustes qui se cultivent en France en pleine terre*; *Elements de l'architecture navale*; *Traité general des pêches maritimes et fluviatiles*; *Elements d'agriculture*; *La physique des arbres*; *Des semis et plantations des arbres et de leur culture*; *De l'exploitation des bois*; *Traité des arbres fruitiers*.

DUISBURG, a town of Prussia, at the head of a circle in the government of Düsseldorf, situated at an important railway junction in the country between the Rhine and the Ruhr, and communicating with both rivers by a canal. It has a fine Gothic church—*Salvatorkirche*—of the 15th century, a gymnasium, and an orphan asylum, and is also the seat of a great Protestant *Diakonenanstalt*, or Deacon's Institute, founded in 1844 by Engelbert, and forming the centre of a large organization for philanthropic action. Its importance, however, is mainly due to the great development of its industry, which deals on an extensive scale with various branches of engineering and the iron manufacture, as well as with cotton—both yarn and cloth—tobacco, sugar, and a number of chemical stuffs, such as alum, soda, and Prussian blue. Probably known to the Romans as Castrum Deutonis, and mentioned under the Frankish kings as Dispargum, Duisburg early attained the rank of an imperial free town, passed in 1290 to Cleves, and afterwards to Brandenburg, and from 1655 to 1818 was the seat of a university, transferred in the latter year to Düsseldorf. Population in 1871, 30,533.

DUKE (Latin, *dux*), next to the princes and princesses of the blood royal, and the four archbishops of England and Ireland, the highest order and rank of the British peerage. The title of duke was introduced into England when, by a charter dated 17th March 1337, the lordships, castles, lands, &c., constituting the earldom of Cornwall, were erected by King Edward III. into a duchy, and were conferred upon his eldest son Prince Edward of Woodstock, afterwards so well and honourably known as the Black Prince, who thus as duke of Cornwall was the *first* English duke. When, in 1343, he was created to the dignity of Prince of Wales, the Black Prince was invested with a coronet, a gold ring, and a silver rod. And, as duke of Cornwall, he had already been invested with a sword. The second of the English dukes was Henry, earl of Lancaster, Derby, and Leicester, and count of Provence, who in 1351 was created duke of Lancaster.

Of the form and enrichment of the princely coronet of the Black Prince no representation or descriptive record is known to exist; nor is it known whether any distinctive coronet was ever assigned to the prince as the ensign of his ducal rank. As now worn, a duke's coronet has eight golden leaves of a conventional type (commonly called, but without any reason whatever, "strawberry-leaves"), set erect upon a circlet of gold, and having their stalks so connected as to form them into a wreath. In representations, three only of the leaves, with two half leaves, are shown. Of late years this coronet has inclosed, and in representations is shown to inclose, a cap of crimson velvet, surmounted by a rich golden tassel, and lined and guarded with ermine (fig. 1); but, still more recently, this coronet is commonly represented, with much better taste, with neither cap or lining of any kind, as in fig. 2. The opinion is prevalent that this distinctive form of coronet appears for the first time placed about the basinet of Prince John of Eltham, the younger brother of Edward III., who died in 1336, on his monumental effigy in Westminster Abbey. That there is no foundation for such a supposed origin of the ducal coronet is evident from the effigy itself; since the decorations of the headpiece and of the rest of the armour are precisely the same, and they also are identical with similar decorations that appear in other effigies of about the same date. The decoration, however, that is carved upon the basinet of Prince John may probably have suggested the crest-coronet, which in the 15th century so frequently supported knightly crests. It must be added that the basinet in the effigy of Prince John certainly once was encircled by a plain narrow fillet, probably of gold, for the reception of which a channel still appears, slightly sunk in the alabaster immediately below the band of conventional leafage that is carved in low relief. The effigy of the Black Prince himself (1376), at Canterbury, exhibits on the basinet a decorative accessory that may possibly have been the prototype of the leaf-crowned circlet restricted to dukes in later times. From the jewelled band or fillet that encompasses this basinet there rise sixteen leaves, with a second series of the same number of trefoils of much smaller size alternating with the larger leaves, the stalks of the whole being conjoined. These larger leaves differ very slightly from those that are carved upon the armour of Prince John of Eltham, and they are in exact accordance with a favourite form of decorative foliage in general use when the effigy was executed. In his will, Lionel, duke of Clarence, who died in 1368, bequeathed the "*two golden circles*," with one of which he states that he himself had been "created a duke," while with the other his elder brother, the Black Prince, had been "created a prince." It may be accepted as certain that for a considerable time the coronets of both dukes and earls were decorated rather after an arbitrary taste than in accordance with any established rule. Thus, more than a century after the death of the Black Prince, the coronet of John de la Pole, K.G. duke of Suffolk, has the circlet heightened with fleurs-de-lys alternating with clusters of three small balls. The exact period at which the distinctive enrichments of the coronets of the different orders in the British peerage was determined and established still remains undecided.

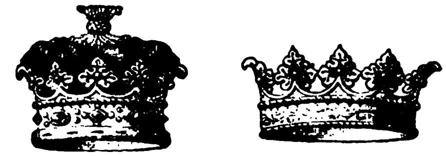
Fig. 1. Fig. 2.

Ducal Coronets.

In early times, the rank, dignity, and title of duke were directly associated with power, authority, and local possessions, which constituted and were inseparable from his dukedom; but, after a while, these associations gradually became weakened, and at length for the most part they ceased to exist of necessity, so that at the present day the connection between a duke and the locality that gives the title to his dukedom may be very slight indeed.

This same title, duke, is borne still, with their princely rank and title, by the princes of the royal family, as it was in the days of Edward III.; but these royal dukedoms, notwithstanding that they constitute peerages and are hereditary, are created chiefly with a view to connect the members of the reigning house with the great cities or with certain provinces of the realm. The old royal dukedom of York is now so far in abeyance that since the last duke of York died without issue no duke of York has been created. The rival royal dukedom of Lancaster since the accession of Henry IV. has been merged in the crown. The dukedom of Cornwall is held by the heir apparent.

At various periods also, and in different countries, this same title, duke, has been in use to denote certain princes who were the actual sovereigns of small states, or others who, while vassals of some great suzerain, enjoyed in an approximate degree a virtual independence. The term duke, again, was introduced into their English version by the translators of the Old Testament, as a becoming title for certain chieftains and potentates, the Oriental sheiks of a remote antiquity.

A duke in the British peerage, not of royal rank, is styled "Your Grace," and he is "Most Noble;" his wife is a "duchess," and she also is styled "Your Grace," and is "Most Noble." All their sons are "lords," and all their daughters are "ladies;" but their eldest son bears his father's "second title," since each of the higher ranks of nobility has one or more of the lower ranks associated with it; thus a duke's eldest son always ranks as a marquis, and generally bears that title. The parliamentary mantle or robe of a duke is scarlet, and has four doublings of ermine. The royal dukes have coronets as princes. The coronet of a duchess is the same as that of her husband.

The titles arch-duke and arch-duchess, grand-duke and grand-duchess, are in use on the Continent, the former in Austria and the latter in Russia, to distinguish the princes and princesses of the imperial families. The title grand-duke has also been applied to certain of the minor Continental independent princes. (G. B.)

DUKINFIELD, a township and local board district of England, in East Cheshire, forming part of the parliamentary borough of STALEYBRIDGE, which see.

DULCAMARA, so named from its taste, at first bitter and eventually sweet, is a drug consisting of the dried young branches of *Solanum Dulcamara*, Bitter-sweet or Woody Nightshade—a woody perennial of the natural order *Solanaceæ*. It has a slender shrubby and climbing stem; flowers in lateral or terminal cymes, with a hypogynous purple corolla, and yellow anthers converging into a cone; and fruit a red, oval, scarlet berry. For medical purposes the branches are collected in autumn when the leaves are shed. Dulcamara contains an alkaloid *solanine*, $C_{43}H_{71}NO_{16}$ (Zwenger and Kind), besides a sweet and bitter principle, *dulcamarine* or *picroglycion*, and other matters. The drug was formerly supposed to be efficacious in a great variety of complaints. It appears to have some effect on the skin and kidneys, and the infusion is now administered in chronic skin diseases, cachectic conditions of the system, and rheumatic affections.

See D. Cauvet, *Des Solanées*, Strasburg, 1864; Garrod, *Materia Medica*, 4th ed. 1874.

DULCIGNO, a town of Turkey in Europe, in the Albanian sanjak of Scutari, occupying a bold promontory on the Adriatic, eighteen miles W.S.W. of the town of Scutari. It has a strong castle, is the seat of a Catholic bishop, and numbers about 8000 inhabitants, who are mainly engaged in agriculture, but also carry on a little ship-building and a certain amount of foreign commerce. The Turkish Olkin, or Olgun, preserves more distinctly the ancient name of *Olcinium*, by which Dulcigno was known to the Romans, who obtained possession of it about 167 B.C. during the war with Gentius, the Illyrian king. In modern history the town is noted for the defeat of the Venetians in 1718; and its inhabitants were long remarkable for their piracies.

DULUTH, a city and lake port of the United States, in the state of Minnesota, advantageously situated at the south-west extremity of Lake Superior, about 150 miles north-east of St Paul. It forms the eastern terminus of the Northern Pacific railroad and the northern terminus of the Lake Superior and Mississippi railroad. A ship canal, 250 feet wide, which has been cut across Minnesota point, gives ready access to the town from the lake. Duluth stands on the side of an acclivity overlooking the lake. It possesses docks, and contains several manufactories. Owing to its position the rise of the town has been very rapid. In 1860 there were not 75 inhabitants, whereas a census in 1875 showed the population to be 5000. It derives its name from Jean Du Luth, a French officer who visited the spot in the 17th century.

DULWICH, a village of England, in the county of Surrey, five miles from London Bridge, remarkable for its college and picture gallery. The manor, which had belonged to the Cluniac monks of Bermondsey, was granted by Henry VIII., in 1541, to Thomas Calton; and his grandson, Sir Francis Calton, sold it in 1606 to Edward Alleyn, whose name is indissolubly associated with the place by his princely foundation. Dulwich College, or, as he quaintly and piously called it, "God's Gift College" (see ALLEYN, vol. i. p. 584), was opened with great state on September 13, 1619, in the presence of Lord Chancellor Bacon, Lord Arundell, Inigo Jones, and other distinguished men. According to the letters patent the almspeople and scholars were to be chosen in equal proportions from the parishes of St Giles (Camberwell), St Botolph without Bishopsgate, and St Saviour's (Southwark), and "that part of the parish of St Giles without Cripplegate which is in the county of Middlesex." By a series of statutes signed in 1626, a few days before his death, Alleyn ordained that his school should be for the instruction of 80 boys consisting of three distinct classes:—(1) the twelve poor scholars; (2) children of inhabitants of Dulwich (who were to be taught freely); and (3) "towne or foreign schollers," who were "to pay such allowance as the master and wardens shall appoint." That it was the founder's intention to establish a great public school upon the model of Westminster and St Paul's, with a liberal provision for university training, is conclusively shown by the statutes; but he was scarcely dead when his grand project was overthrown, and for more than two centuries the educational benefits of God's Gift College were restricted to the twelve poor scholars. In 1858, however, the foundation was entirely reconstituted by Act of Parliament. The government of the college is now vested in 19 governors, of whom 11 are nominated by the Court of Chancery and 8 elected by the four parishes already mentioned. The first head of the reconstituted college, and the first also who has not borne the name of Alleyn, is the Rev. A. J. Carver, D.D. The revenue is at present (1877) more than £17,000 a year, with the prospect of a large and progressive increase. After provision for the expenses of management and the maintenance of the chapel and library, the surplus is divided into four portions, of which three are assigned to the educational and one to the eleemosynary branch of the foundation. The educational foundation comprises two distinct schools, the "Upper" and the "Lower." In the former the curriculum of study, as defined by Act of Parliament, includes, besides ancient and modern languages and mathematics, drawing and designing, civil engineering, physics, chemistry, and other branches of science; in the latter it is similar to that adopted in so-called middle-class schools. The Upper School contained in 1877 nearly 600 boys, and the Lower 160. The buildings of the Upper School are a splendid pile, designed by Mr Charles Barry, in the "Northern Italian style of the 13th century." They are said to form the most commodious and complete, as probably they have proved the most costly, fabric erected for educational purposes in recent times. The main architectural feature is the interior of the great hall, which will compare advantageously with some of the best college halls at Oxford or Cambridge. There are about 25 acres of play-ground and cricket-field included within the boundary fence of the college. Dulwich College possesses one advantage peculiar to itself in its splendid picture gallery, bequeathed to the college by Sir P. F. Bourgeois, R.A., in 1811, with a separate endowment of £520 a year. The pictures most widely known and most highly appreciated are probably the exquisite Murillos and the choice specimens of the Dutch school. The surplus income of the gallery fund is devoted to instruction in drawing and design in the two schools.

See W. Harnett Blanch, *Dulwich College and Edward Alleyn*, 1877.

DUMANGAS, a town of the Philippines, in the island of Panay, near the mouth of the river Jalaur. It is situated in a fertile plain, and deals in rice, trepang, and pina. Population stated at 25,000.

DUMARSAIS, CÉSAR CHESNEAU (1676–1756), a French philologist, was born at Marseilles, July 7, 1676. His father died while he was yet an infant; and his mother, by her extravagance, dissipated his patrimony. He was educated in his native town by the Fathers of the Oratory, into whose congregation he entered; but feeling the restraints on his liberty too severe, he left it at the age of twenty-five, and repaired to Paris, where he married, and was admitted an advocate in 1704. He soon, however, quitted the bar, separated from his wife, to whom he gave up the little he possessed, and went to reside with the President de Maisons, in the capacity of tutor to his son. He was afterwards successively tutor to the son of Law, the projector, and the son of the Marquis de Baufremont. It was during this last period that he published the results of his grammatical investigations, which were received with great indifference. On terminating his engagement with the Marquis de Baufremont he opened an establishment for education in the faubourg St Victor, which scarcely afforded him the means of subsistence. He strove to eke out his scanty income by contributions to the Encyclopædia, but his last years were spent in very straitened circumstances. He died at Paris on the 11th June 1756, at the age of eighty. Dumarsais possessed no ordinary talents. His researches are distinguished alike by their accuracy, ingenuity, and depth. As a man, he combined the greatest purity of morals and simplicity of character with a rare degree of manly fortitude in the midst of his misfortunes; yet during the greater part of his life he was left to languish in obscurity, and his merits scarcely attracted any notice until nearly half a century after his death. His works on philosophy and general grammar, however, are worthy of attention. Of these, the best are his *Principes de Grammaire* and his *Histoire des Tropes*. D'Alembert and Voltaire both paid a just and discriminating tribute to the merits of Dumarsais. An edition of his works was collected by Duchosal and Millon, and published at Paris in 1797, in seven vols. 8vo. In 1804, the French Institute proposed a prize for an *éloge* on Dumarsais, which was gained by De Gérando, whose work was published at Paris in 1805, in 8vo. An earlier *éloge* by D'Alembert is to be found in the *Mélanges de Littérature*, and prefixed to the above-mentioned edition of the works of Dumarsais.

DUMAS, ALEXANDRE (1802–1870), one of the most remarkable characters that the 19th century has produced, was the son of General Dumas and of Marie Labouret, an innkeeper's daughter. His father was an officer of remarkable gallantry, who for his dashing exploits had obtained the odd title of the "Horatius Cocles of the Tyrol." He was a creole, the illegitimate son of the Marquis Davy de la Pailleterie, and of Louise Dumas, a black woman of St Domingo. Long after, his grandson was to excite the laughter of Paris by claiming this title, and assuming the family arms. The general had an insubordinate temper, and excited the dislike and suspicion of Napoleon, who sent him back from Egypt to languish in obscurity, and die of disappointment at Villers-Cotterets in the year 1806.

Alexandre Dumas was born on July 4, 1802, at Villers-Cotterets, where he was brought up under the care of an affectionate and pious mother. Some of the most graceful passages of autobiography are to be found in those pages of his memoirs which are devoted to an account of his boyhood, and which present an excellent picture of French country town life. He seems to have been an idle and a troublesome youth, and, though places were found for him with notaries and other functionaries, he could not settle to business. The family means were slender. They were soon almost reduced to poverty; and in the year 1823 Alexandre set off for Paris to seek his fortune, where he was to make such good use of his slender opportunities, that within five years his name became famous. Within a few days of his arrival, an old friend of his father's, General Foy, obtained a clerk's place for him in the duke of Orleans's establishment, worth only £50 a year, but it seemed a fortune. A friend, De Leuven, and he now joined their talents in a light farce called *La Chasse et l'Amour* (produced September 22, 1825). This was succeeded by a dramatic piece, written with the assistance of one of his friends, and called *La Noce et l'Enterrement* (November 21, 1826), known in England as the amusing *Illustrious Stranger*. Meanwhile the visit of Macready and other English players to Paris had introduced him to Shakespeare, and had set him to work on a grand romantic and historical drama which he called *Christine*. The young clerk had the boldness to look forward to having it presented on the boards of the first theatre in France, and, with an energy and spirit that should encourage every friendless aspirant, set every resource he could command at work. Charles Nodier introduced him to Baron Taylor, the literary director of the theatre, who, if we are to credit Dumas, was so enchanted with the work that he accepted it and submitted it to the company at once. It is more probable that, from the rather corrupt fashion which then regulated such matters, the privilege was secured by the influence of the duke of Orleans. But it happened that another *Christine* was supported by even greater influence, and Dumas's had to be withdrawn. In a short time he had written *Henri III.* which was produced (February 11, 1829) with the most extraordinary results. This piece was important as being the first success of the well known "Romantic school." *Henri III.*, it is said, brought its author about £2000. But the revolution of July now broke out and interrupted every literary scheme.

It was, however, welcomed by the creole's son, who flung himself with ardour into the struggle. And here begins that double interest in his life, which was as adventurous as that of some of his own heroes, and suggests the career of Benvenuto Cellini. He has, of course, made his own share in the exciting scenes of the Three Days as conspicuous as possible; and his expedition to Soissons, and almost single-handed capture of a powder magazine, a general, and officers were heartily laughed at and wholly disbelieved. Allowing, however, for embellishment, it is due to him to say that his narrative seems to be true in the main. He was, however, unlucky enough to have cast his lot with the more violent party, which found itself opposed to the Orleans family, and never recovered their favour; and King Louis Philippe always treated him with a good humoured contempt.

He now returned to his dramatic labours, and produced *Antony* (1831), one of the earliest of those gross outrages on public morality which have helped to make conjugal infidelity the favourite theme of the French drama. But by this time he had found that the slow production of dramas scarcely offered a profitable field for his talents. The successful founding of the *Revue des Deux Mondes* tempted him into trying his skill on historical romances, professedly in imitation of Sir Walter Scott. And this would seem to be the first opening of that seam which was to be worked later with such extraordinary profit. Here he introduced that daring system of working up the ideas of others, which he had already carried out in his dramatic labours, his successful pieces of *Henri III.* and *Christine* proving to consist of whole scenes stolen from Schiller and other writers almost without changing a word, though the arrangement of the plot and situations are masterly and original. A piece of his, called the *Tour de Nesle* (produced in 1832), which caused a perfect furore in Paris, led, however, to a more serious charge of plagiarism. In consequence of a duel he was directed to leave France for a time, and set off—in July 1832—on a tour through

Switzerland, which suggested to him a series of those odd books of travels made up of long extracts from old memoirs, guide-books, imaginary dialogues, and adventures.

In 1842 he married an actress named Ida Ferrier, who had performed in his plays; but the union was not a happy one, and, after a rather extravagant career, the lady retired to Florence, where she died in the year 1859. Hitherto his success, though remarkable, could not be called European, and he was not to be distinguished from the crowd of French professional *littérateurs*. But in 1844 the famous *Monte Christo* appeared, which may be said to have excited more universal interest than any romance since *Robinson Crusoe* or *Waverley*. The extraordinary colour, the never-flagging spirit, the endless surprises, and the air of nature which was cast over even the most extravagant situations, make this work worthy of the popularity it enjoyed in almost every country of the world. It was followed by the no less famous *Three Musketeers*. These productions were the more remarkable as they were written from day to day for the readers of a newspaper, and thus firmly established the *feuilleton* as a necessary element of French literature. In this, as in other departments where he was successful, Dumas was not original, and only took up the idea of a successful predecessor, Eugène Sue, whose *Juif Errant* had enjoyed much popularity in this shape.

This triumph made him, as it were, irresponsible in the literary world, and suggested to him a series of wholesale operations for supplying the public with books, the history of which makes an extraordinary chapter in literature. He contracted for innumerable stories, each of great length, and to be published at the same time, almost any one of which would be beyond the powers of a single writer. In a single year, 1844, he issued some forty volumes, and later on he engaged himself even more deeply to meet these heavy demands. He began by employing one or two assistants, with whose aid he furnished his two great stories; and it may be said that, with his constant supervision and inspiration, his daily direction, suggestion of incidents, manipulation of the ideas of others, consultations, &c., he might almost fairly claim the credit of having written *Monte Christo* and the *Three Musketeers*. His most valuable assistant was Maquet. Indeed, the chief credit of Dumas's most important stories has been claimed for him; but as he afterwards often tried his powers alone, and with but poor success, it seems probable that his share in Dumas's works was no more than what has been described. But presently the popular writer found that even this form of partnership was too great a tax upon his time, and he began to proceed upon the simpler process of ordering works from clever young writers, to whom he suggested a subject and perhaps a simple outline of treatment—and then issuing their work with his name. Some care in the selection was at first exercised, but later he accepted any stuff that was brought to him—travels, essays, stories—and endorsed them with his name. Indeed a volume could be filled with the odd details and complicated ramifications of this system, which was exposed in the most unsparing fashion by Granier de Cassagnac, Jacquot *alias* "De Mirecourt," and Querard. Dumas justified his system of appropriating from dead and living writers by a theory of what he called "conquests." "All human phenomena," he says, "are public property. The man of genius does not steal, he only conquers. Every one arrives in his turn and at his hour, seizes what his ancestors have left, and puts it into new shapes and combinations."

In the meantime he was earning vast sums. Leaving the work of construction to his journeymen, he now entered on a new and reckless course, with a view of dazzling his countrymen and gratifying his own Eastern taste. In this view he built a vast theatre for the production of his own works, and a gorgeous castle at St Germain, on the model of a palace in a fairy tale, on which he lavished every adornment. While these follies were in progress, he succeeded in getting himself attached to the suite of the young duke of Montpensier, then (1846) setting out for Madrid to be married, and received besides a sort of commission from the Government to visit Algeria, with a view to making it popular by a lively account from his pen. He was granted a passage to Oran on board one of the Government mail boats, but, through an awkward misconception, was allowed to divert this vessel from her regular service, and used her for visiting Carthage, Tunis, and other places. On his return there was much scandal, and the ministry was very severely interrogated as to the irregularity of allowing "a contractor for stories" to make so free with public property. It was explained that this was entirely owing to a misrepresentation of the popular writer's. Another rebuff, too, was waiting him; for, having completely neglected his engagements to the various newspapers while making this agreeable tour, he found himself engaged in heavy law-suits with no less than seven journals, including the *Constitutionnel* and the *Presse*. After defending himself in person, a performance that was the entertainment of all Paris, he was cast in damages. This was the beginning of his disasters. His theatre, after opening with one of his pieces which took two nights to perform, fell on evil days, and the revolution of 1848 plunged it into difficulties. In these new scenes he was by no means popular, being suspected from his assiduous attendance on the Orleans family. By this time all his best works had been written; and he was now only to attract attention by some extravagant literary somersault or impudent attempt at "humbugging" the public. He attempted newspapers like the *Mousquetaire*, of which he would grow tired after a few numbers, but to every article in which he was ready to attach his name. His next escapade was joining Garibaldi (1860), whose messenger and lieutenant he constituted himself; and, in reward for some trifling service, he claimed the appointment of "director of the museum and explorations" at Naples, an office he was presently forced to resign. After this he was reduced to all manner of devices to maintain himself, always borrowing and obtaining money by shifts and pretences which in another could not be called honest. It becomes, indeed, painful to follow the stages in this rapid decay,—to find him reduced to writing "puffs" for tradesmen, to exhibiting himself in shop windows, and to introducing grand schemes to the public which it is impossible to read without hearty laughter. A scandalous infatuation, too, was to be associated with his old age, which last excited the contempt pity of all who knew him. To the last he was full of schemes, devised with the fertility and roseate imagination of a Micawber; and to the last, unfortunately, he was devoted to pleasure. The result was a breaking up of his health, and even a decay of his faculties. When the war of 1870 broke out he was removed from Paris to Puys, near Dieppe, and there affectionately attended by his son and daughter. He died on the 5th of December in the same year. He was even poorer than when he began the world; and the brilliant novelist, who had earned more than £10,000 a year, had hardly a sou left. On the 16th April 1872, when the war was over, his remains were removed to Villers-Cotterets, and interred in presence of the leading *littérateurs* of Paris.

The works that bear Dumas's name are said to amount to some 1200 volumes. His dialogue is entirely his own, full of spirit and dramatic propriety—and this, too, in spite of the temptation, to a man paid by the line, to "spin out" his matter to the utmost extent. He left about sixty dramas, of which not more than three or four will be remembered; but two, the *Mariage sous Louis XV.* and

Mdlle. de Belle Isle, belong to the *repertoire* of the Comédie Française. These will always be listened to with delight. His most popular stories have been mentioned, but even now their undue expansion and interminable development, owing to the necessities of the *feuilleton* system, are found to be serious obstacles to their popularity.

He left a daughter, Madame Petel, who has written a few romances, and a son, the well-known "Alexandre Fils," who, unlike his father, has been distinguished by slow and careful work. He is best known by his romance *La Dame aux Camélias*, which has been translated in every language n which romances are written, and by a number of dramas which deal satirically with the characters, follies, and manners of society under the second empire. (P. F.)

DUMAS, Matthieu, Count (1753–1837), a French eneral and military historian, was born at Montpellier of noble family, on the 23d November 1753. He joined e army in 1773, and entered upon active service in 1780, s aide-de-camp to Rochambeau commander-in-chief of the my sent to aid the Americans in their war against ngland. He had a share in all the principal engagements at occurred during a period of nearly two years. Shortly ter the capture of Yorktown, in which he took part, he ined the expedition under Vandreuil intended to make n attack on Jamaica. On the conclusion of peace with ngland in 1783 he returned to France, where he soon terwards received his commission as major. In 1784 he as sent to explore the archipelago and the coasts of urkey, a service in which he was engaged for two years, nd which he performed with great thoroughness. He was esent at the siege of Amsterdam in 1787, where he co-perated with the Dutch against the Prussians. At the evolution he acted with Lafayette and the constitutional beral party, whose aim was to effect a complete reform ithout abolishing monarchy. He was intrusted by the ssembly with the command of the escort which conducted ouis XVI. to Paris from Varennes, where he had been rested. In 1791 he was appointed to a command at etz, where he rendered important service in improving e discipline of the troops, and in organizing the first attalion of horse artillery that was formed in France. hosen a member of the Legislative Assembly in the same ear by the department of Seine-et-Oise, he advocated with rmness and eloquence the principles and policy of the onstitutional party to which he belonged. In the following ear he was elected president of the Assembly. When the xtreme republicans gained the ascendancy, however, he ecame a marked man, and judged it prudent to make his scape to England. Returning after a brief interval under he apprehension that his father-in-law would be held esponsible for his absence, he arrived in Paris in the midst of the Reign of Terror, and had to flee to Switzerland to avoid the fate of his friends Barnave and Duport Dutertre. Soon after his return to France he was elected a member of the Council of Ancients. On the triumph of the extreme revolutionists in 1797, Dumas, being proscribed as a monarchist, made his escape to Holstein, where he enjoyed the hospitality of Count Stolberg. During this exile he wrote the first part of his *Précis des Événements Militaires*, which was published anonymously in monthly numbers at Hamburg in 1800. Recalled to his native country when Bonaparte became first consul, he declined the prefecture of Bordeaux, preferring a military appointment. Intrusted with the organization of the army of reserve at Dijon, he was on the completion of the task appointed chief of the staff to that army. In 1801 he was nominated a councillor of state, and in the same year he was chosen to propose and defend in the Corps Legislatif the formation of the Legion of Honour, of which order he afterwards (1810) became grand officer. Attached to the household of Joseph Bonaparte, Dumas went in 1806 to Naples, where he became minister of war. On the transfer of Joseph to the throne of Spain, and the accession of Murat to that of Naples, Dumas rejoined the French army, with which he served in Spain during the campaign of 1808, and in Germany during that of 1809. After the battle of Wagram, Dumas was employed in negotiating the armistice, and he was left by Napoleon at Vienna in order to superintend the evacuation of Austrian territory by the French troops. In the disastrous Russian expedition of 1812 he held the post of intendant-general of the army, which involved the charge of the entire administrative department. He shared the horrors of the retreat from Moscow, and the privations he suffered brought on a dangerous illness, from which, however, he recovered after a brief interval of repose at Dantzic. Resuming his duties as intendant-general, he took part in the battles of Lützen and Bautzen. When the decisive defeat of Leipsic occurred, Dumas, who was stationed with the besieged army in Dresden, was employed to negotiate the unavoidable capitulation, the terms of which, though agreed to by the opposing general, were not ratified by the allied sovereigns. Dumas, who had gone to report the matter to the emperor, was consequently arrested and imprisoned in Hungary until peace was concluded in 1814. On the accession of Louis XVIII. Dumas received several important commissions in connection with the administration of the army. He had the entire confidence of the king, and would have been appointed minister of marine but for the adverse influence of the party that had been in exile during the empire. When Napoleon returned from Elba, Dumas at first kept himself in retirement, but he was persuaded by Joseph Bonaparte to present himself to the emperor, who intrusted him with the task of organizing the National Guards. This brought him into disfavour with the Bourbons, and he was obliged to retire upon half-pay when Louis XVIII. was restored to the throne. He devoted his leisure to the continuation of his *Précis des Événements Militaires*, of which nineteen volumes, embracing the history of the war from 1798 to the Peace of Tilsit in 1807, appeared between 1817 and 1826. A growing weakness of sight, ending in total blindness, prevented him from carrying the work farther, but he translated Napier's *History of the Peninsular War* as a sort of continuation to it. In 1818 Dumas was restored to favour through the influence of Gouvion Saint-Cyr, and admitted a member of the Council of State. In 1828 he was chosen a deputy by the first arrondissement of Paris. After the revolution of 1830, in the events of which he took an active part, Dumas was created a peer of France, and re-entered the Council of State as president of the war committee. He died at Paris on the 16th October 1837. Besides the *Précis des Événements Militaires*, which forms a valuable source for the history of the period of which it treats, Dumas wrote autobiographical reminiscences under the title of *Souvenirs*, which were published posthumously by his son (3 vols. 1839).

DUMBARTON, a western county of Scotland, anciently called Lennox or Levenaux, bounded by the river Clyde and its estuary on the S., by Stirlingshire and Lanarkshire on the E., by Perthshire on the N., and by Loch Long and Argyllshire on the W. It consists of two parts, which are six miles distant from each other, and are separated by part of Lanarkshire. The western or larger district is about 35 miles long from N.W. to S.E., and 15 broad, the breadth varying from 2 to 13 miles. The eastern district, which is about 12 miles in length from E. to W., and 4 in breadth from N. to S., is completely inclosed by the counties of Stirling and Lanark. This detached part, comprising the parishes of Cumbernauld and Kirkintilloch, belonged to Stirlingshire till the earl of Wigton, whose property it was, became heritable sheriff of Dumbartonshire, and annexed it to this county, which, as a whole, contains 270 square miles, or 172,677 statute acres, and is divided into 12 parishes. The county is in shape a crescent, having a convex coast-line of 35 miles, formed by the Clyde on the south for 15, and Loch Long on the west for 20 miles. Along its eastern side for a distance of 24 miles stretches Loch Lomond. the "queen of Scottish lakes," studded with small islands. which number 30 in all, and most of which, with about two-thirds of the shore, are in Dumbartonshire. There are other fresh-water lakes in the county, but they are of a minor description. The Gare Loch is an arm of the sea about six miles long by one broad, and forms with Loch Long the peninsula of Roseneath, nearly detaching it from the mainland. Besides the Clyde, the only river of any note which can be said to belong to this county is the Leven, the outlet of Loch Lomond, which, flowing for six miles through a fine valley, joins the Clyde at Dumbarton Castle. The mountainous districts are marked by numberless cascades and lesser streams, falling for the most part into Loch Lomond, of which the chief are the Falloch, Inveruglas, Douglas, Finlas, Fruin, &c. The Kelvin, which skirts the eastern border, drains the detached portion of the county. About two-thirds of Dumbartonshire are hilly and mountainous. The most elevated regions are in the west and north-west, between Loch Long and Loch Lomond, and to the north of Loch Lomond. Ben Voirlich, in the extreme north, attains an elevation of 3092 feet, and Finnart, on Loch Long, is 2500 feet high. While this mountainous character prevails in the north of the county, in the eastern detached district and along the Clyde and the Leven it is lowland—marked, however, by the rising of abrupt eminences such as the hills of Kilpatrick and Cardross, and the rocks of Dumbarton and Dumbuck. In scenery it is unsurpassed in Scotland, not only for what it embraces but for the magnificent and extensive views which it commands. The climate varies with the character of the county, but is on the whole salubrious, though much more humid than in many parts of Scotland. The prevailing winds are from the west and south-west, but easterly winds are frequent in the spring months. Frosts are seldom severe, and, except on the mountains, snow never lies long. In the southern districts of the county Old Red Sandstone stretches from Roseneath to Loch Lomond: limestone is found in the higher grounds of Kilpatrick, Dumbarton, and Row: the hills of Dumbuck and Kilpatrick and Dumbarton Rock are composed of trap; while mica slate, quartz, and talc principally constitute its northern formations. Clay-slate is likewise found, and has been wrought with success at Luss, Camstradden, and Roseneath. Coal measures also exist, and there are pits for working coal in several districts. Ironstone is found in considerable quantities in connection with limestone in the parishes of Kirkintilloch and Cumbernauld.

The arable lands of Dumbartonshire, which extend chiefly along the Clyde and the Leven. and are composed of rich black loam, gravelly soil, and clay, are divided into farms ranging from 30 to 300 acres, and in some cases to 700 or 800 acres. From the proximity to Glasgow and other large towns, the farmers have the double advantage of good manure and a ready market for all kinds both of stock and produce; and, under the stimulus of this, great progress has been made; special attention has been given to the [illegible] of farm buildings, the erection of fences, and the [illegible] of proper draining, as well as to the rearing of cattle and the management of dairy stock, principally of the Ayrshire breed. Black-faced sheep and black cattle are pastured on the hilly lands, and Cheviot sheep and

Ayrshire stock on the low grounds. In 1876 D
shire had 1717 horses, 13,153 cattle. 71,202
911 pigs. Oats and wheat are grown in co
quantities; large crops of potatoes are raised
barley, and beans are also grown. In 1876 t
9862 acres under corn crops. of which 7930
oats and 1140 under wheat. while 4443 under g
On the banks and islands of Loch Lomond ther
yew trees of large size, and evidently of a very
There are few large estates in the county: t
being Rossdhu (Sir James Colquhoun. Bart.), 67,
Strathleven (Mrs Ewing), 9180, Roseneath
Argyll), 6799, and Cumbernauld (Hon. Cornwallis
3520. The whole number of landowners havin
and upwards is 706, possessing 152,968 acres, of t
value of £251,134.

The banks of the Leven. whose waters as wel
constant are singularly soft and pure, have
celebrated for their bleaching establishments,
and print-works. Bleaching was carried on in t
Leven upwards of 150 years ago. The printing
began at Levenfield in 1768, and has for some
the chief manufacturing industry in Dumbartonsh
are carried on with great success at Upper a
Levenbank Works, located within half a mile
Lomond, the dyeing and printing of Turkey red
yarn; at Dalmoonach, the different processes in c
ing; and at Ferry-field, Croftingea, and Dillichip t
departments of the general business are condu
large scale. At Milton, in West Kilpatrick. the f
for machine weaving was erected; and here
century ago, a bleaching and calico printing esta
At Duntocher, in the same parish, cotton-spinning
carried on from the beginning of the centur
extensively as to take rank as the second man
industry in the county. In the town of Dumba
are extensive ship-building yards, engine-works.
tanneries, and breweries. At Dalmuir extensive
the repair of the dredging plant belonging to
Trust were erected by the trustees in 1867, costing
A large patent slip for taking on the dredgers u
Clyde forms part of these works, at which three st
hammers are in constant operation. In 1850 a li
way, already completed from Bowling to Dumb
extended up the Vale of Leven to Balloch. In
Glasgow railway to Helensburgh was opened,
through Bowling, Dumbarton, and Cardross, and
with the steam communication on the Clyde and
abundant facilities for every kind of traffic to al
the county. The Forth and Clyde Canal,
1768 and opened for traffic in 1775, passes thro
bartonshire for more than 16 miles, and is carrie
valley of the Kelvin by an aqueduct. At Bowlin
a harbour with quays, forming a tidal basin of 8

The county is somewhat rich in antiquities,
both with the period of the Roman occupation
that of the aboriginal inhabitants of Scotland.
of Antoninus runs along the north of the eastern
through the south-east corner of the main d
Kilpatrick. Remains of Roman workmanship
found at Duntocher and in the parish of Cumbe
well as at the castle. The Caledonians, Picts,
commemorated by rude forts and tumuli here
and there are several remains of old baronial cas
Roy's district lies to the north: the clans had
in Glenfruin: and the county is associated with
Wallace and Bruce, the latter having built a residen
ross, in which he died. In modern times, the first
gation company in Britain was formed at Dum
1815; Henry Bell, from whose designs the first st

on the Clyde, "The Comet," was constructed, and who indeed was the first to put into operation the idea of employing steam for navigation purposes, lived at Helensburgh, where he died in 1830. A monument to him was erected near Bowling. The celebrated ship-building firm of Napier & Sons had its origin in a smith's foundry business at Dumbarton.

Several important watering-places, including Helensburgh, Kilcreggan, Roseneath, &c., are situated in Dumbartonshire. The other principal towns and villages are Kirkintilloch, Alexandria, Duntocher, Bonhill, Renton, Dalmuir, Kilpatrick, Cardross. The leading gentlemen's seats are Rossdhu (Sir James Colquhoun, Bart.), Roseneath, (duke of Argyle), Garscube House (Sir George Campbell), Tillichewan Castle (J. Campbell), Bonhill Castle, and Shandon (now a hydropathic establishment), built by the late Robert Napier.

The county sends one member to Parliament. Population in 1801, 20,710; in 1841, 44,296; in 1871, 58,857.

DUMBARTON, a royal parliamentary and municipal burgh and seaport-town of Scotland, capital of Dumbartonshire, is situated at the confluence of the rivers Clyde and Leven, 14 miles north-west from Glasgow. It is a very ancient place, and is said to have been once the capital of a kingdom of the Britons in the vale of the Clyde. Alcluyd, "the rock upon the Clyde," was the name of this ancient capital of the Strathclydenses; but whether it was situated on the site of the present town, or confined within the precincts of the castle, cannot be exactly ascertained. The site had previously been used as a naval station by the Romans, who called it Theodosia. At a subsequent period, Dumbarton was the capital of the earldom of Lennox, but was given up by Earl Maldwyn to Alexander II., by whom it was erected into a royal burgh in the year 1221, and declared to be free of all imposts and burgh taxes. It afterwards received other charters from succeeding monarchs, and finally it obtained a confirmation of the whole from James VI. Among other privileges conferred was that of levying customs and dues on all vessels on the Clyde from the Kelvin to the head of Loch Long; and ships within these bounds had to pay duties at Dumbarton. "Offers dues" on foreign vessels coming into the Clyde were also levied. In 1700 these rights were transferred to Glasgow by a contract, but were subsequently vested in a special trust created by successive Acts of Parliament. The town is principally built upon the eastern bank of the Leven, which almost encircles it, and is chiefly composed of one main street, lying in a semi-circular form round the head or west end of the peninsula and parallel to the river. A good stone bridge of five arches, 300 feet long, connects the town with Bridgend, a suburb on the western side of the Leven. The waters of the Leven form the harbour. For seventy years the staple trade of Dumbarton was the manufacture of crown glass, commenced in 1777 and discontinued after the abolition of the glass duty. As many as 300 hands were employed in the business. But for many years its principal trade has been ship-building, and particularly the construction of iron steamers. By situation the most "natural" port on the Clyde, Dumbarton has the distinction of originating in Britain the formation of steam navigation companies. In 1815 a joint-stock company was formed in Dumbarton to run a steamer from that town to Glasgow, and their steamer, the "Duke of Wellington," was built by James M'Lachlan in Dumbarton. The next steamer was built by William Denny in 1820, from which date the ship-building of the town may be said to have started. But it was not till 1844, on the application of iron to the purposes of ship-building, that the trade assumed the important proportions to which it was raised by the firm of Denny and by others. The Dennystoun Forge Company, which is amongst the largest and most unique in Great Britain, both as respects the building itself and the machinery employed, was opened in 1855. Extensive harbour improvements were entered upon in 1852, and successfully carried out. In 1874 the total tonnage of iron vessels launched in Dumbarton amounted to 32,000, in 1875 to 37,000, in 1876 to 17,500. Some of the vessels built in Dumbarton are among the most magnificent employed in the British trade. The General Police Act has been in operation in Dumbarton since 1855. In 1857 the sanction of Parliament was obtained to a bill for extending the municipal boundaries so as to include West Bridgend. The embankment of the Broad Meadow, a project which had been entertained for 250 years, was accomplished in 1859, securing for the town a considerable tract of agricultural land and 20 acres of recreation ground. Since 1860 the burgh has been supplied with water drawn from the Long Craigs. A fine cemetery, a mile from the town, was formed in 1854; and the old Dumbarton parish churchyard has been closed by authority since 1856. The disadvantage Dumbarton long laboured under of having access to the river steamers merely by ferry boats is now obviated by a pier recently constructed from the foot of Dumbarton Rock, at a cost of from £8000 to £9000.

The situation of Dumbarton Castle is eminently picturesque. The buildings composing the fort are perched on the summit of a rocky mount, shooting up to the height of 206 feet sheer out of the alluvial plain on the east side of the mouth of the river Leven. To the east of the castle there are rocky eminences on the verge of the Clyde, of a similar form, though less isolated. The Rock of Dumbarton measures a mile in circumference at the base. It diminishes in breadth near the top, which is cloven into two summits of different heights. The rock is basalt, and has a tendency to columnar formation. Some parts of it have a magnetic quality. The fortress, naturally strong, possesses several batteries, which command a very extensive range. According to a provision in the Treaty of Union, the defences are kept in constant repair, and a garrison is maintained in the castle.

The affairs of the burgh are managed by a provost, 2 bailies, and 16 councillors. The county and burgh buildings are good. Dumbarton joins with Port-Glasgow, Renfrew, Rutherglen, and Kilmarnock in returning a member to Parliament. In 1871 the population amounted to 11,404. (D. M.)

DUMDUM, or DAMDAMÁ, a town and cantonment in British India, at the head of an administrative subdivision in the district of the Twenty-four Pergunnahs, in the presidency of Bengal, with a station on the Eastern Bengal railway, 4½ miles N.E. of Calcutta, in 22° 37′ 53″ N. lat. and 88° 28′ 1″ E. long. It was the head-quarters of the Bengal artillery from 1783 to 1853, when they were transferred to Meerut as a more central station; and its possession of a cannon foundry and a percussion-cap factory procured for it the half jocular name of the Woolwich of India. The barracks—still occupied by small detachments—are brick-built and commodious; and among the other buildings are St Stephen's Protestant church, a Roman Catholic chapel, a European and native hospital, a large bazaar, and an English school. The population in 1872 amounted to 5179, of whom 1201 were Mahometans, 1053 Christians, and 2586 Hindus. The males numbered 3414, the females 1765. It was at Dumdum that the treaty of 1757 was signed, by which the nawab of Bengal ratified the privileges of the English, allowed Calcutta to be fortified, and bestowed freedom of trade; and in 1857 it was the scene of the first open resistance of the sepoys to the use of greased cartridges.

DUMFRIES, one of the three Scottish border counties, lies in an elliptical form on the north side of the Solway Firth, its other boundaries being Lanark, Peebles, and Selkirk on the N., Roxburgh on the E., Ayr and Kirkcudbright on the W., and Cumberland on the S. Its greatest length is fully 50 miles, its breadth 32, its circumference 190, and the area is 1103 square miles or 702,953 acres. The coast-line on the Solway measures 21 miles. Towards this arm of the sea the county slopes down from a high mountain range, by which it is cinctured on the north, the intermediate space being extremely irregular, lofty hills alternating with wide stretches of table land or rich fertile holms, and in other instances the surface looking like a vast undulating mass that by some natural process had suddenly become fixed and rigid. Among the leading features of the county are the three dales by which it is cleft from north to south, and through which run the rivers that give name to them, the Nith, Annan, and Esk. Overlooking these rise numerous elevations, the highest being Whitecoomb in the east, 2695 feet; Hartfell in the north, 2651 feet; Queensberry, also in the north, 2285 feet, which gives to the duke of Buccleuch his secondary title, and the title of marquis to a branch of the house of Douglas; and Ettrick Pen, 2269 feet, the latter standing sentinel over an extensive district.

The Nith is the chief river of the county Starting from its mountain cradle near Dalmellington, in Ayrshire, it takes a south-westerly sweep, watering the old burgh of Sanquhar, at the head of Nithsdale, and further down the modern village of Thornhill, near which stands the ducal castle of Drumlanrig. As the river proceeds it passes on the one hand Dalswinton, where Patrick Miller made his first fruitful experiments in steam navigation, and on the other the acres of Ellisland, which Robert Burns turned over with his plough. At Auldgirth Bridge, near Blackwood, the dale narrows considerably; then it expands till around and below the burgh of Dumfries it appears as a spacious plain, with gentle acclivities or bolder elevations rising on every side. The Nith is swelled by numerous streams at various stages, its latest and largest acquisition being the Cluden, the confluence taking place about a mile above Dumfries, and the absorbing river reaching the Solway about eight miles below that burgh, its whole course measuring about 50 miles

An upland spot, where the counties of Lanark, Peebles, and Dumfries converge, gives birth to three streams, according to the popular saying,

"Annan, Tweed, and Clyde
All arise from one hillside."

The first-named river, after a rapid canter from its highland source, five miles above Moffat, receives several tributaries a little south of that town, then proceeds at a leisurely pace down the dale, which, narrowed at first by rocks or ridges, expands into a fertile basin termed "the Howe of Annandale," studded with hamlets and spangled by the nine lochs of Lochmaben,—that venerable royal burgh, which claims to have been the birth-place of King Robert Bruce, and the prosperous town of Lockerbie occupying conspicuous places on the western and eastern banks; other rivulets, including the Dryfe (flowing past the scene of a fierce clan battle fought between the Maxwells and Johnstones in 1675), giving increased volume to the stream below Bruce's burgh, the valley narrowing again as the water grows wider and deeper. When little more than a mile from the sea it passes Annan, the second town in the county, its entire length being nearly 40 miles.

During about a mile of its course the Esk divides Dumfriesshire from Cumberland; starting from the Selkirkshire frontier it flows southward past the baronial town of Langholm, and, after being a Scottish stream to the extent of 30 miles, it enters English ground, waters Longtown, describes a westward curve, and then falls like its two sister streams into the Solway, its entire course extending to about 40 miles.

Besides the lakes in Annandale already referred to, Loch Skene, lying under the shadow of Whitecoomb hill, 1300 feet above sea-level, is the only one of consequence; its water finds an outlet by leaping over a rocky height of 300 feet, forming a cascade termed the Gray Mare's Tail. Another small but exceedingly picturesque waterfall in Morton parish is called Crichope Linn.

The chief mineral waters of the county are those of the well at Moffat, and another about five miles distant, called Hartfell Spa, situated in a cleft of the hill from which it takes its name. The former are reckoned beneficial for chronic gout, rheumatism, and liver complaints; and the latter acts as a mild astringent and powerful tonic. Owing to the great repute of these waters, and the romantic scenery of the surrounding district, Moffat during summer and early autumn becomes a favourite and fashionable place of resort. A small chalybeate at Brow, on the Solway, possesses considerable virtue, and is rendered interesting from the circumstance that it was partaken of by Burns during his last illness, though without avail.

Generally speaking the climate is mild and salubrious, with a mean temperature of 45° Fahr., the average rainfall supplying sometimes more than enough of moisture. The soils are chiefly gravel or sandy loam and clay, except where river and estuary have formed rich alluvial tracts. At no very distant date it was roughly computed that there were 86 square miles of arable land lying along the sea coast, 322 miles chiefly upland, and 598 miles mountainous yielding nothing but heather and game; but by the application of bone manure, draining, planting, and green crop husbandry, all this is changed, no fewer than 213,784 acres being under the plough—even the huge expanse of Lochar moss, lying in the parishes of Tinwald, Dumfries, and Torthorwald, becoming by degrees less of a reproach to the agricultural enterprise of its proprietors, though much of the surface of the county still wears a pastoral aspect drawn from one of its chief rural industries, sheep-breeding. In 1876 there were 49,975 acres under corn crops, of which 48,292 were oats and 546 wheat; 25,669 were under green crops, of which 20,747 were turnips; and 63,763 were in grass under rotation. These figures differ little from those for 1873, except that 1231 acres were then in wheat. With abundance of coal at the two extremities—Sanquhar and Canonbie; with limestone at Kilhead, Closeburn, and Barjarg; with lead mines at Wanlockhead, the produce of which when undergoing refinement yields a large percentage of silver; with gold dust and even nuggets of that metal in the same district, but now no longer searched for systematically, as they were with considerable success in the 16th and 17th centuries; with sandstone quarries in various quarters; with woollen mills at Langholm; with numerous manufactures centring in the county town; with some little sea-borne traffic; and with good salmon fisheries in the Nith, along the Carlaverock shore, and at Annan Water-Foot on the Solway,—the county itself is still essentially an agricultural one, and as such it takes high rank.

Early in the 18th century the district breeders of Galloway cattle began to send stock to the south; and, before the current century was far advanced, some 15,000 head of heavy cattle were annually driven from Dumfriesshire and Galloway to the English markets. Forty years ago the number had increased to 20,000, their value on an average being at least £200,000. For some years past Ayrshire dairy cattle and shorthorns have superseded the Galloways on most farms of the county, and its trade in live stock generally has considerably decreased. Few store cattle are imported, they being mostly grazed a year or two and fed off; and similar treatment is given to numerous short-horn yearlings and two-year-olds that are imported from Ireland. In 1876 the entire cattle in the county numbered 53,778 head, the sheep 493,020, the horses 7390, the pigs 14,413,—these returns varying little from those of 1873, except as regards sheep, which amounted that year to 513,849. The sheep trade of Dumfriesshire, which is of comparatively recent origin, is now of great extent. Cheviots predominate, the frugal, black-faced breed still occupying the higher sheep walks, while half-bred lambs, the produce of Cheviot ewes crossed by Leicester or other long-wooled rams, are fattened on the richer pasture yielded by low-lying farms, supplemented by turnips in winter, and are thus made ready for the butcher when fifteen months old. For nearly a hundred years pig-feeding has occupied a place in the rural economy of the county. A sum of £50,000 represented its annual trade in pork about sixty years ago. Influenced by large imports of bacon from America, the curing of carcases has of late decreased. In 1876 the number sold in the public markets of the county was under 8000, the value of which, allowing for those disposed off privately, would not exceed £45,000; a few years back the annual value ran from £70,000 to £75,000. As regards quality and flavour, the Dumfriesshire hams still maintain the high character they have long held in the English markets.

Three leading highways, one in each valley, with numerous branch roads, intersect the county. It possesses also ample railway communication,—the Glasgow and South-Western line, completed in 1850, extending through Nithsdale and Lower Annandale, and, soon after passing Gretna Green (famous in days of yore for its matrimonial celebrations), crossing the little border river Sark; and the Caledonian line, completed in 1849, traversing Moffatdale and Upper Annandale, and also a portion of England as far as Carlisle.

In a Parliamentary Blue Book (1874) the acreage of the county is given at 676,971, and its yearly value (1872) at £595,511. 17s., the owners numbering 4177, of whom 886 possessed more than one acre each, the value per acre being 17s. 7d. as compared with 20s. for all Scotland. From the valuation roll for 1876 we learn that the chief proprietor, the duke of Buccleuch and Queensberry, owns 253,514 acres, yielding an annual revenue of £97,840. The names of other leading proprietors, with their extent of land and incomes from it, are—Mr J. J. Hope Johnstone of Annandale, 64,079 acres, with a rental of £28,684; earl of Mansfield, 14,342 acres, £15,938; marquis of Queensberry, 13,243, £13,982; Mrs Villiers and Viscountess Cole of Closeburn, 13,560, £11,658; Sir John Heron Maxwell of Springkell, 13,391, £9023; Mr R. Jardine of Castlemilk, 17,064, £9339; Sir F. J. W. Johnstone of Westerhall, 7714, £7932; and Lord Herries, 5814, £6537. Population of county in 1861, 75,878; in 1871, 74,784.

Dumfriesshire during the Roman occupation formed part of the province of Valentia, which lay between the walls of Hadrian and Antonine, the British tribes occupying it being termed the Selgovæ. In course of time they were dispossessed by other Celts, the Scoto-Irish; but the aboriginal Britons shared with the latter, and with the numerous Saxons and the few Normans of a later day, in being the progenitors of the existing inhabitants; and of them lasting memorials remain in the names of rivers, mountains, and headlands, most of which are British, "the nomenclature of the earliest colonists of the county thus remaining unchanged by the conflicts of race or the flight of ages." Down to the death of David I., Nithsdale and some other portions of the district were still to a large extent Celtic in their people and institutions; after that king's reign we begin to read of its historical families, some of whom are still its leading landowners—of its Maxwells, Douglases, Kirkpatricks, Johnstones, Bruces, Baliols, Comyns, Scotts, Carlyles, Jardines, Murrays, and Crichtons.

Of all the primitive inhabitants numerous memorials still exist in the form of druidical remains, British motes and camps, Roman roads and camps, Anglo-Saxon relics, the chief of the latter being the Runic monument at Ruthwell, which tells the story of the Cross in characters as old as the days of the Heptarchy. As the county is also replete with "chiefless castles breathing stern farewells," and other time-worn tokens of bye-gone ages, it presents a rich field for archæological research.

DUMFRIES, beautifully situated on the left bank of the Nith, about eight miles from the Solway Firth, is the capital of the county just described.

The irregular yet decided progress of the town can be traced through the Middle Ages, and more recently till our own day, when it wears an attractive and flourishing aspect. A serious check was given to its prosperity by a visitation of cholera, which cut off more than 500 of its inhabitants in 1832. Since a copious supply of good water was obtained from a neighbouring loch, and other sanitary improvements were introduced, the salubrity of the burgh has been fairly established, and its size and trade—promoted also by its railway intercourse and the establishment of the tweed manufacture—have greatly increased. Few Scotch provincial towns have gone forward with such a gigantic stride during the last thirty years, and its steps in advance have been especially remarkable during the latter half of that period, as shown chiefly by the bustle of its business streets, the formation of new thoroughfares, and the numerous suburban villas which now environ the old burgh proper.

From time immemorial the town has possessed a great weekly cattle market, which, though reduced since 1848 by the establishment of competing markets, and the substitution of sheep for cattle on many surrounding farms, is still second to none on the north side of the border. The average number of cattle sold on the Sands during five years ending 1872 was nearly 14,000 yearly; in 1876 the number was 18.413, besides 6844 sold at the auction marts. Vast herds are also sent direct south from the railway station. A still larger trade is now done in sheep, the average number offered for sale during five years ending 1872 being 37,000, while 29,980 were sold at market in 1876, and 42,958 by auction. There is also a weekly market for pork, beginning in November and ending about the end of March.

Among the special industries of Dumfries, clog-making and basket-making have long occupied an important place; its traffic in timber has grown to be immense; a hundred acres of nursery ground help to beautify the town, and supply material for an extensive trade in seeds, flowers, and other plants; the conversion of skins into hides and leather gives labour to about 150 hands; while nearly the same number are engaged at iron works. More extensive than any of these is the hosiery manufacture, which, dating a century back, now gives employment to about 480 hands (including warehousemen), the goods produced ranking as the best in Scotland, and next to those of Hawick in extent. Prior to 1847, however, the prosperity of Dumfries depended much on its position as the capital of a rich rural district, which it still is; but soon after that date it began to bulk largely as a manufacturing town in connection with the tweed trade; and to its development the growth of the burgh in size and opulence is principally due. The principal firm, that of Walter Scott and Sons, usually employs about 1400 workers, with 400 looms and 30,000 spindles. Nearly all the business traffic to and from Dumfries is now carried on by rail, the vessels belonging to the port numbering only two or three, and its revenue—burdened by heavy interest on a sum borrowed to erect a large sea-dyke, which has been of little benefit—is insufficient to cover the expenditure.

The origin of two places of worship in connection with the Established Church (St Mary's and Greyfriars') is noticed below; a third, St Michael's, is a stately fabric.

dating from 1746. Before the lower interior was reseated in 1869, it contained a pew which Burns and his family occupied. The poet's remains rest under a magnificent mausoleum in the surrounding churchyard; and besides this paramount distinction the cemetery is richer with monumental erections than that of any other provincial town in the United Kingdom. Among the other ecclesiastical buildings are three Free churches, three belonging to the United Presbyterians, two to the Congregationalists, one each to the Wesleyan, the Scottish Episcopal, the Catholic Apostolic, and the Roman Catholic, while two other denominations—the Baptists and Evangelical Union—are also represented. Dumfries has three newspapers, two of them published twice a week and one weekly. It has long been able to boast of a well-equipped grammar-school—the Academy. The town possesses its full share of benevolent institutions. Its oldest one, Moorhead's Hospital, erected in 1753, gives accommodation to decayed householders. A hospital for the reception of persons suffering from disease or accident has been in existence since 1778, under the name of the Dumfriesshire and Galloway Royal Infirmary, but the building now used as such, an imposing edifice in the Northern Italian style, was only opened a few years back; 398 patients were treated in 1876, at a total outlay of £2137. Crowning an eminence situated a little southward of the town stands a noble building resembling a Greek cross; this is the Crichton Royal Institution for lunatics, due to the munificence of Dr James Crichton of Friars' Carse, whose bequest of £100,000 was applied in erecting and partly endowing the asylum. Since it was opened, nearly forty years ago, it has been considerably enlarged, and also supplemented (in 1848) by the Southern Counties' Asylum for pauper inmates chiefly; usually the patients number about 500, nearly a third, as middle and upper class patients, being housed in the older portion of the establishment. The old infirmary building is now used as a commercial academy connected with the Marist Brotherhood, and dedicated to St Joseph. In it about 70 youths receive education; belonging to the establishment there is a novitiate adjoining the Roman Catholic chapel, where 14 members of the order are under training for missionary service at home or abroad. Several of the banking establishments possess a fine appearance, but the county buildings in Buccleuch Street (Scotch baronial in design), Greyfriars' Church fronting the head of High Street (Pointed Gothic), and the new infirmary are the most imposing edifices within the burgh. It has a theatre royal, opened in 1792, which was almost entirely reconstructed at a cost of £3000 in 1876, and its interior is now, size considered, as handsome as that of any similar place of entertainment throughout the kingdom. There is no object in the town that can vie with Devorgilla's Bridge as regards archæological interest. Built of stone about 1280, it had no equal at that period in Scotland, though the popular story which assigns to it thirteen arches is belied by indisputable documents which show that they never numbered more than nine. A second stone bridge was built in 1793-5, at an expense of about £5000; and a small iron foot bridge, which cost nearly £2000, was opened on the closing day of 1875. The associations of Dumfries with Burns, however, and the memorials it possesses of the national bard, draw to it more travellers annually than all its other attractions—scenic, antiquarian, or social.

The town council consists of 25 members, including a provost, 3 bailies, a dean of guild, and a treasurer. Four other royal burghs combine to form a parliamentary constituency with Dumfries, namely, Annan, Kirkcudbright, Sanquhar, and Lochmaben—these "The Five Carlins" of Burns's ballads, being represented by one member. In 1861 the population within the royalty was 12,347, in 1871 it had increased to 13,704. As a parliamentary burgh Dumfries includes Maxwelltown on the opposite bank of the Nith, its population as such amounting in 1871 to 18,826.

History.—The precise circumstances of the origin of Dumfries are but imperfectly known; but the prevailing opinion is that a fortlet built by the Selgovæ Britons formed the nucleus of the town, an hypothesis that is supported by its name, which, according to Chalmers, is resolvable into two Gaelic terms signifying a castle among the brushwood. The oldest existing charter is one granted by Robert II., dated 1395. Made a royal burgh by William the Lion, Dumfries thereby acquired important privileges; and another stimulus to its prosperity was supplied when Devorgilla, daughter of Alan, lord of Galloway, connected that province with the town by building a stone bridge over the Nith. It was the son of that munificent lady, John Baliol, whom Edward I. of England selected as heir to the Scottish throne from the numerous competitors for it who placed their claims at his disposal. During the troubles that ensued, Nithsdale and Galloway supported Baliol, and on his withdrawal from public life they for the most part favoured the pretensions of his nephew John, the Red Comyn, as opposed to those of Robert Bruce, who drew considerable support from his patrimonial estates of Annandale.

Dumfries figured much in the wars of the period. Whilst the great border castle of Carlaverock was being besieged by an army under the command of King Edward in 1300, the town was visited by him personally, and, as we learn from the *Wardrobe Accounts*, he lodged with a body of Franciscan friars in a house built for them by Devorgilla, and partly maintained by dues levied at the bridge which owed its existence to her liberality. Six years afterwards, when Edward had smitten down all opposition to his ambitious designs, the monastery which he had visited became the scene of a deed which led to the overthrow of them all. On the 10th of February 1306 Bruce and Comyn were brought together in the streets of the ancient burgh. As they entered the monastery in company, Bruce charged his rival with treachery; the latter denied the accusation, and the next moment was stabbed to the heart, Kirkpatrick rushing in to "mak siccar" or complete the deed of slaughter which the lord of Annandale had begun. The blow by which the Red Comyn perished in the house erected by his pious grandmother broke all amicable intercourse between the homicidal baron and the English king; and thenceforward Bruce became thoroughly committed to the national cause, of which he had been previously but a questionable friend. A modern ecclesiastical edifice, St Mary's Church, occupies a site mournfully associated with the war of independence.—Sir Christopher Seton, husband of Bruce's sister Christiana, having been there executed by order of Edward I. After peace was restored, the sorrowing widow built upon the spot a little chapel, which her royal brother endowed with a hundred shillings sterling per annum in order that masses for the soul of the deceased should be said in it "for ever." Another church, Greyfriars', stands on the site of the old castle of Dumfries, which exchanged owners half a dozen times at least during the same troublous period,—its sufferings by siege or storm indicating but too truly the sad experiences of the town itself; and for nearly 250 years afterwards, the proximity of the burgh to the western border exposed it to wasting raids from the English side, carried on sometimes by freebooting parties, and not seldom also by more formidable hosts with higher objects in view than the burning of the place or the plunder of its inhabitants,—these hostile visits, with their retaliatory forays southward, terminating at last in 1551. The long close connection of Dumfries with the heroic yet turbulent Douglases proved on the whole more hurtful to it than advantageous. Bound up for several generations quite as intimately with the Maxwells of Carlaverock and Terregles, the town experienced alternate "weal and woe" from the protracted feuds of that family with the Annandale Johnstones.

When the Union with England was under debate, the provost of Dumfries, as its representative in the Scottish Parliament, voted against the measure; and the Articles of Union were publicly burned (Nov. 20, 1706) by a party of Cameronians at the market cross, with the enthusiastic approval of the populace. About nine years afterwards the inhabitants were threatened with a hostile visit from Viscount Kenmure, but they manifested such a bold front that the Jacobite chief acted on Falstaff's maxim, "Discretion is the better part of valour." Less vigilant during the next rebellion, they allowed the town to be peacefully occupied by the young Pretender, who, converting No. 6 of the tenement now used as the Commercial Hotel into a little palace, held high state there for three days towards the close of December 1745. In order at once to recruit his own exchequer and punish the burgh for its loyalty to the house of Hanover, the prince demanded a tribute of £2000 in money; also 1000 pairs of shoes for his kilted followers, whose foot-gear had nearly vanished during their forlorn journey from the south; and, as if he had been *de facto* king, he levied the dse and appropriated all the moneys possessed by the local vernment officials. Influenced by a false alarm, "Bonnie arlie" made a hurried departure, having first received £1100 of vy, and carrying with him hostages for the rest. Some years erwards the burgh was reimbursed by the state for the money ntribution, the whole of which had been paid, and for the shoes ually delivered, 225 pairs, the compensation amounting to 348.

In 1264 Alexander III. planned an expedition to the Isle of n at Dumfries. The town was visited at subsequent periods by mes IV., James V., by the beautiful daughter of the latter narch, Queen Mary, and by Mary's son, the "British Solomon." the arrival of James VI., 3d August 1617, he was sumptuously ertained by the magistrates in a house that was known as "The inted Hall;" afterwards he presented the incorporated trades, en in number, with a tiny "war-engine," the celebrated Silver n, the competition for which encouraged the practice of musketry ong the craftsmen, and constituted a great septennial festival, the racteristics of which are finely mirrored in a well-known poem John Mayne, though the wapinschaw itself has not been held ce 1831. (W. M'D.)

DUMONT, Jean, a well-known publicist, was born in ance in the 17th century, the precise date being unknown. followed the profession of arms; but, not obtaining protion so rapidly as he expected, he quitted the service and velled through different parts of Europe. He stopped Holland with the intention of there publishing an account his travels. But in the interval, at the request of his kseller, he wrote and published several pamphlets, which re eagerly sought after, owing to the unceremonious nner in which he treated the ministry of France. This edom having deprived him of all hope of employment his own country, he thought of forming a permanent ablishment in that where he resided, and accordingly nmenced a course of lectures on public law. The project ceeded far beyond his expectations; and some useful npilations which he published about the same period de him favourably known in other countries. The peror appointed him his historiographer, and some time erwards conferred on him the title of Baron de Carlscroun. died at Vienna in 1726, at an advanced age. Dumont ote with facility, but his style is deficient in vigour and rectness; his works, however, contain a great number of cuments valuable for history.

The following is a list of the works published by Dumont:—1. yage: *en France, en Italie, en Allemagne, à Malte, et en Turquie*, gue, 1699, 4 vols. 12mo; 2. *Mémoires Politiques pour servir à parfaite intelligence de l'histoire de la Paix de Ryswick*, Hague, 99, 4 vols. 12mo; 3. *Recherches modestes des causes de la présente erre, en ce qui concerne les Provinces Unies*, 1713, 12mo; 4. *cueil de Traités d'alliance, de paix, et de commerce entre les Rois, inces, et États, depuis la Paix de Munster*, Amsterdam, 1710, 2 ls. 12mo; 5. *Soupirs de l'Europe à la vue du projet de paix tenu dans la harangue de la reine de la Grande-Bretagne*, 1712, mo; 6. *Corps Universel Diplomatique du Droit des Gens, connant un Récueil des Traités de paix, d'alliance*, etc., *faits en Europe, puis Charlemagne jusqu'à présent*, Amsterdam, 1626, and following years, 8 vols. fol., continued after Dumont's death by J. sset; and 7. *Batailles gagnées par le Prince Eugène de Savoie*, gue, 1723. Dumont was also the author of *Lettres Historiques tenant ce que se passe de plus important en Europe*, 12mo. This riodical, which was commenced in 1692, and two volumes of hich appeared annually, Dumont conducted till 1710, from which ne it was continued by Basnage and others until 1728. The earlier lumes are much prized.

DUMONT, Pierre Étienne Louis (1759–1829), a litical writer celebrated chiefly for his literary connection ith Mirabeau and Jeremy Bentham, was born on the 18th ly 1759 at Geneva, of which his family had been citizens good repute from the days of Calvin. Shortly after his rth his father died, leaving a widow and four children holly unprovided for. But the widow, though placed in ch destitute circumstances, found means to send Étienne the college of Geneva, where he distinguished himself th by his ability and by his independent spirit. In short time he not only defrayed the cost of his own ucation, but even contributed to the support of the family, acting as *répétiteur*, or private tutor to his comrades. Having completed his academical course, he took clerical orders; and in the year 1781 he was chosen one of the pastors of the city, where his talents as a preacher soon attracted general notice, and gave promise of his becoming one of the most brilliant and persuasive of pulpit orators. But the political troubles which disturbed Geneva in 1782 suddenly turned the course of his life into a different channel. He belonged to the liberals or democrats, and the triumph of the aristocratical party, through the interference of the courts of France and Sardinia, made residence in his native town impossible to him, though he was not among the number of the proscribed. He therefore became a voluntary exile, and went to join his mother and sisters at St Petersburg, a city to which many Genevese had resorted. In this he was probably influenced in part by the example of his townsman Lefort, who was the first tutor, minister, and general of the czar. At St Petersburg he filled for eighteen months with great acceptance the office of pastor of the French church. In 1785 he removed to London, Lord Shelburne, then a minister of state, having invited him to undertake the education of his sons. It was at the house of Lord Shelburne, afterwards marquis of Lansdowne, where he was treated as a friend or rather member of the family, that he became acquainted with some of the most illustrious men of the country, amongst whom may be mentioned Fox, Sheridan, Lord Holland, and Sir Samuel Romilly. With the last of these he formed a close and enduring friendship, which had an important influence on his life and pursuits.

In 1788 Dumont visited Paris in company with Romilly. During a sojourn of two months in that city he had almost daily intercourse with Mirabeau; and a certain affinity of talents and pursuits led to an intimacy between two persons diametrically opposed to each other in habits and in character. On his return from Paris Dumont formed that connection with Jeremy Bentham which exercised a powerful influence over his future opinions, and, as it were, fixed his career as a writer on legislation. Filled with admiration for the genius of Bentham, and profoundly impressed with the truth of his theory, and the important consequences to which it immediately led, Dumont made it one of the chief objects of his life to recast and edit the writings of the great English jurist in a form suitable for the ordinary reading public. This literary relationship was, according to Dumont's own account, one of a somewhat peculiar character. All the fundamental ideas and most of the illustrative material were supplied in the manuscripts of Bentham; Dumont's task was chiefly to abridge by striking out repeated matter, to supply *lacunæ*, to secure uniformity of style, and to improve the French. The following works of Bentham were published under the editorship of Dumont:—*Traité de la Législation* (1802), *Théorie des peines et des Récompenses* (1811), *Tactique des Assemblées législatives* (1815), *Preuves Judiciaires* (1823), and *Organization Judiciaire et Codification* (1828).

In the summer of 1789, that season of promise and of hope, especially to a Genevese exile, Dumont suspended his labours in England in order to proceed to Paris along with his friend Duroverai, ex-attorney-general of the republic of Geneva. The object of the journey was to obtain through Necker, who had just returned to office, an unrestricted restoration of Genevese liberty, by cancelling the treaty of guarantee between France and Switzerland, which prevented the republic from enacting new laws without the consent of the parties to this treaty. The proceedings and negotiations to which this mission gave rise necessarily brought Dumont into connection with most of the leading men in the Constituent Assembly, and made him an interested spectator, sometimes even a participator, indirectly, in the events of the French Revolution.

The same cause also led him to renew his acquaintance with Mirabeau, whom he found occupied with his duties as a deputy, and with the composition of his journal, the *Courier de Provence*, in which he was assisted by Duroverai, Clavière, and other Genevese patriots. For a time Dumont took an active and very efficient part in the conduct of this journal, supplying it with reports as well as original articles, and also furnishing Mirabeau with speeches to be delivered or rather read in the assembly, as related in his highly instructive and interesting posthumous work entitled *Souvenirs sur Mirabeau* (1832). In fact his friend George Wilson used to relate that one day, when they were dining together at a *table d'hôte* at Versailles, he saw Dumont engaged in writing the most celebrated paragraph of Mirabeau's address to the king for the removal of the troops. He also reported such of Mirabeau's speeches as he did not write, embellishing them from his own stores, which were inexhaustible. But this co-operation, so valuable for Mirabeau, and so self-devoted on the part of Dumont, was destined soon to come to an end; for, being attacked in pamphlets as one of Mirabeau's writers, he felt hurt at the notoriety thus given to his name in connection with a man occupying Mirabeau's peculiar position, and resolved to return to England, which he accordingly did in 1791.

In the eventful years which followed he continued to live chiefly at Lansdowne House, or at Bowood, where the most remarkable men of Europe were frequent guests. Latterly, he formed an intimate friendship with Lord Holland, whom he had known from childhood; and he became a member of the society of familiar friends, the habitual visitors at Holland House, where, during many years, celebrated guests were welcomed of every country, party, religion, and of every liberal profession or station. In 1801 Dumont travelled over various parts of Europe with Lord Henry Petty, afterwards marquis of Lansdowne, and brought back a fresher acquaintance with the mental occupations of the Continental nations, from whom England had for years been widely separated. But Dumont had then opened a new course of more serious occupations, in the editorship of the works of Bentham already mentioned. In 1801 he published the *Traité de la Législation*, the first fruits of his zealous labours to give order, clearness, and vivacity to the profound and original meditations of Bentham, hitherto praised only by a very few patient readers, and but little better known, even by name, to the English than to the European public. In 1814 the restoration of Geneva to independence induced Dumont to return to his native place, and he soon became at once the leader and ornament of the supreme council. He devoted particular attention to the judicial and penal systems of his native state, and many improvements on both are due to him. At the time of his death, he was on the eve of proposing a complete code of law, by which he fondly hoped to make the legislation of Geneva an example to Europe. He died at Milan when on an autumn tour of relaxation in October 1829, in the seventy-first year of his age.

DUMONT D'URVILLE, JULES SÉBASTIEN CÉSAR (1790–1842), a French navigator, born in the town of Condé sur Noireau, in Normandy. The death of his father, who before the revolution had held a judicial post in Condé, devolved the care of his education on his mother and his maternal uncle, the Abbé De Croisilles. Failing to pass the entrance examination for the Ecole Polytechnique, he went to sea in 1807 as a *novice* on board the "Aquilon," and soon attracted the attention of the captain, Maignon, by his studious disposition. During the next twelve years he gradually rose in his profession, and continued through all its multitudinous vicissitudes to increase his scientific and linguistic acquisitions: botany, entomology, English, German, Spanish, Italian, and even Hebrew and Greek were added to the more professional branches. In 1820 while engaged in a survey of the Mediterranean under Captain Gauthier of the "Chevrette," he was fortunate enough to recognize the Venus of Milo in a Greek statue recently unearthed, and to secure its preservation by the report he presented to the French ambassador at Constantinople. A wider field for his energies was furnished in 1822 by the exploring expedition of the "Coquille" under the command of his friend Duperrey; and on its return in 1825 his services were rewarded by promotion to the rank of *capitaine de frégate*, and he was intrusted with the control of a similar enterprise. The "Astrolabe," as he renamed the "Coquille," left Toulon on April 25, 1826, and reached Marseilles again on 25th of March 1829,—having traversed the South Atlantic, coasted the Australian continent from King George's Sound to Port Jackson, laid down various parts of New Zealand, and visited the Fiji Islands, the Loyalty Islands, New Caledonia, New Guinea, Amboyna, Van Diemen's Land, the Caroline Islands, Celebes, and Mauritius. Promotion to the rank of *capitaine de vaisseau* was bestowed on the commander in August 1829; and in August of the following year he was charged with the delicate task of conveying the exiled King Charles X to England. His proposal to undertake a voyage of discovery to the south polar regions was discouraged by Arago and others, who criticised the work of the previous expedition in no measured terms; but at last, in 1837, all difficulties were surmounted, and on 7th September he set sail from Toulon with the "Astrolabe" and its convoy "La Zélée." On 15th January 1838 they sighted the Antarctic ice, and soon after their progress southwards was blocked by a continuous bank, which they vainly coasted for 300 miles to the east. Returning westward they visited the South Orkney Islands and part of the New Shetlands, and discovered Joinville Island and Louis Philippe's Land, but were compelled by scurvy to seek succour at Talcahuano in Chili. Thence they proceeded across the Pacific and through the Asiatic archipelago, visiting among others the Fiji and the Pelew Islands, coasting New Guinea, and circumnavigating Borneo. In 1840, leaving their sick at Hobart Town, Tasmania, they returned to the Antarctic region, and on the 21st of the month were rewarded by the discovery of Adélie Land, in 140° E. of Greenwich. The 6th of November found them at Toulon. D'Urville was at once appointed rear-admiral, and in 1841 he received the gold medal of the Société de Géographie. On the 8th of May 1842 he was killed along with his wife and son in a railway accident near Meudon. Though many of his observations are no longer regarded as trustworthy on account of the defective character of the instruments employed, he made many important additions to various departments of scientific geography; and his natural history collections were especially valuable. His principal works are—*Enumeratio plantarum quas in insulis Archipel. aut littoribus Ponti Euxini*, &c., 1822; the *Histoire du voyage* (5 vols. of the 22) in the great work on the "Astrolabe" expedition in 1826–1829; the first part of the *Histoire du voyage* (10 vols. of the 23) in the series devoted to the expedition from 1837 to 1840; *Voyages autour du Monde: résumé général des voyages de Magellan*, &c., 1833, 1844.

See Berthelot's *Éloge* in *Bull. de la Soc. de Géogr.* 2d ser. t. xix.; Matterer, *Notice necrologique*, &c., Paris, 1842; Isidore Lebrun, "Biographie," &c., in *Annales Maritimes*, t. lxxviii.; De Rosier, *Vie, voyages*, &c., Paris, 1844; Lesson, *Notice histor.*, Rochefort, 1846.

DUMOURIEZ, CHARLES FRANÇOIS (1739–1823), general of the French republican army, was born at Cambray in 1739 of a respectable family of Provence. His father was a commissary of the royal army, and had acquired some celebrity as a poet; and from him young Dumouriez received his earliest instructions. His studies were connued at the college of Louis-le-Grande for three years. 1757, his father having been attached to the army under 'Estrées about to invade Hanover, he accompanied him to auberge, and served with distinction during the Seven ears' War. In 1763 he attained the rank of captain; t, in consequence of a reform reducing the numbers of e army, he retired with a small pension and the cross of Louis. He afterwards received a subordinate situation the secret service.

On his return from a pedestrian tour in Italy, he dressed a memorial to the Duc de Choiseul, urging him to nbrace the cause of the Corsicans against the Genoese; d a public audience which he had with the minister on e subject led to a violent altercation, the result of which s a *lettre de cachet* which forced Dumouriez to leave rance. But the expedition which he had advised being terwards resolved on, Choiseul made him an honourable blic reparation, and appointed him quartermaster-general the troops. The political conjunctures of the times fered an unlimited scope for his fertility in diplomatic pedient, and he mingled in all the intrigues of the age. 1770 he was sent on a secret mission to Poland with the ew of neutralizing the efforts of Catherine II., and suceded in securing fifty senators for the cause of independce, effected a unity of action among the confederates, and sciplined a militia; but, when there was some appearance the resurrection of Poland being effected, Choiseul lost s place, owing to the machinations of the Duc d'Aiguillon d Madame Du Barry, and Dumouriez was recalled to aris. He was soon, however, sent back on a similar ission by D'Aiguillon. He endeavoured to assist the volutionists in Sweden, and to raise troops in the Hanse wns to menace Stockholm, but this was contrary to the iews of the French cabinet; and the Duc d'Aiguillon, havng discovered his project, had him arrested and imprisoned the Bastille for six months. He was afterwards sent to he castle of Caen, from which he was not released until he accession of Louis XVI.

Dumouriez had naturally little inclination to resume the connection with foreign politics which had proved so dangerous, and he accordingly devoted his attention to the internal economy of his own country. He wrote a memoir on the great importance that might be given to the harbour of Cherbourg, one result of which was that he was appointed governor of the place in 1778.

In 1788 Dumouriez was promoted to the rank of major-general. When the revolutionary movement began he pronounced in favour of political reform without breaking with the court. The connections which he held with the leading men of the Girondist party greatly advanced his political career. At the opening of the second legislative assembly he was appointed minister for foreign affairs in place of Delessart, but he held the position for only three months. During his short tenure of office he exerted himself to the utmost in reforming abuses, and in introducing the greatest economy into every department.

He held for one month the office of minister of war after the dismissal of his colleagues Roland, Servan, and Clavière. At length his own resignation followed, which increased his popularity. When the troops of the coalition advanced against France, he was appointed to the command of the army of the north as lieutenant-general under Marshal Luckner. He made a determined stand against the advance of the allies, which was decisively checked by the defeat inflicted on them at Valmy on the 20th September 1792. This was followed by a campaign in the Austrian Netherlands, in which Dumouriez was uniformly successful, until he was signally defeated by Coburg in the battle of Neerwinden in January 1793. The execution of Louis ad estranged him from the republican party; and, when in consequence of his defeat he was recalled by the Convention and threatened with a charge of treason, he sought refuge in the camp of the Austrians, accompanied by the Duc de Chartres (afterwards Louis Philippe) and his brother.

Lost without hope of return to his native country, Dumouriez wandered a long time an exile in Brussels, England, Switzerland, Germany, Denmark, and St Petersburg. At last in 1804 he took up his permanent residence in England, where the Government conferred on him a pension of £1200 a year. In 1814 and 1815 he endeavoured to procure from Louis XVIII. the baton of a marshal of France, but was refused. He died at Turville Park, near Henley-on-Thames, on the 14th March 1823. His memoirs, written by himself, were published at Hamburg in 1794. An enlarged edition, under the title *La Vie et les Memoires du General Dumouriez*, appeared at Paris in 1822. Dumouriez was also the author of a large number of political pamphlets.

DÜNABURG, a town of European Russia, at the head of a district in the government of Vitebsk, for the most part on the right bank of the Dwina, 12 miles south-east of Riga, in 55° 53′ N. lat. and 31° 29′ 9″ E. long. It consists of four portions—the main-town or fortress, the old suburb, the new suburb, and on the left bank of the river the village of Griva. The fortress is of the first class, and forms the most important point in the line of defences of the Dwina; the floating bridge across the river is protected by a splendid *tête-de-pont*. Among the public buildings are five churches, a Roman Catholic chapel, a Jewish synagogue, a gymnasium, and a theatre; and among the industrial establishments several tanneries and breweries, a saw-mill, a flour-mill, brick and tile works, and limekilns. Its position on the railway between Warsaw and St Petersburg, and its double means of communication with Riga, render the town an important commercial centre, especially for the trade in flax, hemp, tallow, and timber. There are weekly markets and two large annual fairs. Of the 25,674 inhabitants registered in 1861, 7561 were Jews, 3994 Roman Catholics, and 690 Protestants. In 1873 the total population was 29,613.

Dünaburg was originally founded in 1278 by the Livonian Knights of the Sword, about 12 miles further down the river than its present site, at a spot still known as the Old Castle or *Staruí Zamok*. In 1559, along with other portions of the territory belonging to the order, it was mortgaged by the grand-master Gothard Kettler to Sigismund Augustus king of Poland for the sum of 700,000 guldens; and two years afterwards it became the centre of the new Polish province of Infland. Captured in 1576 by Ivan the Terrible, it was again restored to Poland; and in 1582 Stephen Bathori transferred the fortress to its present site. In the 17th century it was held now by the Swedes and now by the Russians; and in 1656 it ran the risk of losing its old name for that of Borissoglebsk, bestowed by the emperor Alexis Michaelovitch. Finally incorporated with Russia in 1772, it received its present administrative rank in 1777, and its recognition as a first-class fortress in 1811. In July 1812 the *tête-de-pont* was vainly stormed by Oudinot, but a few weeks afterwards the town was captured by Macdonald.

DUNBAR, a royal and parliamentary burgh and seaport of Scotland, in the county of Haddington, situated on an eminence near the mouth of the Firth of Forth, 29¼ miles E.N.E. of Edinburgh by the North British railway. The ruins of the castle, the remains of the Grey Friars' monastery founded in 1218, and a mansion house of the Lauderdale family, are the principal objects of historical interest. The parish church is a fine building of red sandstone, with a tower about 107 feet in height, which forms a well-known landmark to seamen; it dates only from 1819, but occupies the site of what was probably the first collegiate church established in Scotland, and still preserves the large marble monument of Sir George Home, created earl of Dunbar and March by James VI. in 1605. The town-hall, the assembly rooms, the public-schools, the mechanics' institute and subscription library, and the other local institutions require no special notice. The principal source of wealth is the herring fishery, which fosters an extensive curing trade; but ship-building is also carried on, and there are several iron foundries, breweries, and distilleries, as well as a large paper-mill in the vicinity. The harbour, formerly small and shallow, has been greatly enlarged and improved in the course of the present century, at the joint expense of the town and the Fishery Board; but the entrance is rendered somewhat dangerous by the number of craggy islets and sunken rocks. Dunbar unites with Haddington, Jedburgh, Lauder, and North Berwick in returning a member to Parliament. In 1875-6 the value of real property was £11,832. Population in 1871 3320.

The castle of Dunbar, mentioned as early as 856, from the strength of its position became of great importance as a bulwark against English invasion, and a town grew up under its protection, which was created a royal burgh by David II. It was captured by Edward I., who defeated the forces of Baliol in the neighbourhood of the town in 1296; it afforded shelter to Edward II. on his flight from Bannockburn; and it was besieged in 1337 by the English under Montague earl of Salisbury, but was successfully defended by Black Agnes of Dunbar, countess of March and a member of the Douglas family. In the 15th century it was chosen as her usual residence by Joanna Beaufort, the widow of James I. of Scotland; and in the 16th it served on several occasions as a retreat for the unfortunate Queen Mary. An Act of Parliament had been passed in 1488 ordering the demolition of the castle, but it was reserved for the Regent Murray to effect its destruction in 1567. A battle popularly known as the "race of Dunbar" was fought in 1650 between Cromwell and Leslie, and resulted in the total rout of the Scotch.

DUNBAR, WILLIAM, one of the most distinguished of the early poets of Scotland, is supposed to have been born about 1460. Comparatively little is known about his personal history, but, from an allusion in one of his poems, he seems to have been a native of Lothian.[1] In his fifteenth or sixteenth year he was sent to the university of St Andrews, where he received the degree of B.A. in 1477, and that of M.A. in 1479.

Of the events of his life for nearly twenty years after this we possess little information. He mentions, however, in his poems that he had been employed as a preaching friar of the order of St Francis, and as such had made good cheer in every flourishing town in England had ascended the pulpit at Dernton and Canterbury, and had crossed the sea at Dover, and instructed the inhabitants of Picardy. He also mentions that this mode of life compelled him to have recourse to many a pious fraud, from whose guilt no holy water could clear him. After this he appears to have entered the service of James IV., by whom he was sent on numerous embassies to foreign princes.[2] In 1491 he was residing at Paris, most likely in connection with the Scottish embassy there. The knowledge of the Continent he thus obtained must have had considerable influence in imparting greater strength and energy to his poetical conceptions.

In the year 1500 Dunbar obtained from the king a yearly pension of £10, until he should be promoted to one of greater value. In 1501 he went to England with the ambassadors sent to conclude the negotiations for the marriage of the young King James with the Princess Margaret, daughter of Henry VII. During the festivities on this occasion Dunbar was styled "the Rhymer of Scotland," and received from Henry a present of £6, 13s. 4d. in December, and a similar sum in January of the subsequent year. On his return to Edinburgh a sum of £5 was paid to him in addition to his salary. In honour of the marriage Dunbar composed his well known poem, *The Thrissil and the Rois*, another in honour of the city of London, and several others in which he described the personal attractions of the young queen. After this he lived much at court writing poems, although at the same time he hoped to obtain preferment in the church.

In 1504 he first performed mass before the king, whose offering on that occasion was £4, 18s., a larger sum than that usually paid on the occasion of a priest's first mass. In 1507 his pension was augmented to £20, and three years afterwards it was raised to £80, to be paid during his life, or until he should be promoted to a benefice of £100 or more. In 1511 he seems to have been in the train of Queen Margaret when she visited the northern part of Scotland, as one of his poems descriptive of her reception at Aberdeen, is evidently written by an eye-witness.

After the disaster of Flodden, in 1513, Dunbar's fortunes seem to have changed, and no further mention of him occurs as receiving pension. That he may have obtained church preferment is quite possible, but the probability is that the early death of the king, and the unpopularity of the queen and the little influence she had after her marriage with the earl of Angus, may have led to neglect of Dunbar in his old age. His poems contain many allusions to the unequal division of the world's goods. He was alive in 1517, as in that year he wrote a poem on the occasion of the Regent Albany passing into France, in which he laments the distracted state of public affairs in Scotland.[3] He is supposed to have died about the year 1520, when he had attained his sixtieth year.

The poems of Dunbar, "the darling of the Scottish muses," are about a hundred in number, for the most part of no great length. *The Thrissil and the Rois*, written, as before remarked, on the occasion of the marriage of James IV., is an allegory in which he describes the amity between England and Scotland in consequence of that event. *The Golden Targe* is a moral poem of great power of imagery, in which the ascendency of love over reason is shown to be general—the golden shield of reason being insufficient to ward off the shafts of Cupid. *The Twa Maryit Wemen and the Wedo*, a tale in which the poet overhears three females relating their experiences of married life, is an imitation of Chaucer's *Wyf of Bath*. *The Freiris of Berwik*, a tale, is also in the Chaucerian style. *The Flyting of Dunbar and Kennedy* is perhaps the most obscure of his poems, though it seems to have been very popular, and frequently imitated in the 16th century. Several of his smaller poems show a quick appreciation of peculiarities of character, but some of them—such as the tournament, or *Justis betuix the Tailyour and Sowtar*—though ludicrous, are very coarse. In one called *Of a Dance in the Queenis Chalmer*, he describes himself as one of the performers:—

> Than cam in Dunbar the makkar,
> On all the flure thair was nane frakkar,
> And thair he dancet the dirry dantoun,
> He hoppet like a pillie wantoun
> For luff of Musgraeffe, men tellis me,
> He trippet quhill he tint his pantoun;
> A mirrear dance mycht na man see.

Another Dance, that of the *Sevin Deidlie Synnis*—in which Mahoun, prince of devils, is described as holding a carnival with Pride, Ire, Envy, Covetousness, Idleness, Lechery, Gluttony, each with a train of followers, while a company of fiends stand by enjoying the sport, encouraging performers with various hot applications—is as extrava- t a piece as can well be conceived. In contrast, however, wrote several poems of a religious character, *e.g.*, *Off the tivitie of Christ; Off the Passioun of Christ; Off the urrection of Christ;* and *The Maner of Passyng to fessioun*, &c.

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[1] *Flyting with Kennedy*, line 110.

[2] In a poem to the king he reminds him that he had been employed not only in France, England, and Ireland, but also in Germany, Italy, and Spain. (Notes by Laing, vol. i. app. 263).

[3] There is considerable doubt about the period of Dunbar's death, as the poem on the absence of the Regent Albany may have been attributed to him by mistake. Mr Laing has conjectured that he may have accompanied King James, and been killed along with him in the battle of Flodden, where so many ecclesiastics perished. The volume of the accounts of the Treasurer from 1513 to 1515, which might have settled this and other important points, has been lost.

ore fortunate than Douglas and some of the earlier Scottish s, Dunbar had the satisfaction of seeing his principal works in t. *The Thrissil and the Rois*, *The Golden Targe*, *The ing with Kennedy*, and the ballad of *Lord Barnard Stewart* printed by Chepman and Myllar in 1508, and are the specimens of typography that issued from the Scottish press.[1] ral of his poems were preserved in the Asloane MS., written 575, the Bannatyne MS. 1568, preserved in the Advocates' ary, the Maitland MS. in the Pepysian Library, and the Reidpeth in the University Library, Cambridge. Of these detached ns some appeared in collections edited by Allan Ramsay, John erton, and Lord Hailes, in the course of the last century, but at th the works of Dunbar were collected and published in 1834 r David Laing (2 vols. 8vo, with a supplement, 1875), having ography and valuable illustrative notes. In 1873 a minute ysis of the language of Dunbar was published at Bonn by Dr annes Kaufmann of Elberfeld.

UNBLANE, a market-town in Perthshire, Scotland, nerly the seat of a bishopric, pleasantly situated on banks of the Allan. Its cathedral is one of the few cimens of Gothic architecture in Scotland which escaped truction at the Reformation. It is said to have been nded in 1142, and was nearly rebuilt by Clemens, hop of Dunblane, about 1240. The whole building of the Early Pointed style of architecture, except tower, which is Early Norman. The cathedral ains unroofed, with the exception of the choir and pter house. The choir has been used as the parish rch since the Reformation, but lately alterations have n made by the removal of a thick partition wall l galleries, and the erection of a light partition wall taining two windows, the gift of Sir William Stirling rwell, Bart. One of the bishops of Dunblane was ghton, who left his library, which is still preserved, to clergy of the diocese. About a mile and a half to the of the town is Sheriffmuir, where a battle was fought in 5 between the earl of Mar, in the command of the troops the Pretender, and the royal forces under the duke of yll. Dunblane has no charter. A sheriff court and missary courts are held there, and there is a large district on. There is a market on Thursdays, and several fairs held annually. At Cromlix, a mile and a half to the h, there are two mineral springs, and not far from the n an elegant hydropathic establishment has been erected. population in 1871 was 1921.

UNCAN, Adam, First Viscount (1731–1804), an trious' naval commander, was born July 1, 1731, at die, in Forfarshire, Scotland. After receiving the rudi- ts of his education at Dundee, he was in 1746 placed r Captain Haldane, of the "Shoreham" frigate, and 749 he became a midshipman in the "Centurion." In he was appointed second lieutenant of the "Norwich," rth-rate; but on the arrival of that ship in America, her, with the rest of Keppel's squadron, it had convoyed ral Braddock's forces, he was transferred to the nturion." Once again in England, he was promoted second lieutenant of the "Torbay," 74, and after three on the home station he assisted in the attack on the ch settlement of Goree, on the African coast, in which as slightly wounded. He returned to England as first enant of the "Torbay;" and in 1759 was made a com- ler, and in 1761 a post-captain. His vessel, the "Valiant," was Commodore Keppel's flag-ship in the expedition against Belleisle in that year, and also in 1762, when it took an important part in the capture of Havana. In 1778, on the recommencement of war with France, Captain Duncan was appointed to the "Suffolk," whence before the close of the year he removed to the "Monarch," one of the Channel Fleet. On January 16, 1780, in an action off Cape St Vincent, between a Spanish squadron under Don Juan de Langara and the British fleet under Sir George Rodney, Captain Duncan in the "Monarch" was the first to engage the enemy; and in 1782, as captain of the "Blenheim," he took part in Lord Howe's relief of Gibraltar. From the rank of rear-admiral of the blue, received in 1789, he was gradually promoted until, in 1799, he became admiral of the white. In February 1795 he hoisted his flag as commander-in-chief of the North-Sea fleet, appointed to harass the Batavian navy. Towards the end of May 1797, though, in consequence of the wide-spread mutiny in the British fleet, he had been left with only the "Adamant," 50, besides his own ship the "Venerable," 74, Admiral Duncan proceeded to his usual station off the Texel, where lay at anchor the Dutch squadron of fifteen sail of the line, under the command of Vice-Admiral De Winter. From time to time he caused signals to be made, as if to the main body of a fleet in the offing, a stratagem which probably was the cause of his freedom from molestation until, in the middle of June, reinforcements arrived from England. On October 3 the admiral put into Yarmouth Roads to refit and victual his ships, but, receiving information early on the 9th that the enemy was at sea, he immediately hoisted the signal for giving him chase. On the morning of the 11th De Winter's fleet, consisting of four seventy-fours, seven sixty-fours, four fifty-gun ships, two forty-four-gun frigates, and two of thirty-two guns, besides smaller vessels, was sighted lying about nine miles from shore, between the villages of Egmont and Camperdown. The British fleet numbered seven seventy-fours, seven sixty-fours, two fifties, two frigates, with a sloop and several cutters, and was slightly superior in force to that of the Dutch. Shortly after mid-day the British ships, without waiting to form in order, broke through the Dutch line, and an engagement commenced which, after heavy loss on both sides, resulted in the taking by the British of eleven of the enemy's vessels. When the action ceased the ships were in nine fathoms water, within five miles of a lee shore, and there was every sign of an approaching gale. So battered were the prizes that it was found impossible to fit them for future service, and one of them, the "Delft," sank on her way to England. In recognition of this victory, Admiral Duncan was, on October 21, created Lord Viscount Duncan of Camperdown, and baron of Lundie, with an annual pension of £3000 to himself and the two next heirs to his title. In 1800 Lord Duncan withdrew from naval service. He died August 4, 1804.

See Charnock, *Biographia Navalis*, 1794–6; Collins, *Peerage of England*, p. 378, 1812; W. James, *Naval History of Great Britain*, 1822; Yonge, *History of the British Navy*, vol. i. 1863.

DUNCAN, Thomas (1807–1845), a distinguished Scottish portrait and historical painter, was born at Kinclaven, in Perthshire, May 24, 1807. He was educated at the Perth Academy, and afterwards began the study of the law, which, however, he speedily abandoned for the more congenial pursuit of art. Commencing his new career under the instruction of Sir William Allan, he early attained distinction as a delineator of the human figure; and his first pictures established his fame so completely, that at a very early age he was appointed professor of colouring, and afterwards of drawing, in the Trustees' Academy of Edinburgh. In 1840 he produced one of his finest pieces, Prince Charles Edward and the Highlanders entering Edin-

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f these the only copy known to exist is preserved in the Advocates' ry, Edinburgh. This unique volume was reprinted in 1827 under tle *The Knightly Tale of Golagrus and Gawane, and other ancient printed at Edinburgh by W. Chepman and Androw Myllar in* ar 1508, 4to.

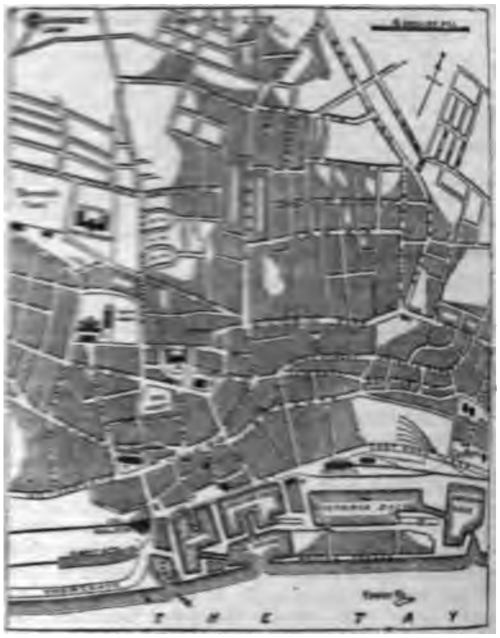
[illegible]

DUNDALK, a parliamentary borough, [illegible] of Louth county, Ireland, [illegible] Dundalk Bay, [illegible]. It consists of one long street, intersected by several smaller ones. The parish church is [illegible] with a modern wooden steeple [illegible]; and the Roman Catholic chapel is a handsome building in the style of King's College Chapel, Cambridge. The other public buildings that may be named are the Exchange Buildings, containing the town hall and a free library, the county court house and prison, the union workhouse and infirmary, and the cavalry barracks. There are several educational establishments in the town. The borough government is in the hands of town commissioners, and the port is under the control of harbour commissioners. The county assizes are held in the town, as well as quarter and petty sessions; and it returns one member to Parliament. A large trade, chiefly in agricultural and dairy produce, is carried on, and the town contains [illegible]. Distilling and brewing are the principal industries, and there are besides a flax and jute spinning mill, salt works, &c. The port and harbour of Dundalk have recently been undergoing extensive improvements. The course of the river has been straightened, and the bar and harbour deepened, so that vessels of considerable draught can now come up to the town. In the reign of Edward II Dundalk was a royal city, and Edward Bruce proclaimed himself king there in 1315. Population in 1851, [illegible], and in 1871, 11,377. Area, 1355 acres.

DUNDAS, HENRY. See MELVILLE, VISCOUNT.

DUNDEE, a royal and parliamentary burgh and seaport, is situated on the east coast of Scotland, in the county of Forfar, on the north bank of the Firth of Tay, twelve miles from the confluence of that estuary with the German Ocean. It is the third town in Scotland as regards population, and the second in commercial importance. Its latitude is 56° 27' N., its longitude 2° 58' W.; it is distant from Edinburgh [illegible] miles N.N.E., from Perth 22 miles E., and from Forfar, the county town, 14 miles S. It extends nearly three miles along the shores of the Tay, and varies in breadth from half a mile to a mile, and the ground gradually rises towards the hill of Balgay and Dundee Law, the summit of the latter being [illegible] feet above the sea level. Its general appearance is pleasing and picturesque, and the surrounding country very beautiful.

Dundee is the chief seat of the linen manufacture in Britain, and from a very early time appears to have had a special reputation in this branch of industry. Hector Boece, a native of the town, in his *History and Cronklis of Scotland*, thus quaintly refers to it: "Dunde, the toun quhair we wes born, quhair mony virtewus and lauberius pepill ar in making of claith." It was not, however, till the introduction of steam power, in the beginning of the present century, that there was any remarkable development of this industry in Dundee. The first work of importance was the Bell Mill (which is still extant), built in [illegible], and the first power-loom factory was erected in [illegible]. Side by side with the extension of the linen trade has been that of jute spinning and weaving. Large cargoes of this material are imported into Dundee direct from India, and it is manufactured on an enormous scale. In fact the manufacture of flax, hemp, and jute fabrics constitutes the staple trade of the town, and supports, directly or indirectly, the great bulk of the inhabitants. There are upwards of seventy steam spinning-mills and power-loom factories, employing above 50,000 persons. Some of these buildings are of great size and considerable architectural elegance, those of Messrs Baxter, Messrs Cox, and Messrs Gilroy being especially conspicuous. These three afford employment to above 12,000 hands. The principal textile productions are osnaburgs, ducks, canvas, sheetings, bagging, jute carpeting, &c.; and the total value of these fabrics annually produced has been estimated at upwards of £7,000,000. Among the other industries of Dundee may be mentioned ship-building, engineering, tanning, and leather manufactures (including shoemaking by machinery), all of which are conducted on a large scale. There are also considerable foundries, breweries, corn and flour mills, and confectionery and fruit-preserving works—Messrs Keiller & Son's "Dundee marmalade" having a most extensive reputation. The prosperity of Dundee is in a large measure due to its commodious harbour and its magnificent docks. The harbour works extend about two miles along the river side, and the docks, five in number, cover an area of 35 acres. Although they cannot compare in extent with those of London or Liverpool, they are probably unsurpassed in the kingdom for stability and convenience. They have cost, from 1815, when the works were begun, to May 1877, £800,000; and the harbour revenue amounted in 1876 to £50,751. The principal imports for year ending May 1876 were



Plan of Dundee.

1. Barracks.
2. Volunteer Drill Hall.
3. Prison and Sheriff Court Buildings.
4. High School.
5. Albert Institute.
6. Post-Office.
7. Town Churches and old Steeple.
8. Town House.
9. Theatre.
10. Music Hall.
11. Custom House.
12. New Graving Dock.

odilla, and hemp	31,300 tons.
	106,727 „
	146,399 „
r	46,256 loads.
and seal blubber	1,694 tons.
tuffs	6,808 „

al exports were

ute manufactures—	first six mouths	346,472 pieces.
	second „	19,117 tons.
nd sacks	first „	12,001,032.
	second „	8,853 tons.
		8,630 „
		3,506 „

built at Dundee, in 1876, 32 vessels with a
18,794, and at the end of that year the shipping
the port consisted o'

iling vessels	tonnage 68,314
amers	17,078
	tonnage 85,392

he steamers are in the seal and whale fishing
making two voyages yearly to the Arctic Seas.
cipal public buildings are the following :—The
, designed by "the elder Adam," and erected in
in but pleasing structure; the Custom-House;
fice; the Town Churches, an imposing group,
by a noble old tower; St Paul's Free Church,
.67 feet high; St Paul's Episcopalian Church,
Sir G. G. Scott, with spire 211 feet high; the
ol, a fine specimen of Grecian Doric, designed
Morgan Hospital, erected and endowed by
nounting to nearly £80,000) of the late Mr
gan, a native of Dundee, for the board and
of a hundred boys: the Royal Infirmary, a
structure in the Tudor style, designed by Coe
n, and costing about £15,000; the Lunatic
he New Orphan Institution; the Industrial
he Convalescent Hospital; the Asylum for
hildren; the Deaf and Dumb Institution, the
hange; the Clydesdale Bank; the court-house
buildings, with a fine bold portico; the Eastern
gned by Pilkington and Bell; the Christian
n's Association Buildings; the Theatre Royal,
ewspaper offices, and public baths. To these may
deserving of notice the Royal Arch, designed
head, and commemorating Her Majesty's visit
in 1844, and the Albert Institute, a Gothic
memory of the late Prince Consort (mainly
y Sir G. Gilbert Scott), and erected, at a cost
of £20,000, on a site purchased for £8000.
ues of George Kinloch, the first M.P. for Dundee
ormed Parliament, and James Carmichael, the
ave been erected in Albert Square.

t notable of the few antiquities of Dundee is
Steeple" (dating from the 14th century),
igh, which has been recently restored, under
on of Sir G. Gilbert Scott, R.A., at a cost
Dudhope Castle, the old seat of the Scrym-
reditary constables of the burgh, and granted
II. to Viscount Dundee, is now used as bar-
e old custom-house, in the Green Market, is
uilding of the 16th century. The East Port,
elic of the ancient walls, is allowed to stand
noration of George Wishart the martyr, who,
to tradition, preached from it during the
544. The pillar of the old town cross, bearing
has been re-erected. In High Street, Vault,
rt, and Fish Street there still remain a few
f the 16th and 17th centuries. But the castle,
and the numerous convents have entirely dis-
he last of the monastic buildings, once occupied by the nuns of St Clare, having been demolished only a few years ago. The old burying-ground (or "Howff"), now closed, contains many interesting monuments and epitaphs. Three spacious suburban burying-grounds have taken its place—the Western Cemetery, the Eastern Necropolis, and the Balgay Cemetery. Till the middle of the present century, or even later, many of the streets were narrow and irregular, and many of the buildings unhealthy and unsightly; but of late a great change for the better has taken place. Under the Improvement Act of 1871, the narrow gorge of the Murraygate has been swept away; the ugly and tortuous Bucklemaker Wynd has been transformed into the spacious Victoria Road, with the Victoria Bridge at its upper end; and a dense and dingy mass of buildings between Meadowside and Seagate has been replaced by Commercial Street, which, when completed, will be one of the finest civic thoroughfares in Britain. Many improvements still remain to be accomplished, and although the total cost will probably amount to £400,000, it is expected that there will be ultimately a profit on the street improvements. By the aid of local building societies a large number of working men's houses have recently been erected; and a double line of tramways has been laid from the post-office to the west end of the town.

Arms of Dundee.

Dundee is well supplied with recreation grounds. The Baxter Park, 35 acres in extent, designed by Sir Joseph Paxton, was presented by Sir David Baxter to the community in 1863; the pavilion contains a marble statue of the donor by Sir John Steell, erected by public subscription. The Balgay Park, a picturesque wooded hill commanding fine prospects on every side, was secured by the police commissioners and opened to the public in 1871. Besides these there are the Magdalen Green, the Barrack Park, the Bleaching Green, and Dundee Law. A magnificent promenade along the river side between Magdalen Point and the Craig Pier has lately been opened. It is called the Esplanade, and incloses a space of 54 acres, which when filled up will give ample station and traffic accommodation for the Caledonian and North British railways, and leave the public a clear carriage-way and foot-path by the river side. The expense of the undertaking (about £40,000) is borne in nearly equal proportions by the two railway companies and the Harbour Trustees. An extensive abattoir and cattle market have recently been constructed by the police commissioners at the east end of the town. Dundee has regular and frequent steam-boat traffic with London, Hull, Newcastle, Liverpool, Leith, and Rotterdam. To render communication with the south more direct, the North British Railway Company designed the Tay Bridge, a colossal work, completed in 1877 (see Bridges, vol. iv. p. 340).

The water supply of Dundee is copious and excellent. Thirty years ago works were established at Monikie, but in time the quantity (about 2½ million gallons per day) proved insufficient, while the quality deteriorated. The loch of Lintrathen, 20 miles distant, with necessary grounds, was accordingly purchased for £33,108. The surface of the loch, originally 180 acres, has been raised 20 feet, and is now 405 acres in extent; the storage capacity is 257,000,000 cubic feet; the drainage area, 19,000 acres. The main pipe from Lintrathen, 27 inches in diameter, transmitting 8 million gallons per day, conveys the water to Clatto reservoir, four miles from the town, which has an area of 21 acres, and holds 80 million gallons; two pipes from Clatto lead to the service reservoirs. The total cost of the works exceeds £305,000.

Dundee possesses a large number of benevolent institutions, as well as "mortifications" (dating from 1656 downwards) for charitable or educational purposes.

Among eminent men who were natives of Dundee may be named Hector Boece or Boethius, historian, born about 1465; John and Robert Wedderburn, authors or collectors of the book of *Gude and Godlie Ballatis* published 1578; Sir George Mackenzie, the celebrated lawyer, born in 1636; Rev. John Willison, author of *The Afflicted Man's Companion*, born 1680; Viscount Duncan of Camperdown, born 1731; James Ivory, an eminent mathematician, born 1765; and Dr Dick, author of *The Christian Philosopher*, born 1774. The father of Thomas Hood, author of *The Song of the Shirt*, was a native of the town, and Hood's first literary production appeared in the *Dundee Advertiser*, about 1816. Robert Nicoll, "Scotland's second Burns," at one time kept a circulating library in Castle Street, and William Thom, the Inverury poet, rests in the Western Cemetery, where a monument was erected by public subscription over his grave.

Statistics.—The terrible havoc resulting from the siege of 1651 greatly checked the progress of Dundee, but the following century witnessed the beginning of that rapid and healthy growth which of late years has been so marked. The following figures show the population at successive periods of 30 years since 1755:—

1755	Population	12,480	1841	Population	64,629
[illegible]	"	15,700	1871	"	121,976
1811	"	29,716	1877	(estimated)	142,951

In 1876 the births numbered 5231, deaths 3076, marriages 1222. The birth-rate was 3[illegible] and the death-rate 22 per 1000.

The rainfall in Dundee for 1876 was 43·12 inches, which is considerably above the average, in fact, the highest of any recorded year except 1872, when it was 43·70. The number of "wet days" in 1876 was 230, being 50 above the average. The prevailing winds are westerly.

Previous to 1832, Dundee was grouped with Forfar, Perth, Cupar, and St Andrews in returning a member to Parliament; the Reform Act gave it the privilege of a member for itself, and the Act of 1868 added another. For municipal purposes the town is divided into nine wards, the third of which includes the populous and thriving suburb of Lochee. The town council is composed of the provost, dean of guild, 6 bailies, and 20 councillors; these are also the police and water commissioners. Part of the town being in the parish of Dundee, and part in the united parishes of Liff and Benvie, there are two parochial boards. When the Education Act came into operation (1873) there was class-room accommodation within the burgh for 17,719 pupils, and since then the school board has built or enlarged 10 schools. In 1877 there was accommodation for 20,816 pupils, and the number of children in the town of school age, that is from 5 to 13 years, was estimated at 21,000. The principal educational institution is the high school, where an excellent curriculum is available; and since 1875 classes, taught by professors from St Andrews, have been opened for the study of chemistry, geology, physiology, and literature.

In 1866 the ratepayers cordially adopted the Free Libraries' Act, and advantage has been largely taken of the privileges thus afforded. The library premises are centrically situated in Albert Square, and include a lending library, reference library, museum, and picture gallery, admission being free. In the lending library there are 25,000 volumes, in the reference library 5500. A fine arts exhibition is occasionally held within the free library buildings, and an Art Union for Dundee has just been sanctioned by the Board of Trade.

There are 78 places of worship in the town, which may be classified as follows:— In connection with the Established Church, 16; Free Church, 20; U.P. Church, 11; Congregationalist, 6; Episcopalian, 5; Roman Catholic, 4; Baptist, 3; other denominations, 13.

Lochee, a suburb of Dundee, forming part of the municipality, is situated about two miles to the north by the Coupar-Angus road. Though within recent years only a small country village, it has now a population of 15,000. It contains several flax and jute factories,—by far the largest and most comprehensive in the whole district being the Camperdown Linen Works, belonging to Messrs Cox Brothers and Co. They cover an area of 25 acres, and employ upwards of 5000 persons. The most striking external feature, and one of the prominent landmarks in the district, is the stately chimney-stalk (282 feet high) in the style of the Italian campaniles, built of parti-coloured bricks, with stone cornices.

Broughty Ferry, three miles distant, towards the mouth of the Firth of Tay, may also be considered as a suburb of Dundee. The name originally *Bruch-tay*, is believed to be Pictish, and refers to the castle or fortress, which is mentioned repeatedly during the wars of the 16th century. Its picturesque ruins continued till about 1857, when they were removed to make way for the present fort, which is intended as a defence for the Tay, and which mounts [illegible] guns, and can accommodate 60 men. Broughty Ferry is a burgh under the General Police Act, which was adopted in 1864, and is partly in the parish of Dundee partly in that of Monifieth. Some thirty years ago it was only a fishing village, although designed and partly laid out with a degree of breadth and regularity in the streets which fishing-villages rarely display. The population in 1861 was 3513, in 1871 it was 5707, and now (1877) it is estimated at 8000. There are nine churches of various denominations, the finest, in an architectural point of view, being the East Free and the Episcopalian, the latter designed by Sir G. G. Scott. Some of the villas on and around Fort Hill, occupied by Dundee merchants, are exceedingly handsome. Reres Hill and the Castle Green have been acquired by the commissioners of police as recreation grounds for the use of the public.

History.—Dundee is said to have been at one time called *Alectum*, but of this assertion there is no explicit documentary evidence. The earliest authentic mention of the town is in a deed of gift by David earl of Huntingdon, dated about 1200, which distinctly designated it "Dunde." The origin of the name is disputed,—some absurdly tracing it to the Latin *Donum Dei*, "the gift of God," others to the Celtic *Dun Dhia*, the Hill of God, others to *Dun taw*, the hill or fort on the Tay; the last named derivation is the most probable. Dundee was erected into a royal burgh by William the Lion, and has always been a place of considerable importance, figuring conspicuously in the early history of Scotland, especially about the time when Bruce and Baliol were contending for the crown. It was here that Wallace was educated; and here he struck the first blow against the English domination. In the great Reformation movement of the 16th century the inhabitants took such a leading and active part as to earn for the town the appellation of "the Scottish Geneva." Few places have been subjected to more frequent or serious calamities. It was twice taken by the English in the reign of Edward I., again in that of Richard II., and a fourth time in that of Edward VI. The marquis of Montrose took it by assault, and set part of it on fire in 1645; and in 1651 it was besieged by General Monk, and, after an obstinate resistance, was taken by storm, and given up to plunder and massacre. It was then probably the most opulent, and was certainly the best fortified town in Scotland, and many people of note from Edinburgh and elsewhere had found refuge within its walls. More than one-sixth of the inhabitants and garrison, including the brave governor Lumsden, were put to the sword; while the plunder was so great as to fill 60 vessels which were seized in the harbour; but, says Gumble in his life of Monk, "the ships were cast away within sight of the town, and that great wealth perished." Notwithstanding the number of burnings and plunderings to which Dundee has been subjected, the collection of charters, council-records, and other ancient documents preserved in the archives of the Town House is remarkably interesting and complete. There are characteristic despatches from Edward I. and Edward II., the original charter of King Robert Bruce, dated [illegible], a papal order from Leo X., and a letter from Queen Mary, dated 1564, providing for extra-mural interments. (G. C. M.)

DUNDEE, John Graham of Claverhouse, Viscount (1643–1689), born in or about the year 1643, was the elder son of Sir William Graham and Lady Jean Carnegie. Of his youth little record has been kept; but in the year 1665 he appeared in St Andrews as a student of St Leonard's College. His education was upon the whole good, as appears from the varied and valuable correspondence of his later years. Young Graham was destined for a military career; and, having remained in St Andrews for about four years, he proceeded abroad as a volunteer in the service of France. Thereafter, in 1672, he went to Holland, and obtained the post of cornet in one of the cavalry regiments of William, prince of Orange. In 1674 he was raised to the rank of captain, as a reward for having rescued the prince from a marsh where his horse had foundered during a retreat. Shortly afterwards William having at his disposal the command of one of the Scotch regiments in Holland, Graham made application for the post. He was not appointed, and resigned his commission. In the beginning of 1677 he returned to England, bearing, it is said, letters of strong recommendation from William to Charles II. and the duke of York.

Early in 1678 he accepted a lieutenancy in a troop of horse under the command of his relative the marquis of Montrose. Promotion immediately followed. He was as usly nominated by Charles II. to the command of one of newly raised troops of cavalry. From the time, indeed, of return to Scotland he assumed an influential position. s prestige as a soldier, his uncompromising disposition, l his unmistakable capacity, at once marked him out as eader upon whom Government could rely. In the end the year he was despatched with his troop to Galloway suppress the disorders which prevailed in the district. had a difficult and unpopular task,—that of carrying out policy of Lauderdale in the most disaffected part of otland. The Act of 1670, imposing the punishment of ath and confiscation of goods, was still in operation: and Covenanters had for years before Graham's return Scotland propounded the theory that opposition to the vernment and the actual slaughter of the king were not ly just, but a religious duty. Opposition to Lauderdale's asures, however, was winked at by the duke of Hamilton, d the recent authorized inroad of the Highlanders had dened the area of dissatisfaction. It is not wonderful at the success of Graham in his mission was small. He tered, however, upon his occupation with zest, and inter- eted consistently the orders he received. There is evi- nce, also, that his efforts were appreciated at head- arters, in his appointment, jointly with the laird of Earls- ll, to the office of sheriff-depute of Dumfriesshire in arch 1679, with powers—specially narrated in his com- ission—anent "separation," conventicles, "disorderly ptisms and marriages," and the like.

For some years thereafter the position of Graham was rhaps as difficult and delicate as one man was ever lled upon to occupy. In the midst of enemies, and in rtue of the most erroneous but direct orders of his overnment, he combined the functions of soldier, spy, osecutor, and judge. Shortly after the murder of Arch- ishop Sharp, on 5th May 1679, he was summoned to creased activity. There were reports of an intended athering in the neighbourhood of Glasgow, and at the ead of his dragoons Graham went in pursuit of the bels. On Sunday the 1st of June, the Covenanters aving removed from Loudon Hill to a well-protected osition upon the marshy ground of the farm of Drumclog, raham, who had gone in search of them, advanced. indered from the attack by the nature of the ground, e had to wait till the impatience of his adversaries, ho were under better leadership than they ever afterwards njoyed, induced them to commence an impetuous attack. eaded by the youthful Clelland, the Covenanters charged he cavalry, who in a little turned and fled. The loss of he victors was but three men, while thirty-six dragoons ere killed, Graham himself having a narrow escape. This as the only regular engagement he had with the Cove- anters. Small as it was, the result raised an enthusiasm n the bosoms of the victors, and was the beginning of an ctual rebellion.

On the 22d June Graham was present at the battle of Bothwell Bridge, at the head of his own troop. Immedi- tely thereafter he was commissioned to search the south-western shires for those who had taken part in the insur- ection. In this duty he seems to have been engaged till he early part of 1680, when he disappears for a time from he record of these stringent measures. His powers during hese months were of the most sweeping description; and appears that his ample commission was most slenderly sed. The gravest accusation against him in reference to his period is that he was a robber.

Graham had for some time been recognized as an lherent of the party who were adverse to measures of niency and conciliation. During these months he was cordingly despatched to London along with Lord Lin- thgow to influence the mind of Charles II against the indulgent method adopted by Monmouth with the extreme Covenanting party. It is perhaps not to his credit that he succeeded in the object of his mission. He was then in the prime of life, was commandingly handsome in appearance, a lover of sport, and a devoted royalist. Charles seems to have been fascinated by his loyal supporter, and from that moment Graham was destined to rise in rank and honours. On the 21st of April 1680 he obtained a royal grant of the barony of the outlawed Macdowall of Freugh, and the grant was confirmed by subsequent orders upon the Exchequer in Scotland. In April 1680 it appears that his roving commission had been withdrawn by the Privy Council. He is thus free from all concern with the severe measures which followed the Sanquhar Declaration of 22d June 1680.

The turbulence occasioned by the passing of the Test Act of 1681 required to be quelled by a strong hand; and in the beginning of the following year Graham was again commissioned to act in the disaffected districts. In the end of January he was appointed to the sheriffships of Wigtown, Dumfries, Kirkcudbright, and Annandale. He was besides acting captain of a troop of dragoons—the pernicious combination of his offices being thus repeated. He appears further to have had powers of life and death in virtue of a commission of justiciary granted to him about the same time. In his despatches there are indications that he disapproved of a system of indiscriminate punishment, and desired that severe vengeance should only be executed upon ring-leaders and men of rank. This, however, applied solely to the harshest measures then known to the law, those of torture and death. Where these were involved he preferred, after hunting out and seizing his prisoners, to send them to Edinburgh for trial. But within these limits his methods of procedure in the large districts over which he had control were uncompromising, and, if we suppose him to have had sympathy with his orders, most cruel. He quartered on the rebels, rifled their houses, and, to use his own words, "endeavoured to destroy them by eating up their provisions." The effect of his policy, if we believe his own writ, is not overstated as

> "Death, desolation, ruin, and decay."

The result of a bitter quarrel with Sir John Dalrymple confirmed the prestige of Graham, who was not only acquitted by the verdict of the Privy Council of the grave charges of exaction and oppression preferred against him, but had the satisfaction of seeing Sir John condemned to fine and imprisonment for interference with his proceedings. On 25th December 1682 he was appointed colonel of a new regiment raised in Scotland, and captain of its leading troop. He had still greater honours in view, and in March 1683 he started for Newmarket to demand an audience of the king. In the preceding January the case of the earl of Lauderdale, late Maitland of Hatton, which involved the question of his malversations with regard to the Scottish mint, was debated in the House of Lords. Maitland was proprietor of the lands and lordship of Dundee and Dudhope, and the decree of the lords against him was in March 1683 issued for the sum of £72,000. Graham succeeded in having the property of the defaulter transferred to him by royal grant, and in May the additional honour was conferred upon him of nomination to the Privy Council of Scotland.

Shortly afterwards Claverhouse was appointed to be present at the sittings of the recently instituted Circuit Court of Justiciary in Stirling, Glasgow, Dumfries, and Jedburgh. The notable objects of the circuit were the imposition of the test and the punishment of rebels. Several were sentenced to death. During the rest of the year he attended the meetings of council. As a statesman he was incapable of rising to an independent view of affairs, and was unable to overcome his dutiful obedience to superior orders. Although he had had experience of the most disaffected portions of the country, there is but one record of his having interfered to prevent the accustomed irritating measures. He declared decisively against the proposal to let loose the Highland marauders upon the south of Scotland.

In June 1684 he was again at his old employment—the inspection of the southern shires; and in August, after the ambuscade of Enterkine-hill, he was commissioned as second in command of the forces in Ayr and Clydesdale to search out the rebels and report to head-quarters. By this time he was in possession of Dudhope, having on the 10th of June married Lady Jean, daughter of Lord Cochrane. As constable of Dundee it is recorded to his honour that he recommended to the Privy Council the remission of extreme punishment in the case of many petty offences. He issued from his retirement to take part in a commission of lieutenancy which perambulated as a criminal court the southern districts, and in the end of the year he was again in the same region on the occasion of the disturbances in the town of Kirkcudbright.

Shortly after the death of Charles II. (6th February 1685), Graham, through the jealous efforts of Queensberry, incurred a temporary disgrace by his deposition from the office of privy councillor; but in May he was reinstalled, although it is to be observed that his commission of justiciary which had expired was not renewed.

In May 1685 he was ordered with his cavalry to guard the borders, and to scour the south-west in search of rebels. By Act of Privy Council, a certificate was required by all persons over sixteen years of age to free them from the hazard of attack from Government officials. Without that they were at once liable to be called upon oath to abjure the declaration of Renwick, which was alleged to be treasonable. While on this mission he pursued and overtook two men—John Brown, and a nephew whom he calls John Brownen. Brown, having refused the abjuration oath, was shot dead. The order was within the authorized power of Graham.

Until 1688 there is little more of note in his career. In 1686 he was promoted to the rank of major-general, and had added to his position of constable the not inconsiderable dignity of provost of Dundee. He appears, however, in the Privy Council in 1688 opposing the proposal that Lieutenant-General Douglas should have command of the whole army which had been ordered to England to aid the falling dynasty.

A week or two after his departure with the army his fascinating influence had made itself felt upon James II., and amid the hurry of events he was created viscount of Dundee on 12th November 1688. From York he went to Salisbury, where he advised James to sterner measures than the feeble-hearted monarch had the courage to adopt. Throughout the vexed journeyings of the king, Dundee is found accompanying or following him, endeavouring in vain to prompt him to make his stand in England and fight rather than flee from the invader. At last James announced his resolve, with the promise that he would send from France an appointment in favour of Dundee to command the troops in Scotland, and arrangements were entered into for communication with the voluntary exile.

Dundee returned to Scotland in anticipation of the meeting of the Convention, and at once exerted himself to increase the waning resolution of the duke of Gordon with regard to holding Edinburgh Castle for the exiled king. He had conceived the idea of forming a rival Convention at Stirling to sit in the name of James II., but the hesitancy of his associates rendered the design futile, and it was given up. Dundee, however, boldly appeared at the first meeting of Convention on 16th March 1686, and disclosed a plot which he declared he had discovered against his own life, but the matter after some inquiry was departed from.

On the 18th of March, despising the fears of his promised allies, he left Edinburgh at the head of a company of fifty dragoons, who were strongly attached to his person. He was not long gone ere the news was brought to the alarmed Convention that he had been seen clambering up the west side of the castle rock and holding conference with the duke of Gordon. In excitement and confusion order after order was despatched in reference to the fugitive, and the Convention sat with locked doors to prevent communication with traitors without. Dundee retired to Dudhope. On the 30th of March he was publicly denounced as a traitor, and in the latter half of April attempts were made to secure him at Dudhope, and the residence in Glen Ogilvy to which he had retired. But the secrecy and speed of his movements outwitted his pursuers, and he retreated to the north. His career presents strange peculiarities. It was only in 1678 that he had returned to Scotland from abroad. Yet in the short period of intervening years he had, despite the opposition of his superiors in rank, risen from the post of captain, and the social status of a small Scotch laird, to positions as a soldier and statesman and the favourite of his sovereigns, of the greatest dignity, influence, and wealth. Yet it was in this period that he committed those acts on account of which his memory is loaded with reproach. When the ruling dynasty changed, and he who had so often been commissioned to quell insurrection had himself become an outlaw and a rebel, he supported the cause of his exiled monarch with such skill and valour that his name and death are recorded as heroic.

On his march into the Highlands he commenced among the chieftains the diplomatic policy in which he excelled. General Hugh Mackay was now in the field against him, and what was simply a Highland chase began. Mackay started with a body of cavalry, marched to the north, and having refused reinforcements from the untrained peasantry of Aberdeenshire, pushed the pursuit further and further to the west. Elgin, and latterly Inverness, were occupied by the Government troops. Dundee had in the meantime been scouring the country from Perth, which on the 11th of May he had plundered, to the wilds of Lochaber, to which he had latterly retired. The clans were assembled by the 28th of May, and on the 29th the castle of Ruthven, near Kingussie, was seized. The army of Dundee was now much superior in numbers to that of Mackay, and the prudent general beat a hasty retreat. Having received reinforcements, however, he again advanced northward, and in Strathdon, in the early part of June, it seemed likely that the opposing forces would meet. But the Highland warriors, laden with plunder, were returning homewards, and the army of Dundee was melting away. The outlawed leader again retired, and Mackay conceived his mission at an end. He proceeded westward, and, having garrisoned Inverness, marched to the south.

Throughout the whole of the campaign Dundee was indefatigable in his exertions with the Highland chiefs and his communications with his exiled king. To the day of his death he believed that formidable succour for his cause was about to arrive from Ireland and France. He justly considered himself at the head of the Stewart interest in Scotland, and his despatches form a record of the little incidents of the campaign, strangely combined with a revelation of the designs of the statesman. It mattered little to him that on the 24th of July a price of £20,000 had been placed upon his head. The clans had begun to reassemble, and he was now in command of a considerable force.

Mackay, who had visited Edinburgh to report events, re ed to Perth, whence, with an army now amounting to t 4000 men, he proceeded to Dunkeld on the 26th of y. While in the metropolis he had endeavoured to re the Athole interest, and that the castle of Blair ld be held for King William. But he was as usual witted by Dundee, who, after unsuccessful negotiations h Lord Murray, won over the Athole factor by the pretation of a commission prepared for the occasion. The le was at once occupied, and at Dunkeld Mackay received lligence that the design of his march was frustrated. ten A.M. of the 27th of July 1689 he was at the entrance he pass of Killiecrankie.

Dundee had appointed a gathering of the clans at Blair the 29th; and on the 27th he was at the head of at st 2000 men, including a contingent from Ireland. The orts of scouts that 400 of the enemy had already threaded pass roused the impatience of the chiefs. But it was not til he received intelligence that the whole army of Mackay d entered the defile that he gave the order to march. ith caution he disposed his troops on the hills to the right the opposing army, which, making its exit from the gully, s forming on the haughs. On Mackay's right and beyond e narrow plain were undulating heights backed by Craig ulloch. On one of these Mackay was astonished to observe e movement of the troops of Dundee. To prevent e enemy from gaining an intervening eminence, he at once rdered a flank movement, and his army marched up the face f the hillock, leaving the Garry in the rear. For several ours the two armies faced each other, Dundee restraining he impatience of his troops, but at eight in the evening the rder was given to advance. Mackay had formed his line hree deep, while his opponent had arranged his men in attalions with intervals wide enough to prevent the outanking of superior numbers. The Highlanders having disharged their firelocks threw them on the ground, and ushed impetuously on the foe. The result was instantaneus; Mackay's line was broken and driven helplessly into he gorge. Dundee, at the head of his cavalry, charged e enemy, but, confusion having arisen as to the leadership f the troop, he was not at once followed. The gallant ldier, waving on his men, was pierced beneath the breastlato by a bullet of the enemy, and fell dying from his orse. Dundee asked "how the day went," and, hearing e answer and the expression of sympathy, replied that it was the less matter for him seeing the day went well r his master." He was conveyed to the castle of Blair, here within an hour or two of his death he was able write a short account of the engagement to King ames. The battle, in which the Government forces had st 2000 men as against 900 of the enemy, was in truth he end of the insurrection. The Highland camp was roken by jealousies, for the controlling and commanding enius of the rebellion was no more.

See *Memorials and Letters of Graham of Claverhouse*, by Mark apier, 1859-62, where the literature of the subject is referred to. he work itself must be read with caution. (T. S.)

DUNDONALD, THOMAS COCHRANE, TENTH EARL OF 1775-1860), known during his brilliant naval career as ord Cochrane, was born at Annsfield, in Lanarkshire, on he 14th December 1775. His father, the ninth earl, had reat scientific attainments, especially in chemistry, and ossessed a genius for invention which ruined his fortune ithout much benefiting any one. He was so poor that he education of Thomas, his eldest son and heir, was left ery much to such volunteer instructors as the parish inister. At the age of seventeen Lord Cochrane joined he navy on board the "Hind," of which his uncle, afterards Admiral Sir Alexander Cochrane, was at the time ptain. His father had previously procured for him a ommission in the 79th regiment, but his own preference for the other branch of the service was so decided that it was found necessary to gratify it. In 1795 he was transferred with his uncle to the frigate "Thetis," which proceeded to the North American station. Soon afterwards he received his lieutenant's commission; and in 1798 he was sent to the Mediterranean to serve in the fleet under the command of Lord Keith. He had already begun to show that rare combination of daring and prudence which probably no British naval officer, save Nelson, ever possessed to a greater degree. As commander of the sloop "Speedy," to which he was appointed in 1800, he performed a series of exploits in capturing vessels of immensely larger size than his own which are almost without parallel in the annals of naval warfare. The little "Speedy," with its miserably weak armament of four-pounders, became the terror of the Spanish coasts, and more than once she was honoured by a frigate being especially detached to capture her. One of the attacks she ingeniously evaded; another she boldly met (28th February 1801), and actually succeeded in capturing her opponent, the "El Gamo," a Spanish frigate of 32 guns. Her cruise of thirteen months, during which she took upwards of fifty vessels with 122 guns and 534 prisoners, ended in her own capture by three French line of battle ships, after making so gallant a resistance that the French captain, to whom Cochrane delivered up his sword, at once returned it. After a brief imprisonment, Lord Cochrane was exchanged. The promotion to post-rank, to which he was fully entitled, came somewhat tardily in August 1801; and the persistence with which his claims had to be urged laid the foundation of the bad understanding with the authorities at the Admiralty that caused him to be lost to the British service a few years later, while he was still in his prime. Its immediate result being that he was refused further employment, he spent the period of enforced leisure (1802) at the university of Edinburgh, where he wisely endeavoured to repair the defects of his early education. The renewal of hostilities in 1803 brought him the opportunity of such distinction as was likely to be gained in the command of the "Arab," an utterly unseaworthy old collier purchased into the navy, in which he was sent to take part in the blockade of Boulogne. The animus against him in official circles was clearly shown when, on his complaining that his vessel was unfit for service, he was sent to the North Sea to protect non-existent fisheries! In 1804, on the advent of Lord Melville to the head of the Admiralty, tardy justice was done by his appointment to the command of the new frigate "Pallas" (32), in which, after making several valuable prizes within ten days, he entered Plymouth harbour in charge of them with three golden candlesticks, each five feet high, at the mastheads as a sample of the spoils. Before the "Pallas" was again sent to sea her fortunate captain was returned to Parliament as member for Honiton, partly through the influence of his fame, but still more through the influence of his prize-money. In her second cruise the "Pallas," after convoying a merchant fleet to Quebec, returned to the coast of France, where she cut out and captured several of the enemy's corvettes, and destroyed many of the signals. In August 1806 Lord Cochrane was transferred to the command of the "Imperieuse" (44), in which during the succeeding two years he did immense damage to the enemy's fleet in the Bay of Biscay and the Mediterranean. One of his most gallant exploits during this period was his defence of Fort Trinidad, near Rosas, which he held for twelve days (November 1808) against overwhelming odds. When he found further resistance impossible he blew up the magazines and returned to his ship.

Meanwhile, though his services were so distinguished, his relations with the Admiralty had not become more friendly. At the general election in May 1807 he had been returned triumphantly for Westminster in the Radical interest, along with Sir Francis Burdett, and during a brief interval spent at home, while he was in command of the "Imperieuse," he had rendered himself still further obnoxious as a critic in Parliament of naval abuses. In 1809, however, the authorities had occasion for a daring service which he alone was found competent and willing to undertake. It had been suggested to them that the French fleet blockaded in Basque Roads might be destroyed by means of fire ships, and the hazardous duty was intrusted to Cochrane. On the night of the 11th April he personally piloted the vessels loaded with explosives to the entrance of the harbour, where they spread such terror that seven French frigates slipped their cables and ran on shore, five of them being afterwards destroyed. Unfortunately this first success was not followed up as it ought to have been. Lord Gambier, the commander of the blockading fleet, ignoring the repeated and urgent requests of Cochrane, refused to order a general attack, and thus the opportunity of destroying the whole of the enemy's ships was lost. Lord Cochrane was bitterly disappointed, and made no attempt to conceal his opinion of the incompetency of his superior, who found himself compelled to demand a court martial. The trial was worse than a mockery; the court was packed, witnesses were manipulated, and charts fabricated,—with the scandalous result that Gambier was acquitted and Cochrane by implication disgraced. There was, of course, no further professional employment for one who had been stigmatized as a false accuser. For four critical years Lord Cochrane held no command, and his country lost the services of one of the few naval heroes she has had worthy to be named along with Nelson. In his place in Parliament he did what he could to secure a reform of the many abuses connected with the administration of the navy, and his unsparing criticisms greatly embittered his already unfriendly relations with the Admiralty and the Government. In 1814 an unfortunate concurrence of circumstances, suspicious in themselves though capable of a satisfactory explanation, led to his being accused, along with several others, of a conspiracy to defraud the Stock Exchange, by circulating a false report of the success of the Allies and the death of Napoleon. He had only a week or two before so far overcome the disfavour with which he was regarded by the Admiralty as to secure his appointment to the command of the "Tonnant," the flag-ship of his uncle Sir Alexander Cochrane, but he had to resign the position in order to meet the prosecution which the Government were not slow to institute. The trial was conducted before Lord Ellenborough, a noted partisan, who, if he did not, as Cochrane's friends have insinuated, exceed the limits of his office in order to secure a conviction, certainly showed no favour to the accused, who were all found guilty. Lord Cochrane was sentenced to a fine of £1000, twelve months' imprisonment, and an hour in the pillory. His ruin and disgrace were completed by his being expelled from the House of Commons, and deprived with the usual humiliating ceremony of the knighthood of the Bath, which had been bestowed on him after his heroic service at Basque Roads. Popular sympathy, however, was strongly with him. An influential minority of forty four voted against his expulsion from the House of Commons, and when a new writ was issued for Westminster he was unanimously returned, no one having ventured to stand against him. A public subscription was raised by his constituents for the payment of his fine. His colleague, Sir Francis Burdett, pledged himself to stand along with him in the pillory if that part of the sentence was carried out, and the Government judged it prudent to remit it. Lord Cochrane's conduct was throughout that of an innocent, if somewhat imprudent, man. At his trial he volunteered a full explanation of the suspicious circumstances that were urged against him, and after his conviction he took every opportunity of protesting against the injustice that had been done him, and was urgent in his demand for a new inquiry. During the currency of his sentence he contrived to make his escape from prison, and took his seat in the House of Commons, from which he was forcibly removed by the warden and officers of the King's Bench.

At the close of his imprisonment Lord Cochrane soon found that there was little hope of his being again actively engaged in the service of his native country. The peace that followed Waterloo promised to be enduring, and, even had it been otherwise, he could not expect employment, as his name had been struck off the navy list. When, therefore, the command of the fleet of the republic of Chili was offered to him in 1818, he at once accepted it, finding a congenial task in the endeavour to aid a weak state in its struggle for freedom. He arrived at Valparaiso in November 1818; and in a short time afterwards he was ready for action, though the fleet under his command was in every respect miserably weak when compared with that of Spain, to which it was opposed. It seemed almost the characteristic feature of his genius, however, that the greater the odds against him the more brilliant the success he achieved, and this was signally exemplified during his career in South America. It is impossible to detail all his marvellous exploits. Two, however, must be specially mentioned as among the most extraordinary achievements in the annals of naval warfare. On the 3d February 1820 he captured Valdivia, a very strongly fortified town and harbour in the possession of the Spaniards, the forces under his command consisting of his own single frigate and 250 land troops in three small vessels. The place yielded to the mere terror of his name, the handful of troops that obtained possession of it being insufficient to man its guns or even to keep its civil population in order. In the autumn of the same year he blockaded the harbour of Callao, one of the strongest in the world. Within it, fixed to chain moorings, protected by twenty-seven gun-boats, and covered by the fire of no less than 300 guns in the batteries, lay the Spanish frigate "Esmeralda." The ambition of Lord Cochrane was fired by the apparent impossibility of the task to attempt his favourite exploit of cutting out. The attempt was made on the night of the 5th November, and, in spite of the apparent impossibility, it was completely successful after a sharp engagement of a quarter of an hour's duration, in the course of which Lord Cochrane was severely wounded. The moral effect of this achievement upon the Spaniards was all that Cochrane had anticipated; they were completely paralysed, and left their daring opponent undisputed master of the coast. Unfortunately, just at the time when he was rendering her these signal services, the jealousies and intrigues of various members of the Chilian Government were making Lord Cochrane's position uncomfortable, if not untenable. The withholding of prize-money, and even of pay, had nearly caused a mutiny in the fleet, when Lord Cochrane, by taking strong measures to obtain part of what was due to his men, brought on an open rupture between himself and the Government. An invitation from the regent of Brazil to undertake the command of his fleet against the Portuguese was, therefore, accepted as a welcome deliverance. Lord Cochrane entered on his new duties at Rio de Janeiro in March 1822. His services to Brazil were quite as important, though scarcely marked by so many brilliant episodes, as those to Chili, and they were in the end equally ill-requited. His daring capture of Maranham with a single frigate, in July 1823, added a province to the newly formed empire; and the value of the accession was acknowledged by the title of marquis of Maranham being conferred pon the captor, along with an estate, of which, however, ord Cochrane never obtained possession. In fact, both by hili and Brazil he was unjustly defrauded of all substantial wards, and his connection with the new empire which he ad done so much to aid in establishing was ignominously rminated by his dismissal from her service in 1825. He ad given some provocation to this by his obstinacy in reising to appear at a court-martial, and account for his conact in taking the frigate under his command to England ithout orders. The Brazilian Government itself, however, ractically admitted the gross injustice with which it had eated him by awarding him twenty years afterwards the ension that had been agreed upon in the first engagement ade with him.

On his return to England Lord Cochrane found himself e object of a popularity that had grown rather than abated uring his absence. His great achievements had been poken of in the warmest terms in the House of Commons y Sir James Mackintosh, who urged the Government to estore him to his place in the service of his native land. But the time for the redress of his wrongs was not yet; and, nding inaction impossible, he gladly gave his services to he cause of Greek independence. Appointed by the National Assembly admiral of the Greek fleet, he found imself for the first and only time in his career in a position where success was impossible even for him. The want of nion and discipline among the Greek troops frustrated all is plans, and an attempt to relieve the Acropolis at Athens n 1827 ended from this cause in a disastrous failure, Lord Cochrane only escaping by jumping into the sea. In 1828, fter the Great Powers had secured the recognition of the ndependence of Greece, he returned to England.

With the accession of King William and the formation f a Liberal ministry there came at last a tardy and imperect reparation to Lord Cochrane for the injustice he had uffered. He was restored to his rank in the navy, but with this he had to remain content. It was with bitter and ndignant feelings that he found himself compelled to accept a pardon under the Great Seal instead of the new trial he ad long and vehemently demanded. And the restoration to his rank was robbed of much of its grace by the facts that the honour of the knighthood of the Bath, of which he had also been deprived, was not restored at the same time, and that the arrears of his pay were withheld. In 1831 he succeeded his father in the earldom of Dundonald. On the 23d November 1841 he became vice-admiral of the blue. Another instalment of the lingering atonement that was due to him was paid in 1847, when the honour of knighthood of the Bath was restored, though, by that strange fatality which seemed to have decreed that no reparation made to him should be complete, his banner was not replaced in the chapel of the order until the day before his burial. In 1848 he was appointed to the command of the North American and West Indian station, which he filled until 1851. Immediately after his return he published *Notes on he Mineralogy, Government, and Condition of the British West India Islands.* When unfitted by advancing age for active service, he busied himself with scientific inventions for the navy, such as improved poop and signal lights, improved projectiles, &c. During the Russian war he revived secret plans which he had detailed to the prince regent nearly fifty years before for the total destruction of an enemy's fleet, and he offered to conduct in person an attack upon Sebastopol and to destroy it in a few hours without loss to the attacking force. That his intellect remained clear and vigorous to the close of his life was shown by the publication in his eighty-fourth year of his *Narrative of Services in the Liberation of Chili, Peru, and Brazil* (1858), and of his *Autobiography*, in two volumes, the second of which appeared just before his death. The literary style of both works is admirably appropriate to the subject, simple, lucid, and dashing; and the story they tell is one of heroism and adventure that has scarcely its parallel even in romance. The author's burning sense of his wrongs, and his passionate desire for a thorough vindication, reveal themselves at every turn. If he is not unnaturally blind to the fact that his own imprudence and want of self-command contributed in some small degree to his misfortunes, no one will now deny that this "heroic soul branded with felon's doom" suffered more cruel and undeserved wrongs than ever fell to the lot of any warrior of his genius and achievements.

Lord Dundonald died at Kensington on the 30th October 1860, and was buried in Westminster Abbey. (W. B. S.)

DUNEDIN, a city in New Zealand, in 45° 52′ 12″ S. lat. and 170° 32′ 37″ E. long., at the head of Otago harbour, an arm of the sea on the east coast of the South Island. It is the capital of the late province and present provincial district of Otago, and was founded as the chief town of the Otago settlement by settlers sent out under the auspices of the Lay Association of the Free Church of Scotland in 1848. The discovery of large quantities of gold in Otago in 1861 and the following years, and the great increase in the production of wool, have made Dunedin a very flourishing place. The city is beautifully situated in an amphitheatre of hills. The streets, nearly all paved and kerbed, have been made at considerable expense and trouble,—some being carried through swamps and others through cuttings and along embankments. The cost of permanent improvements during the last fifteen years has been about £300,000. The town is supplied with pure water, and (since 1862) with gas from works belonging to the corporation. Dunedin is the seat of a judge of the supreme court, and of a resident minister, who is a member of the Colonial Executive; and it also has a Waste Lands Board, a body constituted for the purpose of administering the public estate of the provincial district. The city contains some fine buildings, especially two handsome Presbyterian churches, constructed of white stone from Oamaru. The so-called university of Otago, now affiliated with the university of New Zealand, which alone has the power to grant degrees, possesses chairs of classics, mathematics, mental and moral philosophy, as well as lectureships on botany, mineralogy, law, and modern languages. A museum (well built of concrete) contains an excellent collection of New Zealand flora and fauna, including some fine skeletons of the *Dinornis.* There is also a scientific body called the Otago Institute, affiliated with the New Zealand Institute. There are three good libraries—one at the supreme court, a second at the university, and a larger one at the Athenæum—six banks, and several large mercantile houses. The people are mostly of Scotch origin, with a considerable intermixture of immigrants from England, Ireland, the British colonies, and Germany. All classes are prosperous: except among the extremely limited criminal class, poverty rarely occurs, and absolute pauperism is quite unknown.

Otago harbour, by which the city is approached from the sea, is an inlet about 18 miles long. There is about 22 feet of water on the bar at low tide. Half way up to Dunedin is Port Chalmers, a fine anchorage for the largest vessels, where, owing to the presence of precipitous hills, the land was found too limited in area for a large city. From this point the water grows shallower as it approaches Dunedin. Until lately no vessels drawing more than 10 feet could pass up; but by two years dredging the channel has been made available for steamers drawing 13 or 14 feet, and this depth is gradually being increased. The Harbour Board has authority to raise £250,000 by bonds, of which £129,400 has been raised, but £66,000 is still unexpended. The revenue of the board is £14,500, which is rapidly increasing, as it arises from a munificent landed endowment. A large part of this money is available for works. The harbour was until lately the terminus of a line of large mail steamers running monthly to San Francisco *via* Auckland and Honolulu, but it is now found more convenient to use smaller steamers for the coastal section. It is, however, still the terminus of a line of fine vessels running at intervals of about ten days to Melbourne, and carrying the monthly mail for Suez and England. There is also direct steam communication with Sydney and Hobart Town, and communication *via* Auckland with Fiji. All the coasting steamers and many sailing vessels are owned in Dunedin. In 1876, besides the San Francisco boats, 69 vessels, varying from 250 to 1800 tons, entered the port from places beyond the seas other than Australasia. The greater number of these arrive in the early part of the summer, and load with wool for London. The customs revenue collected in 1876 amounted to £362,335. The municipal debt amounts to £328,000, and the revenue (raised by rates, rents, water and gas works, &c.) to £47,500. The population of the city in the beginning of 1877 was about 22,500, and that of the suburbs about 9000, while other towns within a circuit of a few miles bring it up to 35,000.

DUNFERMLINE, a city and royal burgh of Scotland, situated in the western district of the county of Fife, about three miles from Limekilns, the nearest point on the Firth of Forth. It is connected with Glasgow by railway *via* Stirling, and with Edinburgh, from which it is distant 16 miles, both *via* Thornton and by a direct line constructed in 1877 to North Queensferry. The town is situated about 300 feet above the sea, on the brow of a slope which ascends from the Forth, and it accordingly commands a very extensive view of the country towards the south. It is intersected from north to south by a deep ravine, at the bottom of which a small stream pursues its tortuous course; and this ravine is crossed by an earthen mound, on which an excellent street is built. At the east end of the town, on the south side of the turnpike road, is a public park comprising about 36 acres, partly the gift of the late Mr Ker of Middlebank; and to the north of the road, at a little distance, are the jail, the workhouse, a hospital, and a cemetery, all in close proximity to each other. The county buildings, with their tall and graceful spire 132 feet high; the new corporation buildings, at present (1877) in course of erection, at an estimated cost of £20,000; the new Assembly Hall, capable of accommodating 1500 persons, now being built by a private company at a probable outlay of £10,000, the Carnegie Public Baths, finished and opened in 1877, and presented to his native town by Mr Andrew Carnegie of New York; the Savings Bank; and the British Linen Company's Bank are all worthy of notice. But the most interesting building in the town is the Abbey Church. The western portion is the nave of the cathedral of the Holy Trinity, originally erected in the massive Norman style by Malcolm Canmore about the middle of the 11th century; it escaped destruction when the rest of the building was demolished by the Reformers on 28th March 1560, served as the parish church till the present century, and now forms a fine vestibule to the New Church. Extensive reparations have been made by the Commissioners of the Woods and Forests, and a number of stained glass windows have been contributed by private individuals. The eastern portion, or New Church—opened for public worship on 30th Sept. 1821—occupies the site of the ancient chancel and transepts, but does not agree in proportions or style with the original edifice. Exactly below the pulpit lie the remains of King Robert Bruce; in the north transept are buried seven other kings, two queens, and numbers of the nobility; and in the southern transept, above the vault of the Elgin family, are monuments in white marble to the Hon. Robert Bruce, tutor to the prince of Wales, and Charles Dashwood Bruce, cousin of the late Lord Elgin, as well as a bust in marble erected by Dean Stanley in memory of his wife Lady Augusta Bruce. The tomb of Queen Margaret, the wife of Malcolm Canmore, lies immediately to the east of the session-house. Of the ancient abbey buildings there still remains the south wall of the Refectory, or Fraters' Hall, with an entire window much admired for its elegant and complicated workmanship. The south-west wall of the palace still stands in testimony of its former stateliness, and an apartment is pointed out by tradition as the spot where Charles I. was born. There are also some slight traces of an ancient tower popularly ascribed to Malcolm Canmore, but in all probability not of so early a date.

Dunfermline has three Established churches, four United Presbyterian, three Free, one Congregational, one Episcopalian, one Evangelical Union, and one Roman Catholic, as well as several places of worship belonging to smaller denominations. The Queen Anne Street United Presbyterian Church was founded by Ralph Erskine, and the Gillespie church by George Gillespie. The former of these two great dissenters is commemorated by a statue in front of his church, and a sarcophagus over his grave in the abbey churchyard; to the memory of the latter a marble mural tablet is inserted above his resting-place within the abbey. The town is well supplied with means of education in all the ordinary branches; but there is no special provision for the higher departments of learning.

The staple industry of Dunfermline is the manufacture of table-linens, and in this department it has almost no rival. The weaving of damask was introduced into the town in 1718 by a Mr James Blake, who had succeeded in getting possession of the jealously guarded secret in workshops at Drumsheugh, near Edinburgh, to which he obtained access by feigning idiocy. Till about 1845 the bulk of the population were engaged on handlooms, but at present only a comparatively small number earn a scanty and precarious subsistence by the old method. The eleven power-loom factories in the town in 1877 give employment to about 5000 persons, of whom a large proportion are females. The annual value of the goods manufactured is about £850,000. Iron and brass foundries, soapworks, and dyeworks are among the minor industrial establishments, and in the vicinity there are about 22 collieries.

Dunfermline returns a member to Parliament in conjunction with Stirling, Inverkeithing, and Culross. The population of the town was 14,963 in 1871, and is now (1877) 15,839; that of the parish, which, besides the strictly rural district around, includes Limekilns and Charlestown, with several colliery districts, was 23,133 in 1871, and is now 24,329. The town is governed by a council consisting of 22 members, including a provost, four bailies, and other officials. The revenue of the town, derived principally from coal-fields, was £7875 in 1876. The number of inhabited houses is 1638; the annual value of real property, £56,038. There are two newspapers published weekly, and four banks, besides the National Savings Bank.

In spite of the introduction in 1850 of an apparently abundant supply of spring water, a scarcity has since been felt in dry seasons; and accordingly at present (1877) works are in progress to effect a communication with the River Devon. It is anticipated that the cost of these will be nearly £60,000. Drainage works are also being constructed, at an estimated cost of £9000, to convey the sewage of the city to the sea at Limekilns. The situation of Dunfermline is very favourable to health: the birth rate is 40 per thousand, the rate of mortality 18·4, and the marriage rate 8·7

ine derives its name, "The Town or Fort on the
n," from the ravine already mentioned. From an early
s a favourite royal residence; and in 1070 Malcolm III.
arried to Margaret. The Culdees are supposed to have
blishment in the place; and the Benedictine priory,
Canmore, was raised to the rank of an abbey under David
owed numerous privileges on the community. In 1244
received a mitre; and in 1249 Queen Margaret, the
, was canonized. During the winter of 1303 the court
I. of England was held in the abbey; and on his
ext year most of the buildings were destroyed by fire.
ing Robert Bruce was interred in the choir of the
e last royal occupant of the palace was Charles II.,
signed the National League and Covenant. Shortly
wn was plundered by Cromwell's soldiers.

ERMLINE, Lord. See Abercromby.

ANNON, a parliamentary borough and market-
reland, in the county of Tyrone, standing on an
miles W. of the south-western shore of Lough
1 94 miles N.W. of Dublin. It consists of a square
ging streets, and is generally well built. The
buildings of note are the parish church, with an
spire, a court-house, a market hall, and a college
by Charles I. Linens are manufactured and
henware. The town also contains a power-loom
manufactory and flour mills. It returns one
Parliament. The early history of the place is
with the once powerful family of the O'Neals,
ef residence was there. In Dungannon the
nce of the Irish Parliament was proclaimed in
e population in 1871 was 3886, of whom 55
were Roman Catholics; area, 230 acres.

ARVAN, a parliamentary borough, market-town,
t of Ireland, in the county Waterford, 125 miles
Dublin. It is situated on the Bay of Dungarvan,
ith of the Colligan, which divides the town into
connected by a bridge of a single arch. The
burb is called Abbeyside, where the remains of an
ep, erected by the M'Graths still exists. The
ins a town hall, a sessions house, a union work-
arket house, and barracks. Brewing is carried
small extent, and there is a steam mill. The
turns one member to Parliament. Area of town,
; of borough, 8499 acres. Population of borough
19, of whom 36 per cent. were Roman Catholics.

ELD, a burgh of barony and market-town of
, Scotland, situated on the north bank of the Tay,
.N.W. from Perth. The river is crossed there by
ge of seven arches, begun in 1805 and completed
t a cost of £42,000. With the exception of the
(erected 1877) and some other modern build-
village consists of narrow and ill-built streets.
an antiquated aspect. It is buried among the
es of luxuriant trees, and stands in the centre of
rrounded by mountains of considerable elevation,
wooded to their summits. The river, the bridge,
nding mountains, and the remains of an ancient
combine to give the town a very romantic
e. As early as 729 the Culdees had a mon
Dunkeld, which was converted into a cathe-
avid I. in 1127. Its architecture is of a compo-
ter, exhibiting features both of the Norman and
yles. The centre of the nave is 120 feet by 60,
are 40 feet high, and the aisles 12 feet wide.
was founded by Bishop Sinclair in 1350; and the
ch is about 90 feet high, was begun by Bishop
1469, and completed by Bishop Brown in 1501.
four bells. The cathedral was unroofed at the
on, but the choir has been rebuilt, and is now used
rish church. Beneath the charter-house is the
vault of the Athole family. In the porch of the
the tomb of Alexander Stuart, earl of Buchan, better known as the Wolf of Badenoch, who died in 1394. The most famous of the bishops of Dunkeld was Gavin Douglas, the translator of the *Æneid*. Immediately behind the cathedral stands Dunkeld House, the mansion of the dukes of Athole. The grounds of the ducal residence (which are extensive and picturesque) contain two of the earliest larch trees introduced into Britain; they were brought from Tyrol in 1738. A mile south of Dunkeld, on the other side of the Tay, is the modern village of Birnam, which has sprung up at the railway station. It lies at the foot of Birnam hill, said to derive its name from the famous wood connected with the fate of Macbeth. The population of the burgh in 1871 was 783.

DUNKERS, or Tunkers, a sect of American Baptists originating in Germany. The name, as its second form indicates, is a nickname meaning *dippers*, from the German *tunken*, to dip. From the first the members recognized no other name than "Brethren." The founder of the sect was Alexander Mack of Schwartzenau, who, along with one or two companions, was led to adopt anti-pædobaptist views about the year 1708. It had scarcely assumed organized existence in Germany when its members were compelled by persecution to take refuge in Holland, from which they emigrated to Pennsylvania in small companies in the years between 1720 and 1729. Their first community was established at Germantown, not far from Philadelphia, and other settlements were gradually formed in New England, Maryland, Virginia, Ohio, and Indiana. In the early history of the sect the sexes dwelt apart, and marriage, while not forbidden, was discouraged. Similarly, while the holding of private property was not absolutely prohibited, a certain community of goods was established and maintained by the voluntary action of the members, and it was considered unlawful to take interest for money. These features have now disappeared, but in other respects the sect retains much of its original character. Every member has the right to exhort and take part in the religious services, and for a considerable period no special provision was made for the conduct of worship. There is now, however, a recognized unpaid ministry of bishops and teachers. There are also deacons and deaconesses. In baptism trine immersion is used. The Lord's Supper is observed in the evening only, and connected with it are the *lavipedium*, or ceremonial feet washing, and the apostolic "love-feasts." Putting a literal interpretation on James v. 14, they practise the anointing with oil for the healing of the sick, and many of them will not adopt any other means of recovery. They resemble the Quakers in their plainness of speech and dress, and their refusal to take oaths or to serve in war. Their number, which at one time was estimated at 30,000, has very considerably declined, and the latest account states it at less than 8000. An early offshoot from the general body of Dunkers were the Seventh Day Dunkers, whose distinctive principle, as their name imports, was that the seventh day, and not the first day, of the week was the true Sabbath intended to be perpetually and universally observed. Their founder was Conrad Peysel, one of the first emigrants, who established a settlement at "Ephrata," about fifty miles from Pennsylvania, in 1733. This branch of the sect has almost died out.

DUNKIRK, or Dunkerque, a strongly fortified seaport town of France, and capital of an arrondissement in the department of Nord. is situated on the Straits of Dover, 40 miles N.W. from Lille, and 194 N. from Paris, in 51° 2′ N. lat. and 2° 22′ 32″ E. long. It is a well-built town. the streets being large, wide, and regular. It is divided into three parts—(1) the town proper, which is the centre of trade; (2) the low town, containing the principal industries: and (3) the citadel, including docks and granaries, and containing the houses of labourers and sailors. Dunkirk is both a naval port and one of the merchant ports of Paris, and has two harbours, its maritime trade employing about 5000 vessels with a tonnage of 270,000. The docks occupy about 100 acres. It possesses sugar refineries, starch manufactories, distilleries, foundries, and large ship-building yards. The fisheries of the coast are valuable and extensive. The public buildings most worthy of notice are the church of St Eloi, reconstructed about 1560 in the Gothic style, with a Corinthian peristyle built in 1783; the lighthouse, 170 feet high; the Beffroi, 300 feet high, surmounted with signals for vessels in distress, and containing a celebrated peal of bells; the exchange, the second story of which is a gallery for pictures, statuary, medals, and curiosities; and the theatre. The principal square contains the statue of Jean Bart by David of Angers.

Dunkirk is said to have originated in a chapel founded by St Eloi in the 7th century, round which a small village speedily sprung up. In the 10th century Baldwin III., count of Flanders, raised it to the rank of a town. In 1388 it was burned by the English, and in the 16th century Charles V. built a tower for its defence, of which no traces now remain. In 1558 the English, who had for some time held the town, were expelled from it by the French, who in the ensuing year surrendered it to the Spaniards. In 1646 it once more passed into the hands of the French, who, after a few years' occupation of it, again restored it to Spain. In 1658 it was retaken by the French and made over to the English. After the Restoration, Charles II., being in money difficulties, sold it to the French king Louis XIV., who fortified it. In 1793 it was attacked by the English under the duke of York, who, however, were compelled to retire from its walls with severe loss. The population in 1872 was 34,342.

DUNKIRK, a lake-port town of the United States, in Chautauqua county, New York, situated on a small bay in Lake Erie, 40 miles south-west of Buffalo. It is an important station on the Lake railroad, and forms the western terminus of the Erie line; and by means of the Carrolton railroad it has connection with the Pennsylvania coal-fields. The town occupies an elevated and agreeable position on the lake, and its harbour is free of ice earlier in the spring than the neighbouring port of Buffalo. The industries of the place comprise oil-refining, and the manufacture of glue, flour, and iron-work. Population (1870), 5231.

DUNMOW, GREAT, a market-town of England, in Essex, situated on a *via militaris*, some remains of which still exist. It consists of two good streets, built on an acclivity near the right bank of the Chelmer, 40 miles north-east of London by rail. Its public buildings include a town hall and a literary institute, besides the parish church of St Mary the Virgin, recently restored. Population in 1871, 2983. Two miles to the east is the village of Little Dunmow (population, 359), formerly the seat of a priory remarkable for the custom of presenting a flitch of bacon to any couple who could satisfy a jury of six bachelors and six maidens that they had spent the first year of married life in perfect harmony, and had never at any moment wished they had tarried. The institution of this strange matrimonial prize—which had its parallel at Whichnoure (or Winchnor) in Staffordshire, at St Meleine in Brittany, and apparently also at Vienna—appears to date from the reign of John; and the only instances recorded of its award occurred in 1445, 1467, 1701, 1751, and 1763. A revival of the custom was effected in 1855 by Mr Harrison Ainsworth, but the scene of the ceremony was transferred to the town-hall of Great Dunmow. For details see Chambers's *Book of Days*, vol. ii. p. 748–751; and W. Andrews, *History of the Dunmow Flitch of Bacon Customs*, 1877.

DUNNING, JOHN, BARON ASHBURTON (1731–1783), an eminent English lawyer, the second son of John Dunning of Ashburton, Devonshire, an attorney, was born at Ashburton, October 18, 1731, and was educated at the free grammar-school of his native place, where he distinguished himself in classics and mathematics. On leaving school he was taken into his father's office, where he remained until the age of nineteen, when he was sent to the Temple. Called to the bar in 1756, he came very slowly into practice. He went the Western Circuit for several years without receiving a single brief. In 1762 he was employed to draw up *A Defence of the United Company of Merchants of England trading to the East Indies, and their Servants, particularly those at Bengal, against the Complaints of the Dutch East India Company to his Majesty on that subject*; and the masterly style which characterized the document procured him at once reputation and emolument. In 1763 he distinguished himself as counsel on the side of Wilkes, whose cause he conducted throughout. His powerful argument against the validity of general warrants (18th June 1763) established his reputation, and his professional business from that period gradually increased to such an extent that in 1776 he is said to have been in the receipt of nearly £10,000 per annum. In 1766 he was chosen recorder of Bristol, and in December 1767 he was appointed solicitor-general. The latter appointment he held till May 1770, when he retired, along with his friend Lord Shelburne. In 1771 he was presented with the freedom of the city of London. From this period he was considered as a regular member of the Opposition, and distinguished himself by many able speeches in Parliament. He was first chosen member for Calne in 1768, and continued to represent that burgh until he was promoted to the peerage. In 1780 he brought forward a motion that the "influence of the crown had increased, was increasing, and ought to be diminished," which he carried by a majority of eighteen. He strongly opposed the system of sinecure offices and pensions; but his probity was not strong enough to prevent his taking advantage of it for himself. In 1782, when the marquis of Rockingham became prime minister, Dunning was appointed chancellor of the duchy of Lancaster, a rich sinecure; and about the same time he was advanced to the peerage, by the title of Lord Ashburton. Under Lord Shelburne's administration he accepted a pension of £4000 a year. He died while on a visit to Exmouth, August 18, 1783. Though possessed of an insignificant person, an awkward manner, and a provincial accent, Lord Ashburton was one of the most fluent and persuasive orators of his time. Sir William Jones speaks in the highest terms of his eloquence and wit, and Bentham commended the closeness of his reasoning.

Besides the answer to the Dutch memorial, Lord Ashburton is supposed to have assisted in writing a pamphlet on the law of libel, and to have been the author of *A Letter to the Proprietors of East India Stock, on the subject of Lord Clive's Jaghire, occasioned by his Lordship's Letter on that Subject*, 1764, 8vo. He was at one time suspected of being the author of the celebrated *Letters of Junius*.

DUNOIS, JEAN (1402–1468), Count of Orleans and Longueville, commonly called the "Bastard of Orleans," a celebrated French warrior and grand-chamberlain of France, was the natural son of the duke of Orleans (brother of Charles VI.) and Mariette d' Enghien, Madame de Cany, and was born at Paris the 23d November 1402. He was brought up in the house of the duke, and in the company of his legitimate sons. His earliest feat of arms was the surprise and rout in 1427 of the English, who were besieging Montargis,—the first successful blow against the English power in France following a long series of French defeats. In 1428 he threw himself into Orleans, and was the principal means of enabling the garrison to hold out until the arrival of Joan of Arc, when he shared with her the honour of defeating the enemy there in 1429. He then accompanied Joan to Rheims, and shared in the victory of Patay. After her death he raised the siege of Chartres and of Lagny, and drove the English from Paris, which he entered in triumph on the 13th April 1436. The English retreated gradually into the Isle of France, and thence into Normandy; and Dunois, having in 1449 been raised to the rank of lieutenant-general, soon conquered from them the whole that province. In 1451 he attacked them in Guienne. king among other towns Bordeaux, which the English had ld for 300 years. At the conclusion of these conquests harles VII. legitimated him, and gave him the title of efender of his country, and the office of grand chamberlain; ut on the death of Charles, Louis XI. deprived him of is titles and dignities. He then joined the league of evolted princes, but, assuming the function of negotiator, and hus securing the favour of the king, he was reinstated in is offices, and named president of the council for the reform of the state. He died 28th November 1468.

DUNOON, a town in Argyllshire, Scotland, situated on the Firth of Clyde, about nine miles west from Greenock, and on the opposite shore. Of recent growth (having been about the beginning of this century a mere fishing hamlet), it is now one of the most extensive and prosperous watering-places on the shores of the Clyde, a condition for which it is much indebted to the late James Ewing of Strathleven, who first drew attention to its capabilities as an agreeable summer residence. On account of the mildness of the climate that prevails, and the amenity of the situation, it was selected as the site of a convalescent home, which has proved a boon to many of the hard-wrought population of Glasgow and its neighbourhood. On a conical hill close above the main pier stand the fragments of Dunoon Castle, the hereditary keepership of which was conferred by Robert Bruce on the family of Sir Colin Campbell of Loch Awe, an ancestor of the duke of Argyll. Near the hillock is the modern castle of Dunoon. Including the suburb of Kirn, the population at the census of 1871 was 3750.

DUNS SCOTUS, JOHN, one of the foremost of the schoolmen, was born in the latter half of the 13th century. The year and place of his birth are both uncertain. For the date 1265 and 1275 have been assigned, without any decisive evidence in favour of either. The form of the surname seems to support the claim of Dunse, in Berwickshire, as the place, though the same ground has been pled, with less plausibility it must be admitted, for Downpatrick (Dunum) in Ireland, and for the village of Dunstane in Northumberland. In favour of Dunstane a statement at the close of a manuscript copy of the work of Duns Scotus, contained in the library of Merton College, Oxford, has been quoted; but this, though it states expressly that the author was born at Dunstane, is inconclusive. The rival claims of England, Scotland, and Ireland have been naturally enough dvocated by natives of the three countries respectively, eland, Dempster, and Wadding, and have been the subject f considerable controversy, into which it would be a waste f time to enter. It is noteworthy, however, as a curiosity f literature, that Dempster published a quarto volume, the ain object of which was to prove by twelve distinct arguents that Duns Scotus was a Scotchman. It is said that hen he was a boy his extraordinary ability was observed two Franciscan friars, who took him to their convent at ewcastle. Whether this be so or not it seems certain that joined the Franciscan order in early life, and that he died at Merton College, Oxford, of which he was made ellow. According to Wadding, he became remarkably proient in all branches of learning, but especially in matheatics. When his master, William Varron, removed to Paris 1301, Duns Scotus was appointed to succeed him as ofessor of philosophy. His lectures attracted an immense mber of students, though the story that in his day the iversity was attended by no less than 30,000 is probably gross exaggeration. He was removed to Paris, probably in 04, though the precise date is uncertain. In 1307 he ceived his doctor's degree from the university of Paris, and the same year he was appointed regent of the theological hool. His connection with the university was made memorle by his defence of the doctrine of the Immaculate Conception, in which he displayed such dialectical ingenuity as to win for himself the title *Doctor Subtilis*. According to the account that is usually given he refuted one by one no less than two hundred objections urged against the doctrine by the Dominicans, and established his own position by "a cloud" of arguments. The doctrine continued long to be one of the main subjects in dispute between the Scotists and the Thomists, or, what is almost the same thing, between the Franciscans and the Dominicans. To judge from its subsequent acts, the university of Paris seems to have been deeply and lastingly impressed by the arguments of Duns Scotus. In 1387 it formally condemned the Thomist doctrine, and a century afterwards it required all who received the doctor's degree to bind themselves by an oath to defend the doctrine of the Immaculate Conception. In 1308 Duns Scotus was sent by the general of his order to Cologne with the twofold object of engaging in a controversy with the Beghards and of assisting in the foundation of a university. He was received with great ceremony by the magistrates and nobles of the city. After a very short residence, however, he died of apoplexy on the 8th November 1308. The story told by Paulus Jovius, that on his grave being opened some time after his death his body was found to have turned in the coffin, from which it was inferred that he had been buried alive, is generally regarded as fabulous.

Duns Scotus was one of the great leaders of scholastic thought, and, as a full account of his philosophical system must therefore necessarily be given in the general article on SCHOLASTICISM, a brief indication of its leading points will suffice here. It may be noted at the outset that the philosophical position of Duns Scotus was determined, or at least very greatly influenced, by the antagonism that existed between the Dominicans and the Franciscans. Thomas Aquinas was a Dominican, Duns Scotus was a Franciscan; and hence arose the schism between the Thomists and the Scotists. Aquinas ranks in philosophy with the realists as well as Duns Scotus, but his view in regard to the great philosophical controversy of the Middle Ages was a modified or eclectic one in comparison with that of Duns Scotus, who is the true representative and apostle of scholastic realism. Theologically, the doctrine of the Immaculate Conception was the great subject in dispute between the two parties. There were, however, differences of a wider and deeper kind. In opposition to Aquinas, who maintained that reason and revelation were two independent sources of knowledge, Duns Scotus held that there was no true knowledge of anything knowable apart from theology as based upon revelation. In conformity with this principle he denied that the existence of God was capable of being proved, or that the nature of God was capable of being comprehended. He therefore rejected as worthless the ontological proof offered by Aquinas. Another chief point of difference with Aquinas was in regard to the freedom of the will, which Duns Scotus maintained absolutely. He held also in an unqualified form the doctrine of predestination, and he reconciled free-will and necessity by representing the divine decree not as temporally antecedent, but as immediately related to the action of the created will. He maintained, in opposition to Aquinas, that the will was independent of the understanding, that only will could affect will. From this difference as to the nature of free-will followed by necessary consequence a difference with the Thomists as to the operation of divine grace. In ethics the distinction he drew between natural and theological virtues is common to him with the rest of the schoolmen, among others with his great opponent. (See AQUINAS, vol. ii. p. 232–3.) Duns Scotus strongly upheld the authority of the church, making it the ultimate authority on which that of Scripture depends.

The works of Duns Scotus were very numerous, though in the collection edited by Luke Wadding, a Franciscan (12 vols. fol., Lyons, 1639), several are ascribed to him without sufficient ground. This edition contains a life full of legends, which was reprinted separately (Mons, 1644). The most important of the works of Duns Scotus consisted of questions and commentaries on the writings of Aristotle, and on the *Sentences* of Lombard.

For the theology of Scotus see the *Summa Theologica ex Scoti Operibus*, by Jerome de Fortius, a Franciscan, the *Resolutio doctrinæ Scoticæ*, by F. E. Albergoni (Lyons, 1643), and the *Controversiæ theologicæ inter S. Thomam et Scotum*, by De Rada, a Spanish Franciscan (Venice, 1599). Of more recent authorities particular value attaches to Baumgarten-Crusius's *De Theologia Scoti* (Jena, 1826) and an article by Erdmann in the *Theologische Studien und Kritiken* for 1863. On the philosophy of Duns Scotus see Ritter's *Geschichte der Philosophie* and Ueberweg's *Geschichte der Philosophie*.

DUNSTABLE, a market-town and, since 1864, a municipal borough of England, in the county of Bedford, 33 miles N.W. of London, and 18 miles S.S.W. of Bedford, with communication by both the North-Western and the Great Northern railways. Its parish church, a fine old building, formerly part of the Augustinian priory, was restored about 1865; the principal points of interest are the richly decorated west front, the ancient monuments of the Chew family, and, among the interior adornments, Sir James Thornhill's painting of the Last Supper. The five dissenting churches, the temperance hall, several alms-houses, and the Ashton charity and other schools complete the list of public buildings. Straw-plaiting and the making of straw hats and bonnets are the principal industries; and, as a consequence, the female considerably outnumbers the male population. The census of 1861 gave 2712 females out of a total of 4470 inhabitants; and that of 1871, 2702 out of 4558.

From its situation at the junction of the ancient Watling and Icknield Streets, it seems probable that Dunstable was a Roman station, but its identification, whether with Magiovinium or Durocobrivæ, is not certainly established. Matthew Paris mentions, in his *Lives of the Abbots of St Albans*, that about 1110 the play of S. Katharina was acted in the town by direction of Geoffrey, afterwards abbot of St Albans, and thus the name of Dunstable is associated with the very earliest authentic notice of theatrical representation in England. The Augustinian priory, to which it was afterwards indebted for its celebrity, was founded in 1131 by Henry I., and for a long period exercised lordship over the town. From 1227 to 1229 there was a violent dispute between the burghers and the canons, but the claims of the latter were acknowledged by Hubert de Burgh, the justiciary. It was at Dunstable that in 1244 the discontented barons met and ordered the papal nuncio to leave the kingdom; and in 1533 the commissioners for the divorce of Queen Catherine sat in the priory. The *Annales de Dunstaplia* are one of the most valuable of the monastic chronicles still extant. They extend from the incarnation to the year 1297, and are fortunately fullest in the account of contemporary events. The entries from 1210 to 1242 are due to Richard de Morins, the prior. The original is a parchment folio preserved among the Cotton MSS. in the British Museum (Tiberius, A. 10). It was greatly damaged by the fire of 1731, and is consequently slightly imperfect, in spite of the care with which it has been stretched and mended. Hearne published an edition in 1733 from a fairly accurate transcript by Humphrey Wanley (Harleian MSS. 4886); another by H. R. Luard, from the original MS., occupies 420 pages of vol. iii. of the *Annales Monastici*, published by the Master of the Rolls.

DUNSTAN, St (924 or 925–988), was born at Glastonbury in 924 or 925. His father, Heorstan, was brother of Ælfheah the Bold, bishop of Winchester; and the tradition that he was connected with the royal house seems not improbable. As a child he was placed under the care of certain Irish teachers who had settled at Glastonbury; and he devoted his boyhood to study with a fervour so intense that he at length brought on himself a severe attack of brain fever, the effects of which are apparent in the fantastic visions which troubled his after life. He was still a boy when he entered the household of Athelstan, and he was only fifteen or sixteen at the accession of Edmund; but he had not been long at court before his ambitious and lofty temper had surrounded him with bitter enemies. In all the accomplishments of his time, except those of the warrior, he stood pre-eminent. His memory was stored with the ancient Irish ballads and legends, and he excelled in music, in painting, and even in the mechanical arts. But he soon found that his talents, while making him a favourite in the ladies' bowers, only inflamed the jealousy of his rough, ignorant soldier rivals. He was accused of dealing in witchcraft, was driven with rude force from the court, and, perhaps under the pretext of testing whether he was really wizard or no, was flung into a muddy pond, whence he was glad to escape to the protection of his uncle Ælfheah. The result of this outrage was a second attack of fever, from which he rose to yield to his uncle's persuasions, and take the vows as a monk. It was with great reluctance that he took this step, for he was deeply in love with a lady at court; but the feeling, natural in that age, that his illness was a direct indication of the will of providence, was likely to impress itself with peculiar force upon an imagination such as his, and he was also, doubtless, conscious that the only protection for his physical weakness lay in the power of the church. After his recovery, he spent some time quietly studying and teaching, and practising the austerities which gained him the reputation of a saint; but it was not long before he returned to court. Again his enemies seemed likely to prove too powerful for him. He, however, gained the favour of King Edmund, who created him abbot of Glastonbury when he was about twenty-two years of age. He became principal treasurer of the kingdom, and we find him a few years later (953), on account of his tenure of that office, refusing an offer of the see of Crediton.

From 946 to 955 the throne was occupied by Edred, whose constant ill health threw the chief power into Dunstan's hands. In 955 Edwy came to the throne; and the party of Edgiva, to which Dunstan belonged, lost its influence. Of the details of the party struggles which ensued we have no trustworthy information; but one incident of the quarrel between the king and the minister has become famous. Edwy, though then probably a mere boy, was deeply in love with his kinswoman Elgiva, whose mother Ethelgiva, a lady of the highest rank, is accused, with what degree of truth cannot now be determined, of having used the most shameful means to gain power over the young king. What relationship really existed between Edwy and Elgiva is unknown, but it was such as to be considered by the churchmen as an insuperable bar to marriage. Edwy, however, defied their opposition. On the evening of his coronation he withdrew from the banquet to the society of Elgiva. Dunstan was sent by the Witan to recall him, and exhibited a violence which may be excused, when we consider that Edwy had both grievously insulted the Witan and openly sought, upon so solemn an occasion, the dangerous society of a girl whom the church forbade him to marry.

A year or so after Ethelgiva and her party triumphed, and Dunstan being outlawed, was obliged to flee to Ghent. In 957, however, a revolt placed Edwy's brother Edgar on the throne of Mercia and Northumbria, and at his court Dunstan resumed his old position of chief minister. He was created bishop (perhaps at first without a see), and, in defiance of strict ecclesiastical law, he obtained and held at once the sees of Worcester and London. By the death of Edwy in 959, Edgar gained the sovereignty of Wessex; and a few months after Dunstan was appointed archbishop of Canterbury.[1] On the death of Edgar (975),

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[1] In connection with the coronation of Edgar, Osbern of Canterbury tells a story intended to exalt the archbishop. The king having

Dunstan's influence secured the crown for Edward. But a fierce struggle ensued between Dunstan and his enemies. In 977 the Witan met three times; and the last meeting, that at Calne, was signalized by an accident, which the friends of Dunstan called a miracle. Half the floor of the room in which the Witan was assembled gave way at the moment that Dunstan was making a solemn appeal to God, so that the enemies of Dunstan fell, and Dunstan and his friends remained unhurt. This accident has been explained by reference to the archbishop's well-known skill in mechanics. During the first few years of the unhappy reign of Ethelred the Unready, Dunstan probably retained some influence in the government; and it is noteworthy that the year of his death (which took place on the 19th May 988) marks the commencement of the most disastrous invasions of the Danes. Towards the close of his life Dunstan is said to have retired from the court, and his last years were devoted to religious observances and the composition of sacred music, his favourite amusement being, as of old, the manufacture of bells and musical instruments.

Dunstan has been frequently painted by historians as one of the most complete types of the bigoted ecclesiastic. If, however, we critically examine the best sources, he will appear to have been statesman much more than ecclesiastic; and the circumstances which caused him to be honoured by the monks as one of their greatest patrons will become manifest. Even in his lifetime he was believed to be endowed with supernatural power, as is shown by the charge of witchcraft brought against him in his youth, and by the story of the miracle at Calne. His earliest biography, written by a contemporary, represents him as a man of vivid imagination, a seer of visions and dreamer of dreams, a man of unusually sensitive nervous organization, as is indicated by the strange "gift of tears" with which he is said to have been endowed; and in this biography we find the first of the tales which became so common of his interviews with the devil, who is said to have tormented him in the form of a bear and in other frightful shapes. By a very common process, there came to be connected with his name a large number of marvellous legends, of which the best known is the story of how the devil appeared to him with impure suggestions while he was working at his forge, and how the saint retaliated by seizing the nose of the great enemy with a pair of red-hot tongs. It is not surprising that the monkish writers should exaggerate any services rendered to their order by an archbishop possessed of so wonderful a reputation. But in fact there is good reason to believe that Dunstan always treated church affairs as subordinate to political considerations. While Ethelwald, the bishop of Winchester, and Oswald, bishop of Worcester, and afterwards archbishop of York, were introducing monks of the strict Benedictine order into their sees in place of the seculars, and doing their utmost to enforce celibacy among the clergy, he allowed the married priests to retain their places in his diocese without interference. On the other hand, no doubt all Dunstan's influence in church affairs was given to the monastic party, though that influence was exerted with a statesman-like moderation for which he has not received credit, and it is likely that he did not attain his canonization without performing substantial service to the church. The political services which Dunstan rendered to England were certainly of the first importance. He guided the state successfully during the nine years reign of the invalid Edred. And there is good reason to believe that he deserves at least as much credit as the king himself for the settlement of Northumbria and the Danes which was effected, for the peace which prevailed, and the glory which was gained, in Edgar's famous reign.

Several works have been attributed to Dunstan, including a commentary on the Benedictine rule, and a *Regularis Concordia* (published in Reyner's *Apostolatus Benedictinorum* and in the *New Monasticon*): but the real authorship of both of these is doubtful. His reputation as a miracle-worker so long outlasted his life, that a tract on the philosopher's stone was published in his name at Cassel in 1649.

The earliest and the most trustworthy of the biographers of Dunstan was "the priest B.," whom some authorities have supposed, though not upon conclusive grounds, to be the scholar Bridferth of Ramsey.[1] The date of his work is fixed by Prof. Stubbs at about 1000; it is dedicated to archbishop Elfric who died in 1006. The later lives,—those of Adelard (which consists of lessons intended to be used in the monasteries), of Osbern, Eadmer, and William of Malmesbury,—are of far less value, being distorted by prejudice and filled with extravagant legends. The *Memorials of Saint Dunstan* have been published by Mabillon, and also in the Master of the Rolls' series, edited, with an introduction, by Prof. Stubbs. A scholarly essay on *Dunstan and his Policy* is contained in Mr E. W. Robertson's *Historical Essays*; and the life of Dunstan is included in Dean Hook's *Lives of the Archbishops of Canterbury*. (T. M. W.)

DUNTON, JOHN (1659–1735) an eccentric bookseller, publisher, and author, was born at Graffham, in Huntingdonshire, May 4, 1659. In his boyhood he showed great fondness for adventure, and a faculty for getting into and out of scrapes. At the age of fifteen he was apprenticed to Thomas Parkhurst, bookseller, at the sign of the Bible and Three Crowns, Cheapside, London, whose strictness had full exercise in the endeavour to keep in check his wayward tendencies. During the struggle which led to the Revolution, Dunton joined the Whig apprentices, and became the treasurer of that body. In 1685 he became bookseller at the sign of the Raven, near the Royal Exchange, having, after much consideration as to the lady he should select, married a sister of Samuel Wesley. His wife managed his business, so that he was left free in a great measure to follow his own eccentric devices, which now took the form chiefly of writing and rambling. In 1686, probably because he was concerned in the Monmouth rising, he visited New England, where he stayed eight months selling books and observing with interest the new country and its inhabitants. He then made a short excursion to Holland; after which, returning to England, he opened a new shop in the Poultry, in the hope of better times. Here he published weekly the *Athenian Mercury*, which professed to answer all questions on history, philosophy, love, marriage, and things in general. It enjoyed considerable popularity for some time, but he discontinued it, after a course of six years, in 1696. His wife died some time after this. He married a second time; but a quarrel about his wife's property led to a separation, and, having no one to manage his affairs, he spent the remainder of his life in great poverty. He died in 1735. He wrote a great many books which are now forgotten, but his *Life and Errors*, on account of its naiveté and as a picture of bygone times, is still read, and his letters from New England were published in America in 1867.

DUPERREY, LOUIS ISIDORE (1786–1865), a French navigator and scientific investigator, was born at Paris, entered the navy in 1803, took part in the military operations of 1809 at Brest and Rochefort, and assisted in the hydrographical survey of the coast of Tuscany carried on during that and the following year. From 1817 to 1820 he served under Freycinet in his great voyage round the world, being intrusted with the hydrographic operations on board the "Urania;" and he contributed largely to the preservation of the crew and the scientific collections when

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taken the nun afterwards called St Wulfrith as his mistress. Dunstan is said to have vindicated the independence of the church by forbidding him, among other penances, to wear the crown for seven years; but there are several reasons for doubting this story. The question is elaborately discussed in the article on the "Coronation of Edgar," in Mr E. W. Robertson's *Historical Essays*

[1] This question is fully discussed by Prof. Stubbs in his Introduction to the *Memorials of Saint Dunstan*; but there are no sufficient data for discovering the author

his vessel was wrecked at the Malouin Islands. In 1822 he attained the rank of lieutenant, and was intrusted with the command of the "Coquille," which during the next three years was engaged in scientific explorations in the South Pacific and along the coasts of South America. From this voyage he brought back not only great additions to cartography and important data in regard to the currents of the Pacific, but also numerous pendulum observations, serving to determine the magnetic equator, and to prove the equality of the flattening of the two hemispheres. During the rest of his life he devoted himself mainly to the investigation of terrestrial magnetism; and the value of his labours was recognized by his admission into the *Académie des Sciences* in 1842. He died in August 1865.

The following are his principal works:—The *Partie historique*, the *Hydrographie*, and the *Physique* of the *Voyage autour du Monde sur la Coquille*, Paris 1826-1830; and extensive contributions to Becquerel's *Traité de l'Electricité*.

DUPERRON, Jacques Davy (1556–1618), a celebrated French cardinal, was born at St Lô, in Normandy, November 15, 1556. His father was educated for a physician, but on embracing the doctrines of the Reformation became a Protestant minister, and to escape persecution settled at Bern, in Switzerland. Here Jacques Davy received his education, being taught Latin and mathematics by his father, and learning without the aid of any one Greek and Hebrew and the philosophy which was then in vogue. At twenty years of age he came to Paris, and was presented to the king by the count of Matignon; and, after he had abjured Protestantism, being again presented by Philip Desportes, abbot of Tiron, as a young man without equal for knowledge and talent, he was appointed reader to the king. He was commanded to preach before the king at the convent of Vincennes, when the success of his sermon on the love of God, and of a funeral oration on the poet Ronsard, induced him to take orders. On the death of Mary Queen of Scots he was chosen to pronounce her eulogy, which, though it contained an attack on Elizabeth of England that the king thought it prudent to disavow, tended to advance both the ecclesiastic's fame and fortune. When the Cardinal de Bourbon, at the end of Henry III.'s reign, plotted to secure to himself the throne to the prejudice of Henry IV., Duperron is accused of having joined in the plot and revealed to Henry IV. its secrets. However that may be, when the plot failed, and Henry IV. mounted the throne, Duperron enjoyed the favour of that monarch, and in 1591 was created by him bishop of Evreux. He converted Henry to the Catholic religion; and, after the taking of Paris, accompanied the Cardinal d'Ossat to Rome to obtain the removal of the interdict which had been passed upon France. On his return to his diocese, his zeal and eloquence were largely instrumental in withstanding the progress of Calvinism, and among others he converted Henry Sponde, who became bishop of Pamiers, and the Swiss general Sancy. His success attracted the attention of the church, and he was chosen to represent it at the conference at Fontainebleau in 1600. In 1604 he was sent to Rome as "chargé d'affaires de France;" and, having hardly arrived when Clement VIII. died, he largely contributed by his eloquence to the election of Leo XI. to the papal throne, and, on the death of Leo twenty-four days after, to the election of Paul V. While still at Rome he was named archbishop of Sens, and the same year was made a cardinal. He died at Paris, Sept. 6, 1618. Duperron was a zealous defender of the infallibility and power of the Pope, and of his superiority over a general council. He was possessed of immense energy, and of a ready and convincing eloquence, which he could make available for whatever opinions he thought it prudent to adopt; and, if he did not form his opinions solely with a view to his advancement, they certainly adapted themselves in each case with remarkable appropriateness to the different emergencies and turning points of his life. His works were collected after his death, and published in three volumes in 1622–23

DUPIN, André Marie Jean Jacques (1783–1865), commonly called Dupin the Elder, a celebrated French advocate, president of the Chamber of Deputies and of the Legislative Assembly, was born at Varzy, in Nièvre, on the 1st February 1783. He was educated by his father, who was a lawyer of eminence, and at an early age he became principal clerk of an attorney at Paris. On the establishment of the *Académie de Législation* he entered it as pupil from Nièvre. In 1800 he was made advocate, and in 1802, when the schools of law were opened, he received successively the degrees of licentiate and doctor from the new faculty. He was in 1810 an unsuccessful candidate for the chair of law at Paris, and in 1811 he also failed to obtain the office of advocate-general at the court of cassation. About this time he was added to the commission charged with the classification of the laws of the empire, and, after the interruption caused by the events of 1814 and 1815, was charged with the sole care of that great work. When he entered the Chamber of Deputies in 1815 he at once took an active part in the debates, and strenuously opposed the election of the son of Napoleon as emperor after his father's abdication. At the election after the second restoration Dupin was not re-elected. He defended with great intrepidity the principal political victims of the reaction, among others, in conjunction with Berryer, Marshal Ney; and in October 1815 boldly published a tractate entitled *Libre Défense des Accusés*. In 1827 he was again elected a member of the Chamber of Deputies, and in 1830 took part in counselling the revolution, and in exhorting the citizens to resistance. In August of that year he became a member of Louis Philippe's cabinet, and more than any one else contributed to the formation of the new régime. At the end of 1832 he became president of the chamber, which office he held succesively for eight years. On Louis Philippe's abdication in 1848 Dupin introduced the young count of Paris into the chamber, and proposed him as king with the duchess of Orleans as regent. This attempt failed, but Dupin submitted to circumstances, and, retaining the office of *procureur-général*, his first act was to decide that justice should henceforth be rendered to the "name of the French people." In 1849 he was elected a member of the Assembly, and became president of the principal committee—that on legislation. After the *coup d'état* of 2d December 1851 he still retained his office of *procureur-général*, and did not demit it till effect was given to the decrees confiscating the property of the house of Orleans. In 1857 he was offered his old office by the emperor, and accepted it, explaining his acceptance in a discourse, a sentence of which may be employed to describe his whole political career. "I have always," he said, "belonged to France and never to parties." He died 8th November 1865. Among Dupin's works, which are numerous, may be mentioned *Principia Juris Civilis*, 5 vols. (1806); *Mémoires et plaidoyers de* 1806 *au* 1^er^ *Janvier* 1830, in 20 vols.; and *Mémoires ou souvenirs du barreau*, in 4 vols. 1855–57.

DUPIN, Louis Ellies (1657–1719), a celebrated French ecclesiastical historian, belonged to a noble family in Normandy, and was born at Paris on the 17th June 1657. He received his early education from his father, and had scarcely reached his tenth year when he entered the college of Harcourt, where he graduated as M.A. in 1672. Determining to adopt the ecclesiastical profession, he became a pupil of the Sorbonne, and received the degree of B.D. in 1680, and that of D.D. in 1684. About this time he conceived the idea of a *Bibliothèque Universelle de tous les*

iastiques, the first volume of which appeared in
erty with which he there treated the doctrines
aroused ecclesiastical prejudice, and the arch-
is condemned the work. Dupin consented
tion, but it was suppressed in 1693; he
allowed again to continue it on changing its
tent of substituting *Nouvelle* for *Universelle*.
quently exiled to Châtellerault as a Jansenist,
nce of banishment was repealed on a new
In 1718 he entered into a correspondence
rchbishop of Canterbury, with a view to a
English and Gallican churches; and, being
projecting a change in the dogmas of the
pers were seized in 1719, but nothing was
ould be properly framed into an accusation
The same zeal for union is said to have induced
e residence of Peter the Great in France, and
ch's request, to draw up a plan for uniting
Roman churches. He died at Paris on the
9.

voluminous author. Besides his great work on
thors, mention may be made of *Bibliothèque Uni-*
riens, 2 vols. (1707); *L'Histoire de l'Église en abrégé*
Histoire Profane depuis le commencement du Monde
4 vols. 1712.

, Joseph, governor-general of the French
in India, was born about the close of the
The son of a rich farmer-general, he was
ated, made several voyages to America and
1720 was named a member of the superior
ondicherry. He displayed great business
in addition to his official duties, made large
is own account, and acquired a fortune. In
made superintendent of French affairs in
e, the town prospering under his energetic
and growing into great importance. His
ocured him in 1742 the appointment of
ral of all French establishments in India.
now was to acquire for France vast territories
for this purpose he entered into relations with
nces, and adopted a style of Oriental gorgeous-
ess and surroundings. The English took the
he danger to their settlements and power was
by the bitter mutual jealousy which existed
eix and La Bourdonnais, French governor of
ourbon. When Madras capitulated to the
'46, Dupleix opposed the restoration of the
nglish, thus violating the treaty signed by La
He then sent an expedition against Fort
7), which was defeated on its march by the
ot, the ally of the English. Dupleix suc-
ing over the nabob, and again attempted the
rt St David, but unsuccessfully. A midnight
ddalore was repulsed with great loss. In
erry was besieged by the English; but in
the operations news arrived of the peace
tween the French and the English at Aix-la-
upleix next entered into negotiations which
object the subjugation of Southern India, and
e body of troops to the aid of two claimants
gnty of the Carnatic and the Deccan. The
engaged on the side of their rivals. After
cesses the scheme failed. The conflicts be-
rench and the English in India continued till
Dupleix was recalled to France. He had
e sums out of his private fortune on account
h company, but in opposition to their wishes,
tempted to recover them from the Government.
to have died in obscurity and want about

DUPONT, Pierre (1821–1871), a French song-writer of great popularity, the son of a workman of Provins, was born at Lyons, his mother's native city, but brought up from childhood under the care of an elderly cousin who occupied the position of priest of Roche-Taillée-sur-Saône. From the seminary of Largentières, where his education was completed, he passed to the uncongenial drudgery of a lawyer's and banker's office; in 1839 found his way to Paris, and got some of his poems inserted in the *Gazette de France* and the *Quotidienne;* and two years later was saved from the conscription and enabled to publish his first volume—*Les deux Anges*—through the exertions of a Provins kinsman and M. Lebrun. The prize founded by M. de Maillé La Tour-Landry was awarded to him in 1842, and he was employed for some time in connection with the Academy's great dictionary. The thought of trying his fortune as a writer for the stage was taking shape in his mind, when in 1847 the success of his peasant song *J'ai deux grands bœufs dans mon étable* opened up another prospect of fame; and from that date to his death he confined himself mainly, though not exclusively, to the cultivation of his lyrical faculty. Accompanied, as they often were, by airs of his own invention, many of his songs became in the widest sense popular, and were equally welcome in the workshop and the drawing-room. His sympathies were much less, however, with the drawing-room than the workshop; and in 1851 he paid the penalty of having become the poet laureate of the socialistic aspirations of the time by being condemned to seven years of exile from France. The sentence was cancelled, and the poet withdrew for a season from participation in politics. He died at Paris in 1871. His lyrical poems may very fairly be arranged according to his own classification—rustic and, as far as the writer is concerned, objective, legendary and subjective, patriotic and contemporaneous. They have appeared in various forms—*Chants et Chansons*, 3 vols., with music, 1852–54; *Chants et Poésies*, 7th edition, 1862; &c. Among the best known are *Lé braconnier*, *Le tisserand*, *La vache blanche*, *La chanson du blé*, but many others might be mentioned of equal merit,—natural, bold, delicate, and piquant. *Dix eclogues*, 1864, *Fin de la Pologne*, 1847, *La legende du juif errant*, 1862, written to accompany Doré's engravings, and *Muse juvénile*, 1859, are separate publications.

See Sainte-Beuve, *Causeries du lundi*, vol. iv., where an interesting description is given of the style in which the author sung his own songs in the clubs and political meetings; Ch. Baudelaire, *Notice sur P. Dupont*, 1849; Déchaut, *Biographie de Pierre Dupont*, 1871.

DUPONT DE L'EURE, Jacques Charles (1767-1855), a French lawyer and statesman, was born at Neubourg, in Normandy, on the 27th February 1767. In 1789 he was an advocate at the Parliament of Normandy. During the republic and the empire he filled successively judicial offices at Louviers, Rouen, and Evreux. He had adopted the principles of the Revolution, and in 1798 he commenced his political life as a member of the Council of Five Hundred. In 1813 he became a member of the Corps Legislatif. During the Hundred Days he was vice-president of the Chamber of Deputies, and when the allied armies entered Paris he distinguished himself by the firmness with which he asserted the necessity of maintaining the principles of government that had been established at the Revolution. A resolution to that effect which he moved in the chamber was adopted, and he was chosen one of the commissioners to negotiate with the allied sovereigns. From 1817 till 1849 he was uninterruptedly a member of the Chamber of Deputies, and he acted consistently with the liberal opposition, of which at more than one crisis he was the virtual leader. For a few months in 1830 he held office as minister of justice, but, finding himself out of harmony with his colleagues, he resigned before the close of the year and resumed his place in the opposition. At the revolution of 1848 Dupont de l'Eure was made president of the provisional government as being its oldest member. In the following year, having failed to secure his re-election to the chamber, he retired into private life. He died in 1855 at the age of eighty-eight. The consistent firmness with which he adhered to the cause of constitutional liberalism during the many changes of his times gained him the highest respect of his countrymen, by whom he was styled the Aristides of the French tribune.

DUPONT DE NEMOURS, PIERRE SAMUEL (1739–1817), a French political economist and statesman, was born at Paris on the 14th December 1739. He studied for the medical profession, but did not enter upon practice, his attention having been early directed to economic questions through his friendship with Quesnay, Turgot, and other leaders of the school known as the Economists. To this school he rendered valuable service by several pamphlets on financial questions, and numerous articles representing and advocating its views in a popular style in the *Journal de l'Agriculture, du Commerce, et des Finances*, and the *Ephémérides du Citoyen*, of which he was successively editor. In 1772 he accepted the office of secretary of the Council of Public Instruction from Stanislas Poniatowski, king of Poland. Two years later he was recalled to his native country by the advent of his friend Turgot to power. After assisting the minister in his wisely-conceived but unavailing schemes of reform during the brief period of his tenure of office, Dupont shared his dismissal and retired to Gâtinais, in the neighbourhood of Nemours, where he employed himself in agricultural improvements. During his leisure he wrote a translation of Ariosto (1781), and *Mémoires sur la vie de Turgot* (1782). He was drawn from his retirement by Vergennes, who employed him in preparing, along with the English commissioner Dr James Hutton, the treaty for the recognition of the independence of the United States (1782), and a treaty of commerce with Great Britain (1786). Under Calonne he was admitted to the Council of State, and appointed commissary-general of commerce. During the Revolution period he advocated reform and constitutional monarchy as against the views of the extreme republicans, and was therefore destined for vengeance when the republicans triumphed. After the 10th August 1792 he was concealed for some weeks in the observatory of the Mazarin College, from which he contrived to escape to the country. During the time that elapsed before he was discovered and arrested he wrote his *Philosophie de l'univers*. Imprisoned in La Force, he was one of those who had the good fortune to escape the guillotine till the death of Robespierre set them free. As a member of the Council of Five Hundred, Dupont carried out his policy of resistance to the Jacobins, and made himself prominent as a member of the reactionary party. After the republican triumph on the 18th Fructidor (4th September) 1797 his house was sacked by the mob, and he himself only escaped transportation to Cayenne through the influence of M. J. Chénier. In 1799 he found it advisable for his comfort, if not for his safety, to emigrate with his family to the United States. On his return to France in 1802 he declined to accept any office under Napoleon, and devoted himself almost exclusively to literary pursuits. The consideration accorded to him in the United States was shown by his being employed to arrange the treaty of 1803, by which Louisiana was sold to the Union, and by his being requested by Jefferson to prepare a scheme of national education, which was published in 1812 under the title *Sur l'éducation nationale dans les États Unis d'Amérique*. Though the scheme was not carried out in the United States, several of its features have been adopted in the existing French code. On the downfall of Napoleon in 1814 Dupont became secretary to the Provisional Government, and on the restoration he was made a councillor of state. The return of the emperor in 1815 determined him to quit France, and he spent the close of his life with his two sons, who had established a powder manufactory in the state of Delaware. He died near Wilmington, Delaware, on the 6th August 1817.

Dupont's most important works, besides those mentioned above, were his *De l'origine et des progrès d'une science nouvelle* (London and Paris, 1767); *Physiocratie, ou constitution naturelle du gouvernement le plus avantageux au genre humain* (Paris, 1768); and his *Observations sur les effets de la liberté du commerce des grains* (1770). Dupont was a member of the Institute of France, to which he contributed many papers.

DUPUIS, CHARLES FRANÇOIS (1742–1809), an eminent French scientific writer, was born of poor parents at Trye-Chateau, between Gisors and Chaumont, October 26, 1742. His father, who was a teacher, instructed him in mathematics and land-surveying. While he was engaged in measuring a tower by the geometric method the Duc de la Rochefoucault met him, and, being struck with his intelligence, gave him a bursary in the college of Harcourt. Dupuis made such rapid progress in his studies that, at the age of twenty-four, he was appointed professor of rhetoric at the college of Lisieux, where he had previously passed as a licentiate of theology. In his hours of leisure he applied himself to the study of the law, and in 1770 was admitted an advocate before Parliament. Two university discourses which he delivered, one on occasion of the distribution of prizes, and the other on the death of the empress Maria Theresa, having been printed, were admired on account of their elegant Latinity, and laid the foundation of the author's fame as a writer. His chief attention, however, was devoted to mathematics, the object of his early studies; and for some years he attended the astronomical lectures of Lalande, with whom he formed an intimate friendship. In 1778 he constructed a telegraph on the principle suggested by Amontons, and employed it in keeping up a correspondence with his friend M. Fortin in the neighbouring village of Bagneux, until the Revolution rendered it necessary that he should destroy his machine to avoid suspicion.

Much about the same time, Dupuis formed his ingenious theory with respect to the origin of the Greek months. In the course of his investigations upon this subject, he composed a long memoir on the constellations, in which he endeavoured to account for the want of any resemblance between the groups of stars in the heavens and the names by which they are known, by supposing that the zodiac was, for the people who invented it, a sort of calendar at once astronomical and rural, and that the figures chosen for the constellations were such as would naturally suggest the agricultural operations of the season. It seemed only necessary, therefore, to discover the clime and the period in which the constellation of *Capricorn* must have arisen with the sun on the day of the summer solstice, and the vernal equinox must have occurred under *Libra*. It appeared to Dupuis that this clime was Upper Egypt, and that the perfect correspondence between the signs and their significations had existed in that country at a period of between fifteen and sixteen thousand years before the present time; that it had existed only there; and that this harmony had been disturbed by the effect of the precession of the equinoxes. He therefore ascribed the invention of the signs of the zodiac to the people who then inhabited Upper Egypt or Ethiopia. This was the basis on which Dupuis established his mythological system, and endeavoured to explain the subject of fabulous history, and the whole system of the theogony and theology of the ancients.

Persuaded of the importance of his discoveries, which, however, were by no means entirely original, Dupuis

ıral detached parts of his system in the *Journal*
r the months of June, October, and December
'ebruary 1781. These he afterwards collected
l, first in Lalande's *Astronomy*, and then in a
ne in 4to, 1781, under the title of *Mémoire*
des Constellations et sur l'Explication de la
Astronomie. The theory propounded in this
refuted by Bailly, in the fifth volume of his
stronomy, but, at the same time, with a just
ent of the erudition and ingenuity exhibited
r. Condorcet proposed Dupuis to Frederick
Prussia as a fit person to succeed Thiébault in
hip of literature at Berlin; and Dupuis had
invitation, when the death of the king put an
engagement. The chair of humanity in the
ince having at the same time become vacant
of Bejot, it was conferred on Dupuis; and
ecame a member of the Academy of Inscrip-
ow resigned his professorship at Lisieux, and
l by the administrators of the department of
he four commissioners of public instruction.
ncement of the Revolutionary troubles Dupuis
lum at Evreux; and, having been chosen a
e National Convention by the department of
he distinguished himself by the modera-
eeches and public conduct. In the third year
c he was elected secretary to the Assembly,
urth he was chosen a member of the Council
lred. After the memorable 18th Brumaire he
y the department of Seine-et-Oise a member
ive body, of which he became the president.
proposed as a candidate for the senate when
o abandon politics, devoting himself during
his life to his favourite studies. He died
9, 1809.

ublished the work by which he is best known, ea-
le tous les Cultes, ou la Religion Universelle (3 vols.
las, or 12 vols. 12mo.) Though its circulation was
me the subject of much bitter controversy, and
propounded as to the origin of mythology in Upper
e expedition organized by Napoleon for the explor-
ountry. In 1798 Dupuis published an abridgment
one volume 8vo, which met with no better success
al. Another abridgment of the same work, executed
ore methodical plan, was published by M. de Tracy.
s of Dupuis consist of two memoirs on the Pelasgi,
Memoirs of the Institute; a memoir "On the Zodiac of
ished in the *Revue Philosophique* for May 1806; and
plicatif du Zodiaque Chronologique et Mythologique
ame year, in one volume 4to. M. Dacier, secretary
lass of the Institute, delivered his éloge; and an
unt of his life and writings was published by his

REN, GUILLAUME, BARON (1777–1835), one
stinguished of French anatomists and surgeons,
ober 6, 1777, at Pierre Buffière, a small town
He was sprung from poor parents, and was
h the means of receiving an ordinary education
e de la Marche by some charitable persons to
been introduced. At the newly established
lecine, under Fourcroy, he began the study of
h great diligence, and was appointed by com-
ector of the faculty when only eighteen years
early studies were directed chiefly to morbid
ich he did much to establish on a scientific
many of his theories were unsound. In 1803
nted assistant-surgeon at the Hôtel-Dieu; and
ited professor of operative surgery in succession
in 1811. In 1815 he was appointed to the
cal surgery, and three years later he became
at the Hôtel-Dieu. Many other offices were
on him; he became inspector of the university,
and afterwards an officer in the Legion of Honour, chevalier of St Michel, baron, member of the Institute, and first surgeon to the king. Dupuytren's energy and industry were alike remarkable. He visited the Hôtel-Dieu morning and evening, performing at each time several operations, lectured to vast throngs of students, gave advice to his out-door patients, and fulfilled the duties consequent upon one of the largest practices of modern times. By his indefatigable activity he amassed a fortune of £300,000, the bulk of which he bequeathed to his daughter, with the deduction of considerable sums for the endowment of the anatomical chair in the Ecole de Médecine, and the establishment of a benevolent institution for distressed medical men. The most important of Dupuytren's writings is his *Treatise on Artificial Anus*, in which the principles laid down by John Hunter are happily applied. In his operations he was remarkable for the skill and dexterity with which he overcame the numerous difficulties incidental to so extensive a practice as he enjoyed. He had complete control over his feelings, and great readiness of resource. Instead of attempting to introduce new methods of procedure, he commonly limited himself to modifying and adapting to his particular exigencies the established laws of surgery. He was thus led to invent several new surgical instruments. In private life Dupuytren was cold and reserved; and this was perhaps increased by his constant struggle against a consumptive tendency, which ultimately carried him off, 8th February 1835. In November 1833 he had suffered a slight shock of apoplexy, but he continued in practice almost until the day of his death.

DUQUESNE, ABRAHAM, MARQUIS (1610–1688), one of the most distinguished naval officers in the history of France, was born at Dieppe in 1610. Born in a stirring seaport, the son of a distinguished naval officer, he naturally adopted the profession of a sailor. He spent his youth in the merchant service, and obtained his first distinction in naval warfare by the capture of the island of Lerins from the Spaniards in May 1637. About the same time his father was killed in an engagement with the Spaniards, and the news raised his hatred of the national enemy to the pitch of a personal and bitter animosity. For the next five years he sought every opportunity of inflicting defeat and humiliation on the Spanish navy, and he distinguished himself by his bravery in the engagement at Gattari (1638), the expedition to Coruña (1639), and in battles at Tarragona (1641), Barcelona (1643), and the Cape de Gata. The French navy being left unemployed during the minority of Louis XIV., Duquesne obtained leave to offer his services to the king of Sweden, who gave him a commission as vice-admiral in 1643. In this capacity he defeated the Danish fleet near Gottenburg and thus raised the siege of the city. The Danes returned to the struggle with increased forces under the command of King Christiern in person, but they were again defeated,—their admiral being killed and his ship taken. Peace having been concluded between Sweden and Denmark in 1645, Duquesne returned to France. The revolt at Bordeaux, supported as it was by material aid from Spain, gave him the opportunity of at once serving his country and gratifying his long cherished hatred of the Spaniards. In 1650 he fitted out at his own expense a squadron with which he blockaded the mouth of the Gironde, and compelled the city to surrender. For this service he was promoted in rank, and received a gift of the castle and isle of Indre, near Nantes. Peace with Spain was concluded in 1659, and for some years afterwards Duquesne was occupied in endeavours to suppress piracy in the Mediterranean. On the revolt of Messina from Holland, he was sent to support the insurgents, and had to encounter the united fleets of Spain and Holland under the command of the celebrated Admiral De Ruyter.

After several battles, in which the advantage was generally on the side of the French, a decisive engagement took place near Catania, on the 20th April 1676, when the Dutch fleet was totally routed and De Ruyter mortally wounded. The greater part of the defeated fleet was afterwards burned in the harbour of Palermo, where it had taken refuge, and the French thus secured the undisputed command of the Mediterranean. For this important service Duquesne received a letter of thanks from Louis XIV., together with the title of marquis and the estate of Bouchet. Owing to his being a Protestant, however, his professional rank was not advanced. His last achievements were the bombardment of Algiers (1682–3), in order to effect the deliverance of the Christian captives and the bombardment of Genoa in 1684. On the revocation of the Edict of Nantes Duquesne lost his commission, but he was specially excepted from banishment. He died at Paris on the 2d February 1688.

DURAN, AUGUSTIN (1789-1862), one of the leaders of the literary movement in Spain during the present century, was born at Madrid, where his father held the post of court physician. He lost his mother in childhood, and, instead of being educated in the capital, was sent to the seminary at Vergara, rather to gain strength and health than such mathematics and Latin as his clerical teachers could supply. Thence he returned a firm believer in ghosts, and erudite in the traditions of Spanish romance. In 1817 he joined the university of Seville for the study of philosophy and law, and in due course was admitted an advocate at Valladolid. From 1821 to 1823 he held a post in the *direccion general de estudios* at Madrid; but in the latter year he was discarded on account of his political opinions, and it was not till 1834 that he received a new appointment as secretary of the board for the censorship of the press, shortly afterwards supplemented by a post in the National Library at Madrid. The revolution of 1840 again led to his dismissal; but he recovered his position in 1843, and in 1854 attained the rank of director of the library. Next year, however, he retired, and the rest of his life was devoted to his literary work. He died in 1862. It was in 1828, shortly after his first discharge from office, that he published his discourse on the influence which modern criticism had exercised on the ancient Spanish theatre (*Discorso sobre il influjo que ha tenido la critica moderna en la decadencia del teatro antiguo*); and, though the work was anonymous, it produced a marvellous effect on the tendencies of the national drama. He next endeavoured to make better known to his fellow-countrymen those half-forgotten treasures of their literature, in the collection of which he had spared neither money nor toil. Five volumes of a *Romancero general* appeared from 1828 to 1832 (republished, with considerable additions and improvements, in 2 vols. 1849–1851), and *Talia española*, or a collection of old Spanish comedies, in 3 vols., in 1834. As an original poet the author is best known by a poem in imitation of the style of the 15th century, entitled *Las tres toronjas del vergel de amor*, or "The Three Citron Trees of the Orchard of Love."

DURANDUS, WILHELMUS (1237-1296), otherwise DURANTIS or DURANTI, was born at Puimisson, sometimes written Puimoisson, a small town in the diocese of Beziers, in Languedoc, whence he is sometimes described as a native of Provence. He studied law under Bernardus of Parma, in the university of Bologna, where he was promoted to the degree of doctor. He shortly afterwards migrated to the university of Modena, where he became so famous by his lectures on the canon law that he attracted the notice of Pope Clement IV., who appointed him auditor of the palace, and subsequently subdeacon and chaplain. In 1274 he accompanied Pope Gregory X. as his secretary to the Council of Lyons, which is reckoned as the fourteenth general council, and under the pontificates of several subsequent popes filled many highly responsible offices. He was appointed in 1277 spiritual and temporal legate of the patrimony of St Peter under Pope Nicholas III., and in 1278 took possession, in the name of the same Pope, of the provinces of Bologna and Romagna. In 1281 Pope Martin IV. named him vicar spiritual, and in 1283 governor of the temporalities of the two provinces, in which office he had the direction of the war against the rebellious province of Romagna. The town of Castrum Riparum Urbanatium having been burnt down during the war, he rebuilt it, and renamed it Castrum Durantis. Pope Urban VIII. subsequently gave to this town the name of Urbania, which it bears in the present day. Pope Honorius IV. retained Durandus in the same offices until the end of 1286, when his election to the bishopric of Meude, in Languedoc, was the occasion of his retiring for a short time from the conduct of civil affairs. Durandus, however, appears to have remained in Italy, and to have revised at this time several of his works. He refused in 1295 the archbishopric of Ravenna, which was offered to him by Pope Boniface VIII., and accepted in preference the more arduous office of governor of the province of Romagna and of the march of Ancona. The party of the Ghibellines, however, carried on hostilities against the Holy See with so much vigour that he found his strength unequal to the exigencies of government; and, having resigned his office, he retired to Rome, where he died on 1st November 1296.

Durandus was the author of several very learned works. The most famous of them is his *Speculum Judiciale*. This work is entitled in the printed copies, the earliest of which was published at Rome in folio in 1474, as *Speculum Juris*; but all the MSS. have the title of *Speculum Judiciale*; and Durandus himself, in his epistle dedicatory to Cardinal Ottobonus Fiesco, afterwards Pope Adrian V., describes it under this latter title. It is a practical treatise on civil and canon law, and it earned for its author, when young, the surname of the Father of Practice. Durandus is said to have completed it in 1271, at the age of thirty-four, and he revised it some time between 1287 and 1291. It has since his death acquired much celebrity as one of the best sources of the dogmatic history of law, and the canonists are accustomed to cite Durandus under the bye-name of "the Speculator." The original work has been enriched by additions from the pen of John Andreæ in 1346, and by further additions from the pen of Baldus. An alphabetic table of its contents (Inventorium) was drawn up by Cardinal Berenger in 1306, and the *Speculum* passed through thirty-eight editions between 1474 and 1678. The next important work of Durandus is his *Repertorium Aureum* or *Breviarium*, which is dedicated to Cardinal Matthæus; Durandus himself in his preface designates this work by the name of Breviarium, but it is described by him in the Preface to the *Speculum* by the title of *Repertorium Aureum*, under which title it is more generally known. It is supposed to have been composed by Durandus in the interval between the first completion and the revision of the *Speculum*. His *Commentarius in Concilium Lugdunense* is a work of much interest, as Durandus himself drew up the Decretals, which after his death were inserted in the *Sextus*. Durandus also wrote a commentary on the decretals of Pope Nicholas III., which is only known to us from the epitaph on his tomb, as preserved by Sarti, and which enumerates all his chief writings, amongst which may be mentioned his *Speculum Legatorum*, inserted in the *Speculum Judiciale*, his *Rationale Divinorum Officiorum*, which has passed through many editions, the earliest of which was printed at Mayence in 1459, and a copy of which is stated by the Abbé Pascal to have been sold for 2700 francs. A manuscript of his *Pontificale Patrum*, being a treatise on the duties of bishops, is preserved in the National Library of Paris. Durandus the Speculator is sometimes confounded with Durandus of Santo Porciano, bishop of Meaux, who died in 1332, and was the author of two treatises, *De Jurisdictioni* and *De Legibus*, and with Wilhelmus Durandus, his own nephew, who was the author of a work entitled *De modo celebrandi Consilii*, and who died in Cyprus in 1328.

DURANGO, a town of Spain, in the province of Biscay 16 miles south-east of Bilbao, at the confluence of the Durango and the Mañaria. As a military position of some importance it is often mentioned in history; its church of San Pedro de Tavira is one of the earliest in the Biscayan district; and that of Santa Ana has some interesting altars constructed by Ventura Rodriguez in 1774. The inhabitants, who number about 2600, are partly engaged in the manufacture of iron and steel, and carry on a trade with Hamburg in chestnuts. The foundation of the town is ascribed to the early kings of Navarre, and in 1153 it obtained the rank of a countship. The decree by which Don Carlos in 1839 ordered all foreigners taken in arms against him to be shot was issued from Durango.

DURANGO, sometimes called **Ciudad de Victoria**, or **Guadiana**, a city of Mexico, the capital of the state of Durango, lies near the foot of the south-eastern slope of the Sierra Madre, at a height of 6847 feet above the sea, in 24° 25′ N. lat. and 105° 55′ W. long. It is the centre of a Roman Catholic bishopric, and possesses a cathedral, ten parish churches, a hospital, Government-buildings, a penitentiary, a state prison, a bull-ring, and a large cock-pit. Formerly the seat of a Jesuit college, it still maintains an episcopal seminary, and an institute with literary, legal, and scientific departments. It is well supplied with water by thermal and other springs, which not only satisfy the demands of nine public baths, but also fill considerable channels along the streets. Trade is carried on with the northern and north-western states; and, besides a mint, a gold refinery, and other offices connected with the mining operations, there are glass works, printing-presses, and factories for cotton and woollen goods, leather, and tobacco. Durango was founded in 1559 or 1560 by Alonso Pacheco, an officer of the Viceroy Velasco, as a military post for the control of the Chichimecas. It was soon after made an episcopal see, but did not attain any great importance till the discovery of the rich deposits of Guarisamey; and most of its public buildings were erected at the expense of Zambrano, the owner of the mines. In 1783 it had no more than 8000 inhabitants; about 1850 they were estimated at 30,000 or 40,000; in 1868 they were reduced to 12,449.

DURANTE, **Francesco**, a celebrated Italian composer, and one of the founders of the so-called Neapolitan school of music, was born at Frattamaggiore, in the kingdom of Naples, and not, as has been erroneously stated, in the city of that name. The date of his birth is generally given nine years too late. In reality he was born on March 15, 1684. At an early age he entered the Conservatorio dei poveri di Gesù Cristo, at Naples, where he received lessons from Gaetano Greco; but soon he attracted the attention of the celebrated Alessandro Scarlatti, at that time the head and ornament of another great music school of Naples, the Conservatory of St Onofrio. Under him Durante studied for a considerable time, and left him only to go to Rome, where, during further five years, he completed his vocal studies under Pitoni. On his return to Naples he obtained the position of chapel-master at the school of St Onofrio, which he occupied till 1742, when he succeeded Porpora as head of the Conservatorio Sante Maria di Loretto, also at Naples. This post he held for thirteen years, till his death in 1755. His fame as a teacher was all but unrivalled, and the most celebrated masters of the earlier school of Italian opera are amongst his pupils. Only Jomelli, Paesiello, Pergolesi, Piccini, and Vinci may be mentioned here. Under him the Neapolitan school of music reached its climax of celebrity, and it was in this school that the great traditions of Italian vocal art were established, the last remnants of which are rapidly disappearing from the modern stage. As a composer Durante adhered to the severe style of the early Italian masters. The structure of his choral pieces is surpassed by Handel alone amongst his contemporaries. His instrumentation also shows many new and beautiful effects. A complete collection of Durante's works, consisting all but exclusively of sacred compositions, was presented by Selvaggi, a Neapolitan lover of art, to the Paris library. A catalogue of it may be found in Fétis's *Biographie Universelle*. The imperial library of Vienna also preserves a valuable collection of Durante's manuscripts. Two requiems, several masses (one of which, a most original work, is the Pastoral Mass for four voices), and the Lamentations of the Prophet Jeremiah are amongst his most important settings.

DURÃO, **Jose de Santa Ritta**, a Brazilian poet, was born at Marianna, in the province of Minas Geraes, in 1737, and died at Lisbon in 1784. He studied at Coimbra, in Portugal, graduated as a doctor of divinity, became a member of the Augustinian order of friars, and obtained a great reputation as a preacher. Having irritated the minister Pombal by his defence of the Jesuits, he retired from Portugal; and, after being imprisoned in Spain as a spy, found his way to Italy, where he became acquainted with Alfieri, Pindemonte, Casti, and other literary men of the time. On his return to Portugal he delivered the opening address at the university of Coimbra for the year 1778; but soon after retired to the cloisters of a Gratian convent. At the time of his death he taught in the little college belonging to that order in Lisbon. His principal poem, entitled *Caramuru, poema epico do descubrimento da Bahia*, appeared at Lisbon in 1781, but proved at first a total failure. Its value has gradually been recognized, and it now ranks as one of the best poems in Brazilian literature—remarkable especially for its fine descriptions of scenery and native life in South America. The historic institute of Rio de Janeiro offered a prize to the author of the best essay on the legend of Caramuru; and the successful competitor published a new edition of Durão's poem. There are two French translations, one of which appeared in 1829 in 3 vols. 8vo.

See Adolfo de Varnhagen, *Epicos Brazilleros*, 1845; Pereira da Silva, *Os Varões illustres do Brasil*, 1858; Wolf, *Le Brésil littéraire*, Berlin, 1863.

DURAZZO, the ancient *Dyrrachium*, or *Epidamnus*, in Turkish Dratsh, and in Slavonian Durtz, a seaport town of European Turkey, in Albania, about fifty miles south of Scutari, on the eastern shore of the Adriatic. It is the seat of a Roman Catholic bishop and a Greek archbishop, but in every respect has greatly declined from its former prosperity. The walls are dilapidated; plantain trees are growing on the gigantic ruins of its old Byzantine citadel; and its harbour, once equally commodious and safe, is gradually becoming silted up. The only features worthy of notice are the quay, with its rows of cannon, and the bridge, 750 feet long, which leads across the marshy stretch along the coast. Such trade as it still possesses is mainly carried on with Trieste, and consists in the export of grain, skins, wool, wood, and leeches. The population is estimated at 9000.

DURBAN, or more correctly **D'Urban**, a town of South Africa, in Natal, in the county of Durban, situated on a sandflat about a mile to the north of the bay of Port Natal, in 29° 52′ S. lat. and 31° 2′ E. long. It is well laid out with wide tree-shaded streets, carries on a considerable export and import trade, and possesses an Episcopalian church, two Wesleyan chapels (one for natives and the other for Europeans), a Government school, a prison, a custom-house, a literary institution, and an agricultural and horticultural society. Durban was founded in 1834 as the capital of the republican colony of Victoria, and its name was bestowed in honour of Sir Benjamin D'Urban, the governor of the Cape. The population, mostly English, was in 1866, 4991.

DÜREN, a town of Prussia, at the head of a circle in the province of the Rhine, on the right bank of the Roer, at a railway junction eighteen miles east of Aix-la-Chapelle. Besides two Roman Catholic and two Protestant churches, it possesses three nunneries, a gymnasium, a mining school, and a blind asylum—the Elizabeth Institution—which was founded in 1845 and in 1863 was made a provincial establishment. Woollen goods, paper, and needles are manufactured on an extensive scale; and flax-spinning, felt-weaving, wire-weaving, rail-casting, and zinc-rolling are also carried on.

Düren is probably to be identified with the Marcodurum of the Ubii, where they were defeated by Civilis in 69 A.D. It received from Charlemagne the rank of an imperial city, and its claims were confirmed by Rupert in 1407. Pawned by Frederick II. to Count William of Juliers as security for the payment of a debt, it was ultimately incorporated with the duchy of Juliers. Its name frequently occurs in the history of the Palatinate. Population in 1875, 14,542.

DÜRER, Albrecht (1471–1528), was born at Nuremberg on the 21st of May 1471; he was therefore six years older than Titian and twelve years older than Raphael. In the history of art, Albert Dürer has a name equal to that of the greatest of the Italians. North of the Alps, his only peer was Holbein. But Holbein was not born till 1497, and lived after 1525 principally in England; hence in youth he came within the influence of the already matured arts of Italy, and in manhood his best powers were concentrated on the painting of portraits in a foreign country. Dürer lived a German among Germans, and is the true representative artist of that nation. All the qualities of his art—its combination of the wild and rugged with the homely and tender, its meditative depth, its enigmatic gloom, its sincerity and energy, its iron diligence and discipline—all these are qualities of the German spirit. And the hour at which Dürer arose to interpret that spirit in art was the most pregnant and critical in the whole history of his race. It was the hour of the Renaissance, of the transition between the Middle Ages and our own. The awakening of Germany at the Renaissance was not, like the other awakening of Italy at the same time, a movement merely intellectual. It was, indeed, from Italy that the races of the North caught the impulse of intellectual freedom, the spirit of science and curiosity, the longing retrospect towards the classic past; but joined with these, in Germany, was a moral impulse which was her own, a craving after truth and right, a rebellion against tyranny and corruption, an assertion of spiritual independence—the Renaissance was big in the North, as it was not in the South, with a Reformation to come. The art of printing was invented at the right time to help and hasten the new movement of men's minds. Nor was it by the diffusion of written ideas only that the new art supplied the means of popular enlightenment. Along with word-printing, or indeed in advance of it, there had come into use another kind of printing, picture-printing, or what is commonly called engraving. Just as books, or word-printing, were the means of multiplying, cheapening, and disseminating ideas, so engravings, or picture-printing, were the means of multiplying, cheapening, and disseminating images which gave vividness to the ideas, or served, for those ignorant of letters, in their stead. Technically, the art of engraving was a development of the art of the goldsmith or metal-chaser. Between the art of the goldsmith and the art of the painter there had always been a close alliance, both being habitually exercised by persons of the same family and sometimes by one and the same person; so that there was no lack of hands ready trained, so to speak, for the new art which was a combination of the other two, and required of the man who practised it that he should design like a painter and cut metal like a goldsmith. The engraver on metal habitually cut his own designs; whereas designs intended to be cut on wood were usually handed over to a class of workmen—*Formschneider*—especially devoted to that industry. Both kinds of engraving soon came to be in great demand. Independently of the illustration of written or printed books, separate engravings, or sets of engravings, were produced, and found a ready sale at all the markets, fairs, and church-festivals of the land. Subjects of popular devotion predominated. Figures of the Virgin and child, of the apostles, the evangelists, the fathers of the church, the saints and martyrs, with illustration of sacred history and the Apocalypse, were supplied in endless repetition to satisfy the cravings of a pious and simple-minded people. But to these were quickly added subjects of allegory, subjects of classical learning—confused mythologies of Hercules, Satyr, and Triton—subjects of witchcraft and superstition, subjects of daily life, scenes of the parlour and the cloister, of the shop, the field, the market, and the camp; and lastly portraits of famous men, with scenes of court life and princely pageant and ceremony. The emperor Maximilian himself, chivalrous, adventurous, ostentatious, on fire with a hundred ambitions, and above all with the desire of popular fame, gave continual employment to the craftsmen of Augsburg and Nuremberg in designing and engraving processional and historical representations, which were destined to commemorate him to all time in his double character of imperial lawgiver and hero of romance. So the new art became the mirror, for all men to read, of all the life and thoughts of the age.

The genius of Albert Dürer cannot be rightly estimated without taking into account the position which the art of engraving thus held in the culture of his time. He was, indeed, first of all a painter; and though in his methods he was too scrupulous and laborious to produce many great works, and though one of his greatest, the Assumption of the Virgin, has been destroyed by fire, and another, the Feast of Rose-Garlands, has suffered irreparably between injury and repair, yet the paintings which remain by his hand are sufficient to place him among the great masters of the world. He has every gift in art except the Greek and the Italian gift of beauty or ideal grace. In religious painting, he has profound earnestness and humanity, and an inexhaustible dramatic invention; and the accessory landscape and scenery of his compositions are more richly conceived and better studied than by any painter before him. In portrait, he is equally master of the soul and body, rendering every detail of the human superficies with a microscopic fidelity, which nevertheless does not encumber or overlay the essential and inner character of the person represented. Still more if we judge him by his drawings and studies, of which a vast number are preserved in private as well as public collections, shall we realize his power in grasping and delineating natural fact and character, the combined gravity and minuteness of his style, the penetration of his eye, and the almost superhuman patience and accuracy of his line in drawing, whether from persons, animals, plants, or landscape, whether with pen, pencil, charcoal, or (which was his favourite method) in colour with the point of the brush. But neither his paintings nor his drawings could by themselves have won for him the immense popular fame and authority which have been his from his own time to ours; that fame and that authority are due to his pre-eminence in the most popular and democratic of the arts, that of which the works are accessible to the largest number, the art of engraving. In an age which drew a large part of its intellectual nourishment from engravings, Dürer furnished the most masterly examples both of the refined and elaborate art of the metal engraver, as well as the most striking inventions for the robust and simple art of the wood engraver.

The town of Nuremberg in Franconia, in the age of Dürer, was a home most favourable to the growth and exercise of his powers. Of the free imperial cities of central Germany, none had a greater historic fame, none a more settled and patriotic government, none was more the favourite of the emperors, none was the seat of a more active

ıd flourishing commerce. Nuremberg was the great mart
ır the merchandise that came to central Europe from the
ast through Venice and over the passes of the Tyrol.
he held not only a close commercial intercourse, but also
close intellectual intercourse, with Italy. Without being
forward as the neighbour city of Augsburg to embrace
e architectural fashions of the Italian Renaissance,—nay,
ntinuing to be profoundly imbued with the old German
ırgher spirit, and to wear, with an evidence which is
nost unimpaired to this day, the old German civic
pect,—she had imported, before the close of the 15th
ıtury, much of the new learning of Italy, and numbered
ıong her citizens a Willibald Pirkheimer, a Sebald
hreyer, a Hartmann Schedel, and others fit to hold a
ıce in the first rank of European humanists. The life
o which Albert Dürer was born was a grave, a devout, a
-loving, and a lettered life, in the midst of a community
voted to honourable commerce and honourable civic
ivities, proud of its past, proud of its wealth, proud of
liberties, proud of its arts and ingenuities, and abound-
; in aspects of a quaint and picturesque dignity. His
nily was not of Nuremberg descent, but came from the
lage of Eytas in Hungary. The name, however, is
rman, and the family bearing—an open door—points
an original form of *Thürer*, meaning a maker of doors,
carpenter. Albrecht Dürer the elder was a goldsmith
trade, and settled soon after the middle of the 15th
ıtury in Nuremberg. He served as assistant under a
ster goldsmith of the city, Hieronymus Holper, and
sently married his master's daughter, Barbara. This
s in 1468, the bridegroom being forty and the bride
een years of age. They had eighteen children, of whom
bert was the second. The elder Dürer was an esteemed
ftsman and citizen, sometimes, it seems, straitened by
claims of his immense family, but living in virtue and
nour to the end of his days. The accounts we have of
n proceed from his illustrious son, who always speaks
h the tenderest reverence and affection of both his
ents, and has left a touching narrative of the deathbed
each. He painted the portrait of his father twice, once
ut 1490, the second time in 1497. The former of these
pieces is in the Uffizj at Florence; the latter, well
wn by Hollar's engraving, is in the possession of the
ke of Northumberland. A third "Portrait of his Father"
Dürer, in the gallery at Frankfort, is probably so called
error. The young Albert was his father's favourite son.
ly father," these are his own words, "took special delight
me. Seeing that I was industrious in working and
ning, he put me to school; and when I had learned to
d and write, he took me home from school and taught
the goldsmith's trade." By-and-by the boy found
ıself drawn by preference from goldsmith's work to
ıting; and after some hesitation, his father at first
osing his wishes on the ground of the time already
ıt in learning the former trade, he was at the age of
en and a half apprenticed for three years to the
ıcipal painter of the town, Michael Wohlgemuth.
hlgemuth furnishes a complete type of the German
ıter of that age. At the head of a large shop with
ıerous assistants, his business was to turn out, generally
a small price, devotional pieces commissioned by
cantile corporations or private persons to decorate their
pels in the churches,—the preference being usually for
ıes of our Lord's Passion, or for tortures and martyrdoms
he saints. In work of this class, the painters of upper
many before the Renaissance show considerable
ınical knowledge, and a love of rich and quaint costumes
of landscape, but in the human part of their representa-
s often a grim and debased exaggeration, transgressing
ounds in the grotesqueness of undesigned caricature.
Wohlgemuth and his assistants also produced woodcuts for book illustration, and probably—though this is a vexed question—engravings on copper. In this school Dürer learnt much, by his own account, but suffered also not a little from the roughness of his companions. At the end of his term under Wohlgemuth, he entered upon the usual course of travels—the *Wanderjahre*—of a German youth. The direction of these travels we cannot retrace with certainty. It had been at one time his father's intention to apprentice him to Martin Schongauer, of Colmar in Alsace, incomparably the most refined German painter and engraver of his time. To Colmar, among other places, Albert Dürer went in the course of his travels; but Schongauer had already died there in 1488. We also hear of him at Strassburg. It is a moot point among biographers whether towards the end of his *Wanderjahre*—about the year 1494—the young Dürer did or did not cross the Alps to Venice. On the one hand it is argued that he did; first, because, on the occasion of an undoubted visit to Venice in 1506, he speaks of admiring no longer that which he had vastly admired "eleven years before;" secondly, because several careful drawings by his hand from the engravings of Mantegna and other Italian masters, bearing the date 1494, show that in this year he was making a special study of Italian art; and thirdly, because he has left a number of coloured drawings of the scenery of Tyrol, such as he would have to traverse on the road between Bavaria and Venice, and these show a technical finish and minuteness of execution, characteristic of his studies at this early period but not later. Those who do not believe in this early visit to Venice reply, first, that the allusion interpreted as above in Dürer's correspondence is too vague and uncertain, and that what Dürer, in 1506, had really "admired eleven years ago" was probably not the work of Venetians seen at Venice, but of a Venetian artist known as Jacopo de' Barbari, or Jacob Walch, who resided about that time in Nuremberg, and who, we know, had a very considerable influence on the art of Dürer; secondly, that the prints of Mantegna and other Italians, undoubtedly copied by Dürer in 1494, may very well have been brought to Germany with other wares on sale from Venice, or have been shown him by the same Jacopo de' Barbari; and thirdly, that other landscapes, bearing the date of 1506 or later dates, do in fact show the same technical characteristics as those which are assigned, by the other side in the argument, to 1494. The question will probably remain open to the end. With reference, however, to the third head of the argument, the character of Dürer's early landscape work, it has not been sufficiently observed that his ideal of scenery shows itself fully formed and developed by the time of the publication of his Apocalypse woodcuts and his earliest engravings on copper, that is, about the year 1497: that this ideal background, of a lake with castled and wooded headlands sloping down from either side, and sloops afloat in the distance, is taken not from the neighbourhood of Nuremberg but from the northern borders of Tyrol—it is the scenery, not of the banks of the Pegnitz nor even the Danube, but rather of the Würmsee or the Tegernsee; that to the alps and lakes, therefore, of the Northern Tyrol, whether on his way to Venice or otherwise, Dürer must certainly have come during these travels of his youth.

At the end of May 1494, being twenty-three years old, Albert Dürer returned, at his father's summons, to his native Nuremberg, and within two months was married to Agnes, the daughter of a well-to-do merchant of the town named Hans Frey. It is probable that the marriage had been arranged between Hans Frey and the elder Dürer while Albert was on his travels: and possible that a portrait of the young painter very richly habited, executed by himself, in the previous year 1493, and showing him in the first bloom of that admirable manly beauty for which he was afterwards renowned, may have been destined to recommend him to the good graces of the lady. Their marriage was childless. Agnes survived her husband. The petulance of an old friend of her husband's has unjustly blackened her reputation. Her name has for centuries been used to point a moral, and among the unworthy mates of great men the wife of Dürer was as notorious as the wife of Socrates. The origin of this tradition must be sought in a letter written a few years after Dürer's death by his close friend and life-long companion, Willibald Pirkheimer, in which Pirkheimer accuses Agnes of having plagued her husband to death with her parsimonious ways, of having made him over-work himself for money's sake, of having given his latter days no peace. But a closer study of facts and documents shows that there is not a jot of evidence to support these splenetic charges. Pirkheimer, when he made them, was old, broken with gout, and disgusted with the world, and the immediate occasion of his outbreak was a fit of peevishness against the widow because she had not let him have a pair of antlers—a household ornament much prized in those days—to which he fancied himself entitled out of the property left by Dürer. On the other hand, there is abundant evidence of the close confidence and companionship that subsisted between Dürer and his wife; she accompanied him on his journey to the Low Countries in 1521; after his death she behaved with peculiar generosity to his brothers; it is perfectly probable that Dürer had in her a kind and beloved as well as a careful partner; the old legend of his sufferings at her hands must be regarded as completely discredited. So far from being forced to toil for money to the end, he died well off, though he had in his latter years occupied himself more and more with unremunerative pursuits—with the theoretical studies of Perspective, Geometry, Fortification, Proportion, for which he shared the passion of Leonardo, and on which, like Leonardo, he has left written treatises.

For more than eleven years after his marriage, Dürer lived at Nuremberg the settled and industrious life of his profession. Within this period his masterly powers unfolded and matured themselves. Two important devotional pictures are attributed to his early practice; one a large triptych painted in tempera on linen, now in the gallery at Dresden, the other also an altar-piece with wings, now in the summer palace of the archbishop of Vienna at Ober St Veit; both probably painted for the Elector Frederick of Saxony. These pictures have been executed, like those of Wohlgemuth, hastily, and with the help of pupils. (Of painters trained in the school of Dürer, we know the names and characters of Schaüfelein, Springinklee, Hans Baldung Grün, and Hans of Culmbach). A finer, and somewhat later, example of the master's work in this class is the altar-piece painted for the family of Baumgartner, having a Birth of Christ in the centre and the figure of a knight on either side; this is now at Munich. The best of Dürer's energies, both of mind and hand, must have been given in these days to the preparation of his sixteen great woodcut designs for the Apocalypse. The first edition illustrated with this series appeared in 1498. The Northern mind had long dwelt with eagerness on these mysteries of things to come, and among the earliest block-books printed in Germany is an edition of the Apocalypse with rude figures. But Dürer not only transcends all efforts made before him in the representation of these strange promises, terrors, and transformations, these thaumaturgic visions of doom and redemption; the passionate energy and undismayed simplicity of his imagination enable him, in this order of creations, to touch the highest point of human achievement. The four angels keeping back the winds that they blow not; the four riders; the loosing of the angels of the Euphrates to slay the third part of men; these and others are conceptions of such force, such grave or tempestuous grandeur in the midst of grotesqueness, as the art of no other age or hand has produced. At the same time, Dürer was practising himself diligently in the laborious art of copper engraving. In the years immediately about or preceding 1500, he produced a number of plates of which the subjects are generally fanciful and allegorical, and the execution is more or less tentative and uncertain. Of several of these, other versions exist by contemporary masters, and it is disputed in most of such cases whether Dürer's version is the original, or whether, being at that time young and comparatively unknown, he did not rather begin by copying the work of older men; in which case, the originals of such engravings would have to be sought in versions bearing other signatures than Dürer's. One signature of frequent occurrence on German engravings of this time, and among them, on several subjects which are also repeated by Dürer's hand, is the letter W. As to the identity of this W, criticism is much divided. He has been generally identified with one Wenzel of Olmütz, whom we know to have engraved copies after Martin Schongauer and other masters. Others, again, attribute some at least of the prints signed W to Dürer's teacher Wohlgemuth, and when the same composition is found engraved by each of the two masters, conclude that the younger has copied the work of the elder. Instances are the subjects of the Four Naked Women with Death and the Fiend; the Old Man's Dream of Love; the Virgin and Child with the Ape, &c. The question is difficult to decide. It seems certain that the work of several different hands is signed with this same initial W; and we are of those who hold that, of the engravers so signing, one, whether Wohlgemuth or not, is a very accomplished master, whose work Dürer, until near the age of thirty, was in the habit of occasionally copying. From another master, again, whose name we have already mentioned, the half Venetian half German Jacopo de' Barbari, Dürer learned much. The Italians had already begun to work out a science of the human structure and of ideal proportions; and from Jacopo de' Barbari, as Dürer himself tells us, he received in youth the first hints of this science; which he subsequently investigated for himself with his usual persistent industry. These early notions received from Jacopo de' Barbari led to one immediate result of value, the famous engraving of Adam and Eve published in 1504. The figures here, as we can see by many preparatory sketches, are planned on geometrical principles, not drawn—as was the common German custom, and Dürer's own in a large majority of his works—direct from the model, with all the crudities of the original faithfully delineated. The background of foliage and animals is a miracle of rich invention and faithful and brilliant execution; the full powers of Dürer as an engraver on copper are here for the first time asserted. In another elaborate engraving which probably soon followed this—the Great Fortune or Nemesis—the opposite principle is observed; above a mountain valley, of which every detail is rendered in bird's eye view with amazing completeness, an allegorical figure of a woman rides upright upon the clouds, bearing a cup in one hand and a bridle in the other; in her countenance and proportions there is nothing ideal, there is the most literal and graceless commonness. In his own journals Dürer calls this plate *Nemesis;* it has been conjectured that the piece was composed in allusion to the unfortunate expedition sent by the emperor Maximilian to Switzerland, in which a number of Nuremberg citizens took part, with Pirkheimer at their head. In the meantime Dürer had been variously exercising his inexhaustible power of dramatic invention on the subjects of Christian story. He had completed the set of drawings of the Passion

, in white on a green ground, which is known
Green Passion, and forms one of the treasures
ılbertina at Vienna. He had followed up his
ɔdcut series of the Apocalypse with preparations
series on a similar scale, and had finished seven
welve subjects for the set known as the Great
and sixteen out of twenty for the Life of the
hen his work was interrupted by a journey which
the principal episodes in his life. In the autumn
ar 1505 he went to Venice, and stayed there until
nn of the following year.

:casion of this journey has been erroneously stated
i. Dürer's engravings, having by this time attained
ɔopularity both north and south of the Alps, had
be copied by various hands, and among others by
rated Marcantonio of Bologna, then in his youth.
g to Vasari, Marcantonio, in copying Dürer's
the Little Passion on Wood, had imitated the
monogram, and Dürer, indignant at this fraud,
or Italy in order to protect his rights, and having
ı complaint against Marcantonio before the
of Venice, carried his point so far that Marc-
was forbidden in future to add the monogram
to copies taken after his works. This account
ɔear examination. Chronological and other proofs
.t if such a suit was fought at all, it must have
connection with another set of Dürer's woodcuts,
sixteen of the Great Passion on Wood. Dürer
ı number of whose familiar letters written from
his friend Pirkheimer at Nuremberg are preserved,
mention of anything of the kind. Nevertheless
g of the kind may probably have been among the
hich determined his journey. Other causes, of
have explicit record, were an outbreak of sickness
ıberg; Dürer's desire, which in fact was realized,
; a good market for the proceeds of his art; and the
also realized, of a commission for an important
om the German community settled at Venice, who
caused an exchange and warehouse—the *Fonduco*
chi—to be built on the Grand Canal, and who
desirous to dedicate a picture in the church of St
new. The picture painted by Dürer on this com-
vas the Adoration of the Virgin, better known as
of Rose-Garlands; it was subsequently acquired
nperor Rudolf II., and carried as a thing beyond
on men's shoulders to Vienna; it now exists
ıtly injured state in the monastery of Strachow,
gue. It is one of Dürer's best conceived and
ultitudinous compositions, and one in which
.t rivalling the richness and playfulness of Italian
ıer pictures probably painted by him at Venice
t disputing with the Doctors, now in the Palazzo
at Rome, Christ Crucified, in the gallery at
and a Madonna and Child in the possession of
hian. These works of the German master were
ut influence upon the Italian painters resident at
n influence which we can distinctly trace in some
ly works of Titian. Dürer's letters testify to the
tion he held at Venice, and speak of the jealousy
wards him by some of the meaner sort of artists,
ship and courtesy by the nobler sort, and especially
ɔblest of all, the veteran Giovanni Bellini. He
he honour and wealth in which he might live if he
ısent to abandon home for Italy, of the Northern
nd how it will make him shiver. Yet he resisted
tions of the South, and was in Nuremberg again
close of 1506. First, it seems, he had made an
to Bologna, having intended to take Mantua on
in order to do homage to the old age of that
aster, Andrea Mantegna, from whom he had himself in youth learnt the most. But the death of Mantegna prevented this purpose.

From the winter of 1506 until the summer of 1520, Dürer was again a settled resident in his native town. During these years his genius and his fortunes were at their height. Except the dazzling existence of Raphael at Rome, the annals of art present the spectacle of no more honourable or more enviable career. Dürer's fame had spread all over Europe. From Antwerp to Rome his greatness was acknowledged, and artists of less invention, among them some of the foremost on both sides of the Alps, were not ashamed to borrow from his work this or that striking combination or expressive type. He was on terms of friendship or friendly communication with all the first masters of the age, and Raphael held himself honoured in exchanging drawings with Dürer. In his own country, all orders of men, from the emperor Maximilian down, delighted to honour him; he was the familiar companion of chosen spirits among statesmen, humanists, and reformers, and had the power to bind to himself with the links of a more than brotherly friendship the leading citizen of the leading city of Germany, Willibald Pirkheimer. His temper and his life were singularly free from all that was jarring, jealous, or fretful. The burgher life of even this, the noblest German city, seems narrow, quaint, and harsh beside the grace and opulence and poetry of Italian life in the same and the preceding generation; but among its native surroundings, the career of Dürer stands out with an aspect of ideal elevation and decorum which is its own. He is even distinguished from his fellow citizens by the stately beauty of his aspect and the rich elegance of his attire. Every reader will be familiar with the portrait in which he has represented himself at this middle period of life—the nobly formed oval countenance, with the short beard, and the long carefully divided locks curled and flowing over either shoulder, the upright brow, the stedfast penetrating gaze of the large perfectly cut eyes, the long nose somewhat aquiline, and full perfectly cloven mouth, the strong delicate fingers playing with the rich fur lappet of his cloak.

These years of Dürer's life can best be divided according to the several classes of work with which, during their succession, he was principally occupied. During and after his residence at Venice, he had come to disuse the traditional German practice of painting with the help of a whole school of assistants and apprentices. The first six years after his return, from 1506 to 1512, are pre-eminently the painting years of his life; in them, working with infinite preliminary pains, and, as it seems almost entirely with his own hands, he produced what are accounted his four capital works,—the Adam and Eve, painted in 1507; of this it has been disputed whether a version at Madrid or one in the Pitti Palace at Florence is the original; the Ten Thousand Martyrs of Nicomedia, painted for the elector Frederick of Saxony in 1508, and now in the imperial gallery at Vienna; a rich altar-piece representing the Assumption of the Virgin, with portraits of the donor and his wife and other accessory subjects, executed for Jacob Heller, a merchant of Frankfort, in 1509—this was afterwards replaced, at Frankfort, by a copy, and the original transported to Munich, where it perished by fire in 1674; and lastly, the Adoration of the Trinity by all the Saints, a composition of many figures commissioned for a chapel dedicated to All Saints in an almshouse for decayed tradesmen at Nuremberg, and completed in 1511—this is now one of the glories of the Belvedere at Vienna. In this same year, 1511, Dürer brought out his three great woodcut books in folio form together—the Apocalypse in a second edition, the Great Passion, and the Life of the Virgin for the first time complete. In 1512, he painted two pictures for his native town, the historical portraits of Charlemagne and the emperor Sigismund, which are now to be seen in the Germanic Museum of Nuremberg. The two or three years next following this are for Dürer years, above all things, of engraving on metal. Of the sixteen pieces composing the Little Passion on Copper, perhaps the best invented and certainly the most brilliantly executed of all his gospel histories, ten were executed in 1512 and the last six in 1513. Of the many devotional figures of the Virgin and Child cut on copper by Dürer at various times of his career, several of the most pathetic and carefully finished date from about the same time. Now, also, he began to repeat with greater persistency the experiment, which he had first tried some years before, of working by the method, then newly invented, of the etcher; that is, of biting the lines of his drawing with acid upon metal instead of cutting them with the burin. And these, again, are the years of those three master-pieces of his mind and hand, the Melancholia, the Knight with Death and the Devil, and the St Jerome reading in his Cell. Those engravings are too well known to need description. The first two, by their earnest and enigmatic significance, have fascinated minds of every class, and given rise to an infinity of discussion. It is nearly certain that in these three plates, of almost the same size, date, and manner, and of equal technical perfection, we have three out of four projected illustrations of the Human Temperaments, as they were divided by mediæval science—the Melancholic, the Sanguine, the Phlegmatic, and the Choleric. Melancholy being intended to stand at the head of the series (although it is dated 1513, and the Knight 1512), has the numeral I. written after the name Melancholia; the winged genius, in whom the qualities of this temperament are incarnated, is seated darkly musing among symbolic instruments of science. She seems an incarnation of the new spirit of the age, the spirit of solemn and resolute search. The subject of the Knight, being intended to illustrate the sanguine temperament, has the initial S written in the corner. To some students this stedfast rider has seemed a type of the righteous man undismayed by the powers of darkness that beset him, to others of the evil man whom fate and retribution are about to overtake at last. Some have read the initial S as designating one one of the first soldiers of the Reformation, Franz von Sickengen; others as designating one of the most infamous of robber nobles, Sparnecker. But indeed the subject is not thus definitely to be interpreted in either sense; the piece is but one, and the most pregnant and impressive, interpret it how you will, of the thousand emblems with which the Northern imagination in this age commemorated the power of Death, and proclaimed how he is for ever dogging at the heels of strong and weak, the just man and the unjust alike. St Jerome, the Father of the church to whom Renaissance Christianity turned with the greatest devotion, and whom the labours of Erasmus had made familiar in especial to the humanists of the North, serves as the natural type of the phlegmatic or student temperament. No fourth subject seems to have been attempted to complete the set. The reason of this may have been the call which at this time began to be made on Dürer's industry by another kind of work. The five years between 1514 and 1519 are devoted above all things to woodcut work, on commission from the emperor Maximilian, who had resided for some time at Nuremberg in 1512, and whose personal favour and friendship Dürer from that time enjoyed. With the learned co-operation of Johannes Stabius, he presently commenced a scheme of design for wood engraving in honour of Maximilian more vast and laborious than either Burgkmair's schemes of illustration to the *Weisskunig* or Schäufelein's to the *Theuerdank*. This is the prodigious work known as the Gate of Honour; on it, and on the Car of Honour, and on portions of the Triumphal Procession, all of which belonged to the same great scheme (other portions of the Procession being the work of Burgkmair) Dürer was chiefly engaged for four or five years. One of the most delightful memorials of his activity in the service of the emperor is the famous *Prayer-Book of Maximilian*, a volume decorated by Dürer's hand with marginal arabesques of an inexhaustibly quaint and various invention, this is now preserved at Munich, and is known by more than one modern edition published in facsimile. His few paintings remaining from this period show a manifest falling off in finish and completeness from those of the period just preceding. In 1518 the Diet of Augsburg brought Maximilian to that city, and there Dürer was in attendance on him. A [illegible] portrait drawn in charcoal, and subsequently used for an engraving in wood, carries a note in the artist's handwriting to the effect that it was done from the emperor at Augsburg "in his little room up at the top in the palace."

In 1519 Maximilian died. In the next year the desire of Dürer to secure from his successors a continuance of the patronage and privileges granted during his lifetime, together with an outbreak of sickness in Nuremberg, gave occasion to the master's third and last journey from his home. On the 12th of July 1520 he set out for the Netherlands, with his wife and her maid, in order to be present at the coronation of the young emperor Charles V., and if possible to conciliate the good graces of the all-powerful regent Margaret. In the latter part of his aim Dürer was but partially successful. His diary of his travels enables us to follow his movements almost day by day. He travelled by the Rhine to Cologne, and thence by road to Antwerp, where he was splendidly received and lived in whatever society was most distinguished, including that of Erasmus of Rotterdam. Many portrait drawings of persons who sat to him in these days are preserved. Besides going to Aachen for the coronation, he made excursions down the Rhine from Cologne to Nimeguen, and back overland by Herzogenbusch; to Brussels; to Bruges and Ghent; and to Zealand with the object of seeing a natural curiosity, a whale reported ashore. The vivid account of this last expedition given in his diary contrasts with the usual dry entries of interviews and disbursements. A still more striking contrast is the passionate outburst of sympathy and indignation with which, in the same diary, he comments on the supposed kidnapping of Luther by foul play on his return from the Diet of Worms. Without being one of those who in his city took an avowed part against the old ecclesiastical system, and probably without seeing clearly whither the religious ferment of the time was tending—without, that is, being properly speaking a Reformer—Dürer in his art and all his thoughts was the incarnation of those qualities of the Teutonic character and the Teutonic conscience which resulted in the Reformation; and personally, with the fathers of the Reformation he lived in the warmest sympathy.

On the 12th of July 1521 Dürer reached home again. The remaining seven years of his life were occupied chiefly with the preparation of the scientific writings of which we have already spoken; with engraving on copper, in a style of consummate care and power, several portraits of his friends, among them the elector Frederick, Pirkheimer, Erasmus, and Melanchthon; and with the execution of those two paintings by which, perhaps, his powers in the highest branch of his art are best known, the figures of St Paul with St Mark and St John with Peter. These are now in the Munich gallery, and exhibit at their greatest Dürer's earnest and pregnant conception of character, with a majesty in the types and a grandeur in the gesture and drapery which in his earlier career he had never yet attained. Each apostle or evangelist represents a "temperament,"—John the melancholic, Peter the phlegmatic, Paul the sanguine

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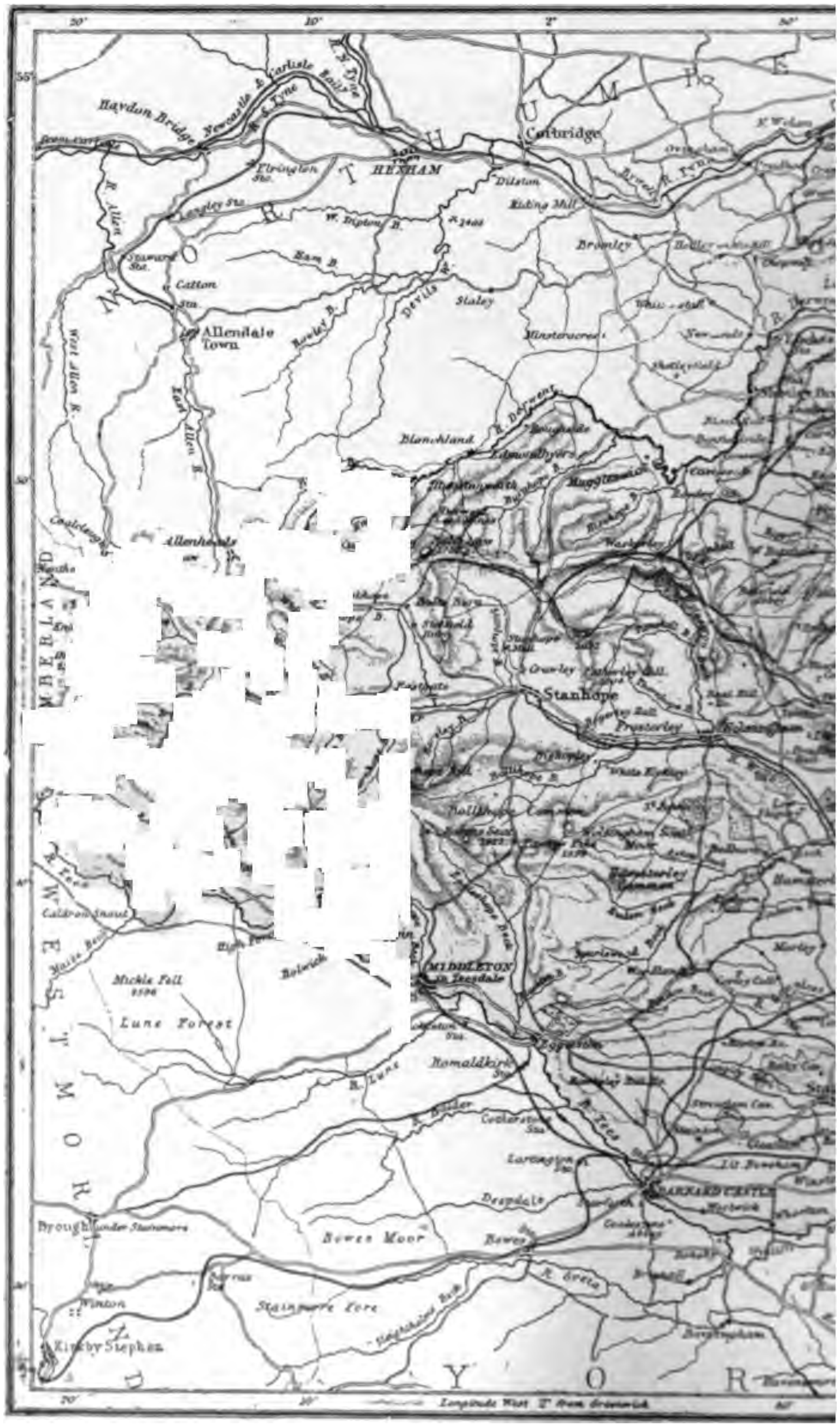
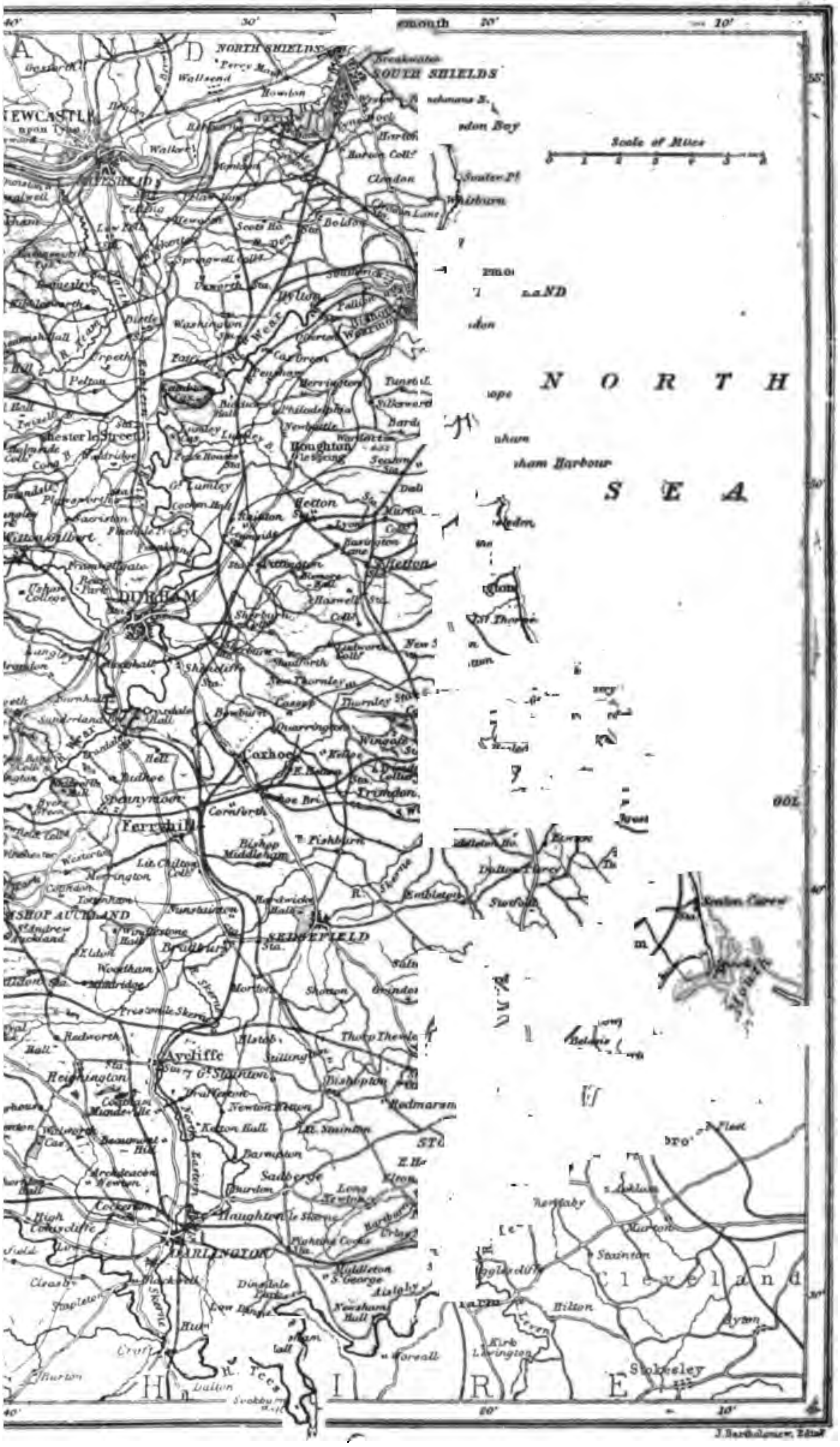

Haydon Bridge
Newcastle & Carlisle Rail.
R. Tyne
Corbridge
HEXHAM
Fourstones
Langley Sta.
Dilston
Riding Mill
R. Allen
Staward Sta.
Catton
Allendale Town
Rowley B.
Devils W.
Staley
Bromley
Minsteracres
R. Derwent
Blanchland
Edmundbyers
Muggleswick
Allenheads
West Allen R.
East Allen R.
Stanhope
Frosterley
Wolsingham
Rookhope B.
Stanhope Park
Hamsterley Common
Caldron Snout
Maize Beck
Mickle Fell 2596
Lune Forest
MIDDLETON in Teesdale
Romaldkirk
R. Lune
R. Balder
Cotherstone Sta.
Lartington Sta.
BARNARD CASTLE
Egglestone Abbey
Deepdale
Bowes Moor
Bowes
R. Greta
Stainmore Fore
Brough under Stainmore
Winton
Kirkby Stephen
N O R T H U M B E
D U R H A M
C U M B E R L A N D
W E S T M O R L A N D
Y O R
Longitude West 2° from Greenwich
20'
10'
2°
50'
55°
50'
40'
30'

PLATE V.


NORTH SHIELDS
SOUTH SHIELDS
NEWCASTLE upon Tyne
GATESHEAD
DURHAM
Chester le Street
Houghton
Hetton
Coxhoe
Ferryhill
BISHOP AUCKLAND
SEDGEFIELD
Aycliffe
Heighington
DARLINGTON
Sadberge
Stokesley
Cleveland
Scale of Miles
NORTH SEA
J. Bartholomew, Edin.

ark the choleric; and it is characteristic of Dürer's
it that Peter is put in the background, studying off
: held open by John, the favourite evangelist of the
nation and of Luther; in this representation of
some have recognized the features of Melanchthon;
eness to the poet Schiller is a coincidence much more
ıs. These various classes of work were carried on
face of failing health. In the canals of the Low
ries Dürer had caught a fever, of which he never
off the effects. The evidence of this we have in
vn written words, as well as in a sketch which he
to indicate to some doctor with whom he was in
pondence the seat of his suffering; and again, in
cord of his physical aspect—the shoulders already
hat bent, the features somewhat gaunt, the old pride
abundant locks shorn away—which is preserved in
rait engraved on wood just after his death, from a
ıg made no doubt not long previously. That death
suddenly, so suddenly that there was no time to call
arest friends to his bedside, on the night of the 6th
ril 1628. Dürer was buried in the vault belonging
wife's family, but since disturbed, in the burying-
l of St John at Nuremberg. He left a name that
honoured by the latest posterity, and a place that
g could fill in the affections of his noblest contem-
s. This is the grave and feeling *Requiescat* of Luther,
tter written to their common friend, Eoban Hesse:—
or Dürer, assuredly affection bids us mourn for one
as the best of men, yet you may well hold him happy
e has made so good an end, and that Christ has taken
om the midst of this time of troubles, and from yet
r troubles in store, lest he, that deserved to behold
g but the best, should be compelled to behold the
Therefore may he rest in peace with his fathers:

principal extant paintings of Dürer, with the places where
e to be found, have been mentioned above. Of his draw-
y far the richest collection is in the Albertina Palace at
; the next richest is probably that of the British Museum,
large volume, forming part of Lord Arundel's collection,
rved. By the acquisition of the Posonyi-Hullot collection,
lin Museum has now (1877) taken certainly the third place.
uvre also possesses some good examples, and many others
persed in various public collections, as at Munich, Ham-
Bremen, Basel, Milan, and Florence, as well as in private
ll over Europe.

principal editions of Dürer's theoretical writings are these:—
ETRY AND PERSPECTIVE.—*Underweysung der Messung mit*
rckel und Richtscheyt, in Linien, Ebnen und ganzen Cor-
Nuremberg, 1525. A Latin translation of the same, with
title, Paris, Weichel, 1532, and another ed. in 1555.
in Latin, with the title *Institutionum geometricarum libri*
, Arnheim, 1605.
IFICATION.—*Etliche Underricht zur Befestigung der Schloss,*
und Flecken, Nuremberg, 1527, and other editions in 1530
38. A Latin translation, with the title *De urbibus, arcibus,*
que muniendis ac condendis, Paris, Weichel, 1535.
AN PROPORTION.—*Hierin sind begriffen vier Bücher von*
licher Proportion, Nuremberg, 1548. Latin translation:
etria partium in rectis formis humanorum corporum libri
um conversi, de varietate figurarum, &c., libri II., Nur-
, 1532.

private literary remains of Dürer, his diary, letters, &c.,
st published, partially in Von Murr's *Journal zur Kunst-*
ite, Nuremberg, 1785–1787; afterwards, in Campe's *Reli-*
on A. Dürer, Nuremberg, 1827; and again, carefully edited
fessor Moritz Thausing, in the *Quellenschriften für Kunst-*
ite und Kunsttechnik, Vienna, 1872.

principal remaining literature of the subject will be found
ollowing books and treatises, the elaborate monograph of Pro-
Thausing being the latest, and by far the fullest and most
us of them all:—Neudorfer, Johann, Schreib- und Rechen-
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D'URFEY, THOMAS, more generally known by the familiar name of Tom d'Urfey, an English satirist and song writer, was descended from a family of French Huguenot refugees, and was born at Exeter. The year of his birth is unknown. He was originally bred to the law, which he forsook for the more congenial employment of writing plays and songs. His humour both in writing and in singing the latter procured him access to the highest circles, and made him a favourite even at court. Addison in the *Guardian* (No. 67) relates that he remembered more than once to have seen Charles II. leaning on Tom d'Urfey's shoulder and humming over a song with him. He was a strong Tory and Protestant, and it is said that his songs had considerable influence in strengthening the cause of his party. His dramatic pieces, numbering upwards of thirty, were well received, but were so licentious that none of them kept the stage after the dissolute period for which they were written. D'Urfey, by imprudence and extravagance, became poor as he grew old; and having prevailed on the managers of the playhouse to act his comedy of the *Plotting Sisters* for his benefit, Addison wrote the above mentioned paper in the *Guardian*, with another (No. 82) giving a humorous account of his eccentricities, in order to procure him a full house. He died at an advanced age in 1723. His songs, published in 6 vols., under the title of *Pills to Purge Melancholy*, were reprinted in fac-simile in 1872.

Plate V

DURHAM, COUNTY PALATINE OF, one of the northern shires of England. The county is triangular in form, its eastern limit or base being a coast-line exposed to the German Ocean. It is separated from Northumberland chiefly by the Tyne and its tributary the Derwent, and from Yorkshire by the Tees. Towards its western extremity it joins Cumberland and Westmoreland. Its greatest length is 45 miles, and its greatest breadth 36 miles; and it contains an area of 1012 square miles, or 647,592 acres. It is divided into four wards,—Chester and Easington in the north, and Darlington and Stockton in the south. There were formerly three outlying portions of the county, shown in old maps, and known as North Durham (including Norhamshire and Islandshire), Bedlingtonshire, and Crayke. These were attached to the county as having formed parcels of the ancient "patrimony of St Cuthbert," of which the land between Tyne and Tees was the chief portion.

Physical Features.—The western angle of the county is occupied by spurs of the Pennine chain, and hence is mountainous, with black, naked, and barren regions, from which issue numerous streams flowing to the sea. The elevations vary from 1000 to 2196 feet. There are some beautiful and fertile valleys in the eastern and central parts, pleasantly varied with hill and dale, and alternately appropriated to corn and pasture. Extensive tracts, principally in the western part of the county, are waste, but rich in minerals. In the southern districts the area of cultivation has been considerably increased within the last few years. The ancient common fields belonging to the townships are now mostly inclosed. Draining having been carried on to a great extent; there is very little marshy ground left. Near the river Tees, and in some places bordering on the other rivers, the soil is loam or a rich clay. At a farther distance from these rivers it is of an inferior quality, with patches of gravel interspersed. The hills between the sea and an imaginary line from Barnard Castle on the Tees to Alansford on the Derwent, are covered with a dry loam, the fertility of which varies with its depth. From this line westward the summits as well as the sides of the hills are in great part moorish wastes.

At the distance of about three miles from Darlington, at Oxenhall, are cavities in the earth, called "Hell Kettles." There are similar natural pits in the neighbourhood of Ripon, and elsewhere. The diameter of the largest is not less than 114 feet, and that of the least 75. About five miles from Hartlepool is one of the most singular clusters of rocks in the north of England, called "Black Halls," formed by the force and constant action of the waves, which have separated enormous masses of the magnesian limestone, washing some entirely away, but leaving others standing, like vast towers. In some places the rock is perforated so as to form curious arches.

The only considerable river, beside those just mentioned, is the Wear, which rises in the western hills and flows past Durham to join the sea at Bishop-Wearmouth and Monk-Wearmouth, which places unite with Sunderland to form one great town. The Team, which gives its name to the Team Valley Railway, is a mere rivulet.

Trees are chiefly confined to the parks and seats of the nobility and gentry; but many plantations have been made of late years. The banks of the rivers and brooks, particularly in the vicinity of Durham, are fringed with wood of long growth and much value, and the deep wooded *denes* or ravines which open on to the sea-coast, each having a small stream at the bottom, are very characteristic. Castle Eden dene is about four miles in length, and famous for its beautiful trees and wild flowers.

Minerals.—The western hills are composed of carboniferous limestone, succeeded eastward by millstone grit, coal-measures, magnesian limestone, and new red sandstone. The south-east portion of the limestone is covered with sand, resulting from disintegration of the coal-measures and often showing black beds of coal-detritus. The mountain limestone contains productive veins of lead ore, which are extensively worked, also zinc ore. The beds of coal in the coal-measures are from 5 to 6 feet thick, and have long been source of enormous wealth. The mines are among the most extensive and productive in the kingdom. At Sunderland the coal trade furnishes employment for hundreds of vessels, independently of the "keels" or lighters which convey the coal from the termini of the railroads and tramways to the ships. The seams now worked extend horizontally for many miles, and are from 20 to 100 fathoms beneath the surface. Under almost every seam of coal is a bed of fire-clay, full of roots of primeval forest trees. The basaltic formation known as the "Great Whin Sill" appears in Teesdale, and is also remarkable at Cockfield. A beautiful variety of the mountain limestone known as Frosterley marble, has for many centuries been quarried near Stanhope for decorative purposes, in Durham Cathedral and elsewhere taking the place of Purbeck marble, while in modern houses it is used chiefly for chimney-pieces. Ironstone is extensively worked in the neighbourhood of Swalwell and Winlaton. Some excellent quarries of slate for buildings have been opened in different parts of the county. The neighbourhood of Wolsingham abounds in fine millstones. The Newcastle grindstones are procured at Gateshead Fell; and firestone of high estimation, for building ovens, furnaces, and the like, is obtained in various parts of Durham, and exported in considerable quantity.

Towns.—Besides the city of Durham, the county includes seven ancient boroughs, viz., Hartlepool, Barnard Castle, Bishop Auckland, Darlington, Sunderland, Stockton, and Gateshead. The large villages of Staindrop, Wolsingham, Stanhope, and Sedgefield are "market towns." The port of Stockton-upon-Tees is well situated for commerce. Hartlepool, being on a promontory, nearly encompassed by the German Ocean, which forms a capacious bay to the south of the town is advantageously placed for maritime traffic; Sunderland and South Shields are also well placed at the mouths of the Wear and Tyne.

No county in England presents a closer network of railways than Durham. The York, Newcastle, and Berwick trunk line enters the country south of Darlington, and continues due north until at Gateshead it crosses the Tyne and enters Northumberland. From this a great many smaller lines diverge to the ports and mineral fields.

Agriculture.—Improvements in agriculture have been pursued with considerable spirit and success. On some spots of gravelly soil, turnips and barley are grown in almost perpetual succession, a crop of clover being sometimes interposed. The manures are chiefly lime and the produce of the fold-yard; and though abundance of sea-weed might be collected on the coast, as it was in mediæval times, the farmers now make but little use of it. The farms are of moderate size, few of them exceeding 200 acres. The largest portion of each is arable, except towards the western extremity of the county, where the whole is pasture. The farm houses are well situated and commodious; and improvements in farming and farming machinery keep pace with the age. The cattle of Durham have long been in great repute; in point of form, weight, produce of milk, and quickness of fattening, there are none better. The cows yield from 25 to 30 quarts of milk daily. The sheep also stand high in estimation, particularly the Tees-Water breed. The Weardale sheep are small, but their mutton is finely flavoured.

The following figures, taken from the Agricultural Returns for 1873 and 1876, show the acreage of the principal crops and the numbers of the live stock in the county in those years:—

	Corn Crops.	Wheat.	Oats.	Barley and Bere.	Green Crops.	Turnips.	Grass under rotation.
1873…	99,243	37,669	37,631	18,470	32,803	22,183	[illegible]
1876…	91,109	28,359	35,815	23,070	33,616	22,196	[illegible]

	Horses.	Cattle.	Sheep.	Pigs.
1873……	16,204	62,452	224,714	[illegible]
1876……	17,486	61,028	202,109	12,183

According to the Owners of Land Return, Durham was divided in 1873 among 34,317 separate proprietors, of whom the large proportion of 91 per cent. owned less than 1 acre—the average of England and Wales being 71 per cent. The gross rental of the land amounted to £2,889,152, or an average of £5, 11s. 2½d. per acre—as compared with £3, 0s. 2d., the average of England and Wales. This unusual value per acre is to be ascribed to the presence of minerals. The proprietors possessing more than 8000 acres were as follows:—duke of Cleveland, 55,837 acres; Ecclesiastical Commissioners, 26,868; Viscount Boyne, 15,310; earl of Durham, 14,664; marquis of Londonderry, 12,823; earl of Eldon, 11,841; John Bowes, 8313; dean and chapter of Durham, 8069.

Natural History.—Except in the moorlands of the west only a few scraps of the county have been left in their natural state; but these portions are of great interest to the student of natural history. The [illegible]st-hills at Shields and Hartlepool are overgrown w[illegible]liens, many of which are elsewhere unknown in t[illegible]y. Nearly fifty different species have been found. *Cypripedium*, *Epipactis*, *Pyrola*, *Ophrys*, under the yews of Castle Eden, are visited by butterflies found nowhere else in England, as *Oreina blandina*, *Polyommatus salmacis*, and the little moth *Acidalia blomeraria*. The most interesting birds left are the dotterel (*Charadrius morinellus*), pied flycatcher (*Muscicapa luctuosa*), and crossbill (*Loxia curvirostra*), which still breed occasionally in the west of the county The siskin (*Chrysomitris spinus*) and black redstart (*Ruticilla tithys*) have reared their young near the city of Durham. The stockdove has within the last few years become not uncommon. Red grouse and black game are abundant in suitable localities, and one heronry still remains. But the shores of Durham are deserted by the sea fowl, which 200 years ago were so abundant by Tees and Tyne that, as an old writer says, "in tyme of breeding one can hardly sett his foote so warylye that he spoyle not many of theyr nestes." The badger and the otter still linger in one or two nooks; the last marten was killed in Weardale 30 years ago, and meantime the squirrel has become common. Stockton is almost the last retreat in England of the native black rat. Of the former abundance of deer, wild ox, and boar every peat bog testifies by its remains; the boar appears to have existed in the reign of Henry VIII., and records of red deer in the county may be traced down to the middle of the last century.

Antiquities of pre-Roman date, whether implements of stone or bronze, or sepulchral remains, are scarcely found except in the valley of the Wear. A very remarkable discovery was made some years ago at Heathery Burn Cave, near Stanhope, where, under a coating of stalagmite, were preserved a great many bronze weapons and other objects, including almost every article which appears to have been known in Britain at that remote period. One mile north of Eggleston are some remains of an ancient structure called the Standing Stones. This originally consisted of a cairn in the centre, surrounded by a trench, and that again encompassed by a circular arrangement of rough stones, many of which have been removed and broken to repair the roads. Near a brook, at a small distance, is a large barrow, crossed from east to west by a row of stones. There are frequent references to "Standing Stones" now gone in old charters, where they are referred to as marking boundaries. The principal Roman remains are connected with the ancient Watling Street, which entered the county by crossing the Tees at Pierse-bridge, and left it on crossing the Derwent just north of Ebchester. The boundaries of the four stations of Pierse-bridge, Binchester, Lanchester, and Ebchester, on the line of this road, may still be clearly discerned. At Lanchester there are considerable remains of masonry, and at Binchester the most perfect hypocaust in the north of England. Chester-le-Street, as its name indicates, occupies the site, now obliterated, of a Roman station, on a subsidiary Roman road; and there was a camp, still partly to be recognized, on "Maiden Castle Hill," near the city of Durham. Many Roman altars and sculptured stones from Lanchester and elsewhere are preserved in the chapter library at Durham. Roman altars, coins, &c., have been found at South Shields, as well as about the above-mentioned stations. To the Anglo-Saxon period are to be referred portions of the churches of Monk-Wearmouth and Jarrow, and numerous sculptured crosses, two of which are *in situ* at Aycliffe. The best remains of the Norman period are to be found in Durham Cathedral (the finest Norman building in England) and in the castle, also in some half-dozen parish churches. Of the Early English period are the eastern portion of the cathedral (see below), the fine churches of Darlington, Hartlepool, and St Andrew, Auckland, and portions of a few other churches. The Decorated and Perpendicular periods are very scantily represented, on account, as is supposed, of the incessant wars between England and Scotland in the 14th and 15th centuries. The principal monastic remains, beside those surrounding Durham Cathedral, are those of its subordinate house or "cell," Finchale Priory, situated in a lovely valley by the Wear. The most interesting castles are those of Durham, Raby, Brancepeth, and Barnard. There are ruins of castelets, or peel-towers, at Dalden, Ludworth, and Langley Dale. The hospitals of Sherburn, Greatham, and Kepyer, founded by early bishops of Durham, retain but very few ancient features.

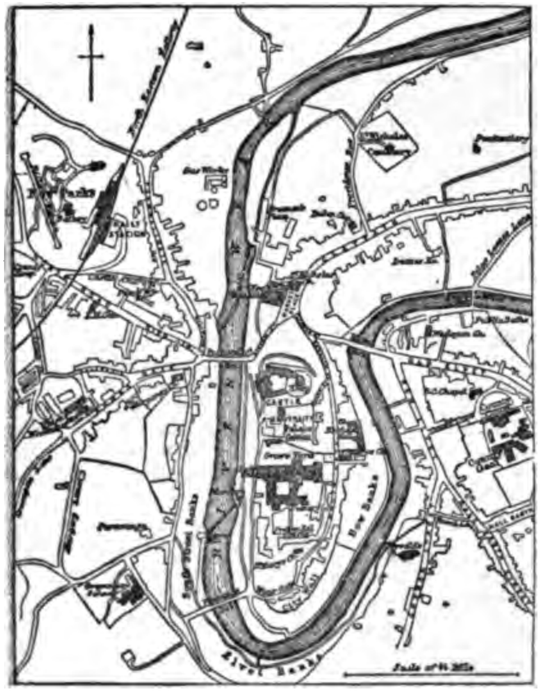
The principal noblemen's seats are Raby Castle (duke of Cleveland), Lambton Castle (earl of Durham), Wynyard Castle (marquis of Londonderry), Ravensworth Castle (earl of Ravensworth), Brancepeth Castle (Viscount Boyne), and Whitham Hall (Sir Hedworth Williamson, Bart.)

The county is divided for parliamentary purposes into two divisions (North and South Durham), each of which returns two members. The northern division includes 20 polling-places, and the southern 33. The population has greatly increased within the last thirty years. In 1851 the inhabitants numbered 390,997; in 1861, 508,666; and in 1871, 685,089—353,117 males and 331,972 females. The increase between 1851 and 1871 amounts to 72½ per cent. The population is estimated at upwards of 850,000 in 1877.

History.—Before the arrival of the Romans the county formed part of the British territory of the Brigantes, which comprised all between Tyne and Humber. Then it became part of the Roman province Maxima Cæsariensis. In Anglo-Saxon times it was included in Bernicia, in the kingdom of Northumbria. After the Norman Conquest it gradually acquired in one way or another that peculiar independence which was attached to "Counties Palatine." The bishops of Durham were temporal princes as well as spiritual rulers, exercising most of the royal prerogatives, such as paramount property in all lands, and supreme jurisdiction both civil and military, as in making war, right of forfeiture, levying of taxes, &c. These privileges would be the more readily conceded to this county on account of its remoteness from the metropolis, and its proximity to the hostile kingdom of Scotland, in order that the inhabitants, having justice administered at home, might not be obliged to go out of their county, and leave it open to an enemy's incursions. For they pleaded privilege not to pass over Tees or Tyne for military service, their special charge being, as was alleged, to keep and defend the sacred body of St Cuthbert, whence they were called "Haliwer folc" (Holy war folk). By an Act passed in the 27th year of Henry VIII. a heavy blow was struck at the regal powers which the bishops of Durham had enjoyed, and at the death of Bishop Van Mildert in 1836, an Act was passed whereby all temporal jurisdictions and privileges were declared to be for ever removed from the bishopric. Up to that time the bishops opened the assizes in person, as being still at the head of the administration of justice, the judges sitting by virtue of the bishop's writ. Durham is now included in the province of York, and in the north-eastern circuit.

The principal county histories are those by Hutchinson and Surtees, the latter incomplete, but, so far as it goes, it is a noble work, one of the very best of that class ever published. Murray's handbooks to the county and to the cathedral, though occasionally inaccurate, are full of interesting and valuable information.

Durham City, a municipal and parliamentary borough of England, and the chief town of the county of Durham, is situated on the River Wear (which is crossed there by four bridges), 14 miles S. of Newcastle and 60 miles N.N.W. of York. Though there was a small Roman camp at Maiden Castle Hill, about a mile distant, Durham itself dates only from the end of the 10th century, when the monks of Lindisfarne rested there with the body of St Cuthbert, after wandering about with it almost all over the north of England. Soon afterwards a church was built by Bishop Ealdhune, and the removal of the see from Lindisfarne thither, together with the growing fame of the incorruptible body of the saint, led to the rise of the city. The rocky peninsula on which Ealdhune's church was founded, about 80 feet above the river, was called Dunholme (Hill Island), which in Norman times was softened to "Duresme," whence "Durham." The castle was erected by William the Conqueror in 1072, across the neck of the peninsula, so as to guard the church and monastery. In 1093 Ealdhune's church was rebuilt by Bishop Carileph, who changed the Anglo-Saxon establishment of married priests into a Benedictine abbey.



Plan of Durham.

The Cathedral.—Carileph's grand Norman church still forms the main part of the cathedral buildings; but numerous additions have been made from time to time, the chief of which are—the Galilee or western chapel, of the Transitional period, the eastern transept or "Nine Altars" and the western towers (Early English), and the central tower (Perpendicular). Decorated and Perpendicular windows have, as is usual in old churches, been freely inserted. The interior presents the appearance, as Dr Johnson remarked, of "rocky solidity and of indeterminate duration," and combines, we may add, absolutely perfect proportion in all its original parts with a harmonious magnificence of detail in its massive columns, arches, and stone groining. It has recently been thoroughly cleaned, and supplied with much painted glass and very costly modern fittings, including a new organ built on the largest scale and of fine tone. Durham Cathedral, or "The Abbey," as old-fashioned residents still call it, has long been celebrated and still maintains its reputation for its choral services, as being at least equal to any in England in point of musical execution. This glorious building has been admirably illustrated in Carter's Plates, and in Billings's *Architecture of Durham Cathedral.* It is 507 feet in length, by 200 in extreme breadth, with a central tower 214 feet in height, and two smaller ones 138 feet high at the west end. The Galilee or western chapel was built by Bishop Pudsey between 1153 and 1195, and contains the supposed remains of the Venerable Bede. In the chapel of the Nine Altars are the remains of St Cuthbert, brought to light in 1827. The cathedral library, formerly the dormitory and refectories of the abbey, contains a number of curious and interesting printed books, and MSS., and the portable altar, vestments, and other relics found in St Cuthbert's grave.

The see of Durham was long the richest bishopric in England. The total revenue of the dean and chapter during the seven years ending 1834 amounted to £36,937 a year. On the death of the incumbent in 1836, at the recommendation of the Ecclesiastical Commissioners, the income of the bishop was fixed at £8000 per annum—the surplus revenues of the see being reserved to form a fund for augmenting the incomes of the poorer bishops.

Arms of Bishopric.

Castle, &c.—The castle of Durham consists of a polygonal keep, now reconstructed to form a very inconvenient set of college rooms; the great hall built by Bishop Hatfield, which in some respects exceeds any hall in the older universities; the Norman hall, now cut up into rooms; the old Norman crypt chapel; Bishop Tunstall's chapel, at present in use; the Black Staircase, built by Bishop Cosin; and the kitchen, the gate-house, and other offices. These are grouped round a court very irregular in plan, and not less picturesque in general effect. Durham Castle was the chief residence of the bishops of the Palatinate, but is now appropriated to the uses of the university, with the exception of the state apartments, which are partly reserved for the bishop and for Her Majesty's judges of assize. The university was opened in 1833; an account of it will be found under UNIVERSITIES. Besides the cathedral, Durham has seven parish churches. There are also places of worship for Roman Catholics, and for various denominations of Protestants. The grammar school attached to the cathedral was founded by Henry VIII. in 1541, and possesses eighteen "king's scholarships," of the annual value of nearly £40 each. There are also several scholarships and exhibitions tenable at the universities. The original school-room is now used by the university of Durham; the new buildings are beautifully situated to the west of the city, and are very handsome and commodious, including residences for the head and second masters, and a school infirmary. Durham possesses flourishing diocesan training colleges for schoolmasters and schoolmistresses; and about four miles to the west of the city is the great Roman Catholic College called St Cuthbert's College, Ushaw, the present representative of the old college at Douai.

The civil corporation of Durham and Framwellgate consists of the mayor, six aldermen, and eighteen councillors, with a recorder, a chaplain, and town clerk, two elective auditors, and two elective assessors. On the passing of the Corporation Act, 5 and 6 Will. IV. c. 76, the election of the eighteen councillors was vested in the citizens occupying houses and paying poor and other rates. The councillors so elected have to choose the six aldermen, and the aldermen and councillors have the election of the mayor. Four charters (all, except the third, preserved in the "Hutch" at the Guild Hall) have been granted to the city by different bishops of Durham:—the first by Hugh Pudsey, confirmed by Pope Alexander III., 1179 or 1180; the second by Tobias

Corporation Seal.

Matthew, confirmed by James I.; the third by Nathaniel Lord Crew, 1684 (afterwards redelivered to the bishop, the corporation acting under the second charter), and the fourth by John Egerton, 1780.

Durham can scarcely be said to have any staple trade or manufacture, though it possesses one carpet factory and one large mill for the preparation of "Durham mustard." It is now a very different place, socially, from what it was when there were twelve prebendaries with much larger incomes than the six canons now have, and when "The College" was a noted centre for dignified and liberal hospitality. At that time, canonical residence was kept with much more strictness than it is at present, and the prebendary in residence entertained guests of all classes. Noblemen and gentlemen then resided in houses in Framwellgate and Elvet, now let out into tenements and serving as the squalid homes of the very poorest class. The Bailey and Old Elvet are, however, still chiefly occupied by the upper classes, and Western Hill is a new and rapidly increasing suburb. The Palace Green is an open space having the cathedral on the south side, the castle, now University College, on the north, the Exchequer Buildings, now the university library, together with Bishop Cosin's library, on the west, and the museum, alms-houses, and other offices on the east. The museum contains an almost complete collection of British birds. Six out of the seven parish churches are ancient, and possess features of interest. The high banks of the river on which the cathedral and castle stand are richly wooded, and traversed in all directions by well-kept paths, which afford ever-changing views of wood, water, rocks, bridges, the cathedral, the castle, picturesque old houses, and terraced gardens.

In 1861 the municipal borough of Durham had within its area of 880 acres 2007 inhabited houses, with a population of 14,088. In 1871, the number of inhabited houses was 2349, and the population comprised 6956 males and 7450 females, or 14,406 in all. The parliamentary borough, which with an area of 967 acres had 14,833 inhabitants in 1871, returns two members to Parliament. (J. T. F.)

DURHAM, JOHN GEORGE LAMBTON, FIRST EARL OF (1792–1840), born at Lambton Castle, Durham, on the 12th April 1792, was the eldest son of William Henry Lambton, M.P. for the city of Durham. It is noteworthy that the family to which he belonged had held the Lambton estate in uninterrupted male succession from the 12th century. Educated at Eton, he held for a short time a commission in a regiment of hussars. In 1813, soon after attaining his majority, he was returned to Parliament as representative of his native county. He was an advanced Liberal from the beginning to the end of his political career, and distinguished himself by his uncompromising opposition to the reactionary measures of the Tory Government. His political position was strengthened by his marriage in 1816 to the eldest daughter of Earl Grey. In 1819 he championed the rights of the people by his denunciation, in the House of Commons and at numerous public meetings, of the coercive measures proposed by the Government against the Chartists. In April 1821 he proposed in the House a scheme of parliamentary reform which was in some points, notably in regard to the redistribution of seats, more thoroughgoing than that which was carried eleven years later. The delicate state of his health compelled him in 1826 to proceed to Naples, where he resided for about a year. He was a prominent supporter of the Canning administration of 1827, and of that of Lord Goderich by which it was succeeded. When the latter fell to pieces owing to its inherent weakness in January 1828, Lambton's services were acknowledged by his elevation to the peerage as Baron Durham. On the accession of Lord Grey to power in 1830 Lord Durham obtained the office of lord privy seal. He was one of a Cabinet committee of four who were intrusted with the preparation of the Reform Bill, the others being Sir James Graham, Lord John Russell, and Lord Duncannon. It was understood at the time that his influence was exerted to make the measure as liberal as possible, and in particular that he wished to introduce the ballot as one of its provisions. In the debates on the bill in the Lords he did not take the leading part that might naturally have been expected from the only peer who had been on the Cabinet committee for its preparation. This was owing partly to his own indifferent health and partly to grief at the death of his eldest son, the Master Lambton of one of Lawrence's most admired portraits. Continued ill-health led him to resign office in March 1833, when he was raised to the dignity of Viscount Lambton and earl of Durham. In the summer of the same year, however, he was able to undertake a special embassy to the court of St Petersburg, the chief object of which was to secure lenient treatment for the insurgent Poles. In this he was unsuccessful. When the party that had carried reform began to be divided, Lord Durham was generally regarded as a likely leader of the more advanced section, and a strongly radical speech which he delivered at the celebrated Grey banquet at Edinburgh in 1834 helped to strengthen his claims to the position. It took the form of a reply to a previous speech of Lord Brougham, whose enmity Lord Durham thus provoked. In 1837 he accepted the post of ambassador at St Petersburg, which he occupied for about a year. Meanwhile a very serious insurrection had broken out in Canada, and early in 1838 the Government found it necessary to suspend the colonial constitution and send out a new governor with special powers. Lord Durham was selected to undertake the difficult task, for which his extensive experience and his well-known advanced liberalism were supposed specially to qualify him. Somewhat hasty and irascible in his temperament, he unfortunately adopted measures which were beyond the powers conferred upon him by the special Act of Parliament under which he had been appointed. These measures were disapproved of by a vote of the House of Lords on the motion of Lord Brougham, who imported the bitterness of his earlier quarrel with Lord Durham into the debate, and the Government were compelled to disallow the ordinances in which they were embodied. Lord Durham was so deeply incensed at this that he took the extraordinary step of returning home without waiting for his recall, and the Government marked its disapproval of his conduct by directing that he should not receive the customary salute on landing in England. He defended his plan of administration in an able and elaborate report addressed to the queen, and his policy was practically justified by being adopted by his successor. He had returned to England in shattered health, and he died at Cowes, in the Isle of Wight, on the 28th July 1840.

DURIAN (Malay, *duri*, a thorn), the fruit of *Durio zibethinus*, a tree of the natural order *Sterculiaceæ*, which attains a height of 70 or 80 feet, has oblong, tapering leaves, rounded at the base, and yellowish-green flowers, and bears a general resemblance to the elm. The durio is cultivated in Sumatra, Java, Celebes, and the Moluccas, and northwards as far as Mindanao in the Philippines; also in the Malay Peninsula, in Tenasserim, on the Bay of Bengal, to 14° N. lat., and in Siam to the 13th and 14th parallels. The fruit is spherical and 6 to 8 inches in diameter, approaching the size of a large cocoa-nut; it has a hard external husk or shell, and is completely armed with strong pyramidal tubercles, meeting one another at the base, and terminating in sharp thorny points; these sometimes inflict severe injuries on persons upon whom the fruit may chance to fall when ripe. On dividing the fruit at the sutures of the carpels, where the spines arch a little, it is found to contain five oval cells, each filled with a cream-coloured, glutinous, smooth pulp, in which are imbedded from one to five seeds about the size of chestnuts. The pulp and the seeds, which latter are eaten roasted, are the edible parts of the fruit. With regard to the taste of the pulp Mr Wallace remarks, "A rich butter-like custard, highly flavoured with almonds, gives the best idea of it, but intermingled with it come wafts of flavour that call to mind cream-cheese, onion-sauce, brown sherry, and other incongruities; . . . . it is neither acid, nor sweet, nor juicy, yet one feels the want of none of these qualities, for it is perfect as it is." The fruit, especially when not fresh from the tree, has, notwithstanding, a most offensive smell, which has been compared to that of rotten onions or of putrid animal matter. The Dyaks of the Sarawak river in Borneo esteem the durian above all other fruit, eat it unripe both cooked and raw, and salt the pulp for use as a relish with rice.

See Linschoten, *Discours of Voyages*, bk. i., chap. 57, p. 102, fol. Lond. 1598; Bickmore, *Travels in the East Indian Archipelago*, p. 91, 1868; Wallace, *The Malay Archipelago*, 3rd. ed. 1872.

DÜRKHEIM, a town in the Palatinate of the Rhine, near the foot of the Hardt Mountain, and at the entrance of the valley of the Isenach, 15 miles north-west of Spire, on the railway between Monsheim and Neustadt. Besides being the seat of various administrative offices, it possesses three churches and a synagogue, a town-hall occupying the site of the castle of the princes of Leiningen-Hartenburg, an antiquarian and a scientific society, a public library, and a high school. It is well known as a resort for invalids, who may either indulge in the grape-cure or have recourse to the salt-springs of Philippshall in the neighbourhood, which not only supply the bathing establishment, but produce annually about 8000 cwt. of marketable salt. The inhabitants have a good trade in wine, and manufacture oil, tobacco, glass, and paper.

As a dependency of the Benedictine abbey of Limburg, which which was built and endowed by Conrad II., Dürkheim or Thurnigheim came into the possession of the counts of Leiningen, who in the 13th century made it the seat of a fortress, and in the 14th inclosed it with wall and ditch. In the three following centuries it had its full share of the military vicissitudes of the Palatinate; but it was rebuilt after the French invasion of 1689, and greatly fostered by its counts in the beginning of next century. In 1794 its new castle was sacked by the French, and in 1849 it was the scene of a contest between the Prussians and the insurrectionists. The ruins of the abbey of Limburg are still to be seen about a mile S.W. of the town; and in the neighbourhood rises the Kastanienberg, with the ancient rude stone fortification of the Heidenmauer or Heathen's Wall. Population in 1871, 5572.

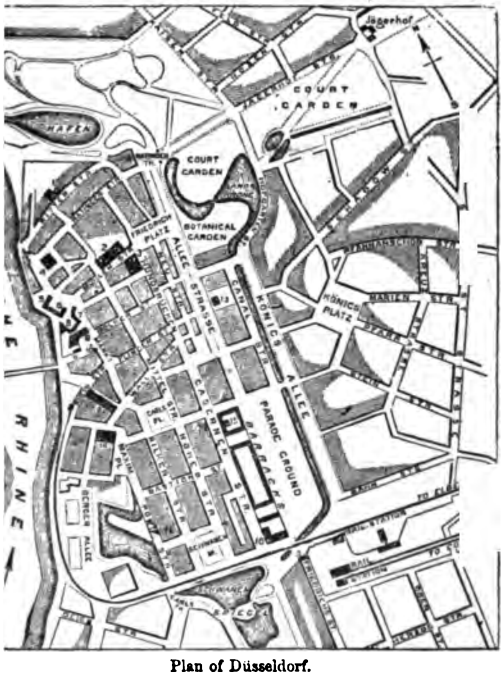
DURLACH, a town of Bavaria, in the circle of Carlsruhe, 2½ miles by rail from the city of that name, with which it is connected by a canal and an avenue of poplars. It lies on the left bank of the Pfinz, at the foot of the vineyard-covered Thurmberg, which is crowned by a watch-tower; and it possesses a castle erected in 1565 and now used as barracks, an ancient Rathhaus, a church with an excellent organ, an upper Bürgerschule, an orphan asylum, and in the market-place a statue of the margrave Charles II. Its inhabitants manufacture tobacco, beer, vinegar, and chicory, and engage in agriculture and gardening. A chalybeate spring is utilized at the bathing establishment of Amalienbad.

Durlach was bestowed by the emperor Frederick on Hermann V. of Zahringen as an allodial possession, but afterwards came into the hands of Rudolf of Hapsburg. It was chosen as his residence by the margrave Charles II., in 1565, and retained this distinction till the foundation of Carlsruhe in 1715, though it was almost destroyed by the French in 1688. In 1846 it was the seat of a congress of the liberal party of the Baden parliament; and in 1849 it was the scene of an encounter between the Prussians and the insurgents. Reichenbach the mechanician and Posselt the historian are natives of the town.

DURRA, or Indian Millet, *Sorghum vulgare*, is [illegible] species of grass of the tribe *Andropogoneæ*. The term *durra* and *surrut* are applied to the plant in Arabia; in India it is known as *jawari* (Hindustani), *jowari* (Bengali), *cholum* (Tamil), and *jonna* (Telugu), and in the West Indies as Negro or Guinea Corn. It is a strong grass, growing [illegible] a height of from 4 to 8 or even 16 feet; the leaves are sheathing, solitary, and about 2 inches broad and 2½ feet in length; the panicles are contracted, dense, and hermaphrodite; and the seeds, which are inclosed in husks and protected by awns, are round, hard, smooth, shining, brownish-red, and somewhat larger than mustard seeds. The plant is cultivated in various parts of India and other countries of Asia, in the United States, and in the south of Europe. Its culms and leaves afford excellent fodder for cattle; and the grain, of which the yield in favourable situations is upwards of a hundredfold, is used for the same purposes as maize, rice, corn, and other cereals. Allied species are *S. bicolor*, much valued in India as a forage-plant, and *S. saccharatum*, commonly called sorghum or Chinese sugar cane, which is extensively cultivated in China, North India, and Africa. The latter species is grown in America chiefly for the manufacture of molasses from its juice, and in France as a source of alcohol. The total quantity of sorghum molasses made in the United States in 1870 has been estimated at 16,050,089 gallons.

DUSSEK, Johann Ludwig (1761–1812), pianist and composer, was born at Czaslau, in Bohemia, on the 9th February 1761. His father, Johann Joseph Dussek, a musician of high reputation, was organist and choir-master in the collegiate church of Czaslau, and several other members of the family were distinguished as organists. He had thus the most favourable opportunity for the development of the musical talent which he displayed almost from infancy. Under the careful instruction of his father he made such rapid progress that he appeared in public as a pianist at the age of six. A year or two later he was placed as a choir boy at the convent of Iglau, and he obtained his first instruction in counterpoint from Spenar, the choir-master. When his voice broke he entered on a course of general study, first at the Jesuits' college, and then at the university of Prague, where he took his bachelor's degree in philosophy. During his curriculum of two and a half years he had paid unremitting attention to the practice and study of his art, and had received farther instruction in composition from a Benedictine monk. In 1779 he was for a short time organist in the church of St Rombaut at Mechlin. At the close of this engagement he proceeded to Holland, where he attained great distinction as a pianist, and was employed by the stadtholder as musical instructor to his family. While at the Hague he published his first works in the form of several sonatas and concertos for the piano. He had already composed at the age of thirteen a solemn mass and several small oratorios, which still exist in manuscript. In 1783 he visted Hamburg, and placed himself under the instruction of Emmanuel Bach. Though he believed himself to have derived great benefit from this, it may be questioned whether his genius was not fettered rather than stimulated by the enthusiastic veneration with which he regarded his model. From Hamburg he proceeded to Berlin, where his powers as a pianist met with their accustomed recognition. After spending two years in Lithuania in the service of Prince Radziwill, he went in 1786 to Paris, where he remained, with the exception of a short period spent at Milan, until the outbreak of the Revolution, enjoying the special patronage of Marie Antoinette and great popularity with the public. Towards the close of 1789 he removed to London, where three years later he married a daughter of Dominico Corri, who was elf a clever harpist and pianist. In London he obtained greatest success alike as composer, performer, and her. Unfortunately, however, he was tempted by the sale of his numerous compositions to open a music- lishing warehouse in partnership with Montague Corri, lative of his wife. The result was injurious to his and disastrous to his fortune. Writing solely for the of sale, he composed many pieces that were quite orthy of his genius; and, as he was entirely destitute usiness capacity, bankruptcy was inevitable. In 1800 was obliged to flee to Hamburg to escape the claims of creditors. Some years later he was attached in the acity of musician to the household of Prince Louis dinand of Prussia, with whom he formed an intimate ndship. On the death of his patron in 1806 he passed the service of Prince Ysenburg as court musician. In 9 he went to Paris to fill a similar situation in the sehold of Prince Talleyrand, which he held until his th in March 1812. Dussek had an important influence the development of pianoforte music. As a performer was distinguished by the purity of his tone, the com- ed power and delicacy of his touch, and the facility of execution. As a composer he possessed a distinct lividuality of style, and, while much that he wrote has tle value, his best works rank high among pianoforte sica. His sonatas known as *The Invocation*, *The rewell*, and *The Harmonic Elegy*, though not equally tained throughout, contain movements that have scarcely en surpassed for solemnity and beauty of idea. Two ras, which he composed during his residence in London, re failures.

DÜSSELDORF, a town of Prussia, at the head of a vernment in the province of the Rhine, on the right nk of the river, 25 miles below Cologne. It is divided into four portions,—the Old Town, the Karlstadt, which dates from 1787 and is called after the electoral prince Charles Theodore, the New Town, which was in process of formation from 1690 to 1716, and the Friedrichsstadt, laid out within recent years. New streets are rapidly stretching out in all directions, and the villages of Pempelfort, Bilk, and Derendorf are already almost incorporated. Within the area of the town proper there are numerous open grounds and public squares, which prevent the regularity of its plan degenerating into monotony: the market-place, with the colossal bronze statute of the electoral prince Johann Wilhelm, the parade, the Allée Strasse, the King's Alley, and the King's Platz may be specially mentioned. Of the ten churches the most noticeable are—St Andrew's, formerly the Jesuit or court church, with frescoes by Hübner, Deger, and Mucke, and the embalmed bodies of several of the electors; St Lambert's, with a tower 180 feet high, and containing monuments in honour of Duke William IV. and Voetius; and Maximilian's, with frescoes by Settegast and others. Besides the old ducal palace, laid in ruins by the French in 1794, but restored in 1846, the secular buildings comprise the former Jesuit college, now occupied by the administrative offices, a town-house dating from 1567, a penitentiary, a lunatic asylum, several hospitals and infirmaries, a theatre completed in 1875, a music hall, a gymnasium, and a polytechnical school. The town also possesses a library of 50,000 volumes, and is the seat of a great number of commercial and intellectual associations; but to nothing is it more indebted for its celebrity than to the Academy of Painting. This famous institution, originally founded by the electoral prince Charles Theodore in 1767, was reorganized by King Frederick William in 1822, and has since attained a high degree of prosperity as a centre of artistic culture. From 1822 till 1826 it was under the direction of Cornelius, a native of the town, from 1826 to 1859 under Schadow, and from 1859 to 1864 under Bendemann. From Bendemann's resignation it continued in the hands of a body of curators till 1873, when Wiscelinus of Weimar was chosen director. The noble collection of paintings which formerly adorned the Düsseldorf gallery was removed to Munich in 1805, and has not since been restored; but there is no lack of artistic treasures in the town. The academy possesses 14,000 original drawings and sketches by the great masters, 24,000 engravings, and 248 water-colour copies of Italian originals; the municipal gallery contains valuable specimens of the local school; and the same is the case with the Schulte collection. The principal names are Cornelius, Lessing, Achenbach, Baur, Tidemann, and Knaus. An annual exhibition is held under the auspices of the Art Union; and the members of the Artist's Society, or *Malkasten*, as they are called, annually celebrate festivities and masquerades of a remarkable description. Not only is Düsseldorf situated in the greatest manufacturing province of Prussia, but it is itself the seat of various important industries,—cotton and carpet weaving, iron-founding, wire-drawing, sugar-refining, brewing, distillation, and the making of pianos and carriages. The surrounding country is largely devoted to market-gardening, and the Düsseldorf mustard is in special repute. A very extensive trade is carried on both by river and by rail; the port was declared free in 1829, and is consequently one of the most frequented on the Rhine. The Düsseldorf Steam-boat Company maintains regular communication with Mayence on the one hand and Rotterdam on the other. A little to the north of the town lies the village of Düsselthal, with Count Recke-Volmarstein's establishment for homeless children in the former Trappist monastery; and in the suburban village of Pempelfort is the *Jägerhof*, the residence at one time of



Plan of Düsseldorf.

1. Ursula Church
2. Government Buildings
3. Court Church.
4. St Lambert's Church.
5. School of Art.
6. Mint.
7. Hauptwaene
8. Old Castle
9. Town Hall.
10. Elector Wilhelm Statue.
11. Theatre.
12. Court of Justice.
13. Gymnasium.
14. Maximilian Church.
15. Garrison Church.
16. Post Office.

Prince Frederick of Prussia, and afterwards of the prince of Hohenzollern Sigmaringen. In 1780 the number of inhabitants was about 8000; by 1831 it was over 23,000. The census of 1861 gave 41,290 (of which 3376 were military); that of 1871, 69,348.

Düsseldorf, as the form of the name—the village on the Düssel—clearly indicates, was long a place of small consideration. In 1288 it was raised to the rank of a town by Count Adolf of Berg; from his successors it obtained various privileges, and in 1385 was chosen as their residence. After it had suffered greatly in the Thirty Years' War and the war of the Spanish succession, it recovered its prosperity under the patronage of the electoral prince John William of the Palatinate, who dwelt in the castle till the restoration of Heidelberg. In 1794 the town was violently bombarded by the French; and after the peace of Luneville it was deprived of its fortifications. In 1805 it became the capital of the Napoleonic duchy of Berg; and in 1815 it passed with the duchy into Prussian possession. Among its celebrities are George and Friedrich Heinrich Jakobi, Schenk, Heine, Varnhagen, Cornelius, Camphausen, and H. von Sybel.

DUTENS, Louis (1730–1812), a French writer of some celebrity, was born at Tours, of Protestant parents, January 15, 1730. In his youth he devoted himself to poetry; and in 1748 he composed a tragedy, entitled *The Return of Ulysses to Ithaca*, which failed in Paris, but was represented with great applause at Orleans. The author, however, soon became sensible of the faults of his work, and abandoned a species of composition in which he found he was not destined to excel. He soon afterwards went to England with an introduction to Pitt, which he had received from a sister of the statesman. His first residence in London was brief, but he soon returned and obtained a situation as tutor in a private family. The father of the pupil was a man of considerable literary and scientific attainments, who instructed him in those branches of knowledge in which he was deficient. In this manner he learnt Greek and mathematics, and studied the Oriental languages, and Italian and Spanish. Soon after the termination of this engagement he was appointed chaplain and secretary to Mr Mackenzie, the English minister at the court of Turin, and left England in October 1758. In 1760, when Mr Mackenzie returned to England, the secretary remained at Turin as chargé d'affaires, until 1762, when he returned to England and attached himself to the family of Lord Bute, who, before retiring from office in 1763, procured him a pension. He again went to Turin as chargé d'affaires; and during this second mission he undertook the task of collecting and publishing a complete edition of the works of Leibnitz (Geneva, 6 vols. 1769) and wrote his work on the *Discoveries of the Ancients*. On again returning to England he attached himself to the duke of Northumberland, who procured him the living of Elsdon, in Northumberland. He accompanied the duke's son, Lord Algernon Percy, in his travels through France, Italy, Germany, and Holland; and while at Paris he was chosen a member of the Academy of Inscriptions, in 1775. In the same year he was made a fellow of the Royal Society. In 1776 he returned to England, and soon afterwards accompanied Mr Mackenzie and his wife on a tour to Naples. On his return Dutens was invited by Lord Mountstuart, who had been appointed envoy extraordinary, to accompany him to Turin, and found himself for the third time chargé d'affaires at that court, during a short absence of the envoy. From Turin he went to Florence, and thence to Rome. He was in Paris in 1783, and returned to London the following year. The revenue he derived from his living amounting to £800 per annum, together with a considerable legacy left him by Mr Mackenzie, and estimated at £15,000, enabled him to pass the remainder of his life in affluence. He died at London, May 23, 1812.

The principal works of Dutens were his *Recherches sur l'origine des Découvertes attribuées aux Modernes* (1766, 2 vols. 8vo); *Appel au bon Sens* (London, 1777, 8vo), directed in defence of Christianity against the French philosophers, and published anonymously; *Explication de quelques médailles de Peuples, de Villes, et de Rois, Grecques et Pheniciennes* (1773, 4to); *Explication de quelques médailles du cabinet de Duane* (1774, 4to); *Troisième Dissertation sur quelques médailles Grecques et Pheniciennes* (1776, 4to); *Logique, ou l'Art de raisonner* (1773, 12mo); *Des pierres précieuses et des pierres fines, avec les moyens de les connaître et de les évaluer* (1776, 12mo); *Itinéraire des routes les plus frequentées, ou Journal d'un Voyage aux principales Villes d'Europe* (1775, 8vo), frequently republished; *Considérations Théologiques sur les moyens de réunir toutes les Églises Chrétiennes* (1798, 8vo); *Œuvres mêlées*, containing his most important works published up to the date (London, 1797, 4 vols. 4to); *L'Ami des étrangers qui voyagent en Angleterre* (1789, 8vo); *Histoire de ce qui s'est passé pour le rétablissement d'une régence en Angleterre*, (1789, 8vo); *Recherches sur le tems le plus reculé de l'usage des Voutes chez les anciens* (1795); *Mémoires d'un Voyageur qui se repose* (Paris, 1796, 3 vols. 8vo). The first two volumes of the last named work contain the life of the author, written in a romantic style; the third bears the title of *Dutensiana*, and is filled with remarks, anecdotes, and bon-mots. (See memoir of Dutens in the *Gentleman's Magazine* for 1812.)

DUTROCHET, René Joachim Henri (1776–1847), a French physiologist and natural philosopher, was born at Château de Néon, Poitou, November 14, 1776, and died at Paris, February 4, 1847. In 1799 he entered the military marine at Rochefort, which, however, he soon deserted to join the Vendean army. In 1802 he began the study of medicine at Paris; and in 1808 he was made physician to Joseph Bonaparte, king of Spain. Appointed chief physician to the hospital at Burgos, he distinguished himself during the prevalence of typhus in that city. He returned in 1809 to France, where he devoted himself to the study of the natural sciences. The number of his scientific publications, which relate to a great variety of topics, is very great. His *Recherches sur l'accroissement et la reproduction des végétaux*, published in the *Mémoires du Muséum d'Histoire naturelle* for 1821, procured him in that year the French Academy's prize for experimental physiology. In 1837 appeared his *Mémoires pour servir à l'histoire anatomique et physiologique des végétaux et des animaux*, a collection of all his biological papers of any importance.

DUVAL, Jules (1813–1870), a French economist, was born at Rodez, in the department of Aveyron, received his early education at the college of St Geniez d'Olt, passed as advocate at the age of twenty-three, and for eight years held an official position first at St Affrique and afterwards in his native town. On the pacification of Algeria he took an active part in the foundation of the Union Agricole d'Afrique; and in 1847 he established an agricultural colony in the plain of Sig. Obliged by ill health to abandon in 1850 the personal charge of the enterprise, he did not leave the country, but in 1852 became editor of the *Echo d'Oran*, and from 1858 to 1861 acted as member and secretary of the general council of the province of Oran. Removing to Paris in the latter year, he there devoted himself to the literary exposition of his views; and among numerous other enterprises founded and edited till his death the *Économiste Français*, a weekly periodical devoted to the treatment of all matters connected with colonization and social reform, which bore his favourite device of *libre et harmonique essor des forces*. He was killed at Plessis-lès-Tours in a railway accident on the 20th of September 1870, while on his way to his native town.

Besides a series of contributions to the *Journal des Débats* and the *Revue des Deux Mondes*, he wrote *Tableau de l'Algérie* (1854), *Les colonies et l'Algérie au concours général et national d'agriculture de Paris en* 1860, *Gheel ou une colonie d'aliénés* (1860), *Histoire de l'émigration européenne, asiatique, et africaine au XIX. siècle* (1862),—probably his masterpiece, and the work by which he gained the prize offered by the Académie des sciences morales in [illegible], *Les colonies et la politique coloniale de la France* (1864), *Des rapports entre la géographie et l'économie politiques* (1864), *Mémoire sur Ant. de Mont Chrétien, auteur du premier traité d'économie politique* (1868), *Notre Pays* ([illegible]), *Notre planète* ([illegible]). See Levasseur's "Notice sur J. Duval" in *Bulletin de la Soc. de Géogr.*, [illegible].

UVERGIER DE HAURANNE, Jean (1581–1643), é of St Cyran, a celebrated French theologian, was born Bayonne in 1581. He studied theology at the university Louvain, where he formed an intimate friendship with sen, who was his fellow student. After quitting vain he went to Paris, where his intimacy with Jansen tinued, and with him he pursued with great ardour the dy of the fathers. Leaving Paris in 1611, they con- ned the same studies at Bayonne, where Duvergier eived the canonry of the cathedral. When Jansen left yonne, Duvergier returned again to Paris, and shortly er his arrival there his inflexible and ascetic character ured for him the esteem of the bishop of Poitiers, who ve him a canonry, and in 1620 made him abbé of St ran. He established in the monastery the order of St oit in all its rigour; but his zeal for reform was so great at it awakened opposition, and he found it expedient to it his diocese and return to Paris. Here he formed a nnection with the influential Arnauld family, and along ith Angelique Arnauld, directress of the convent of Port oyal, he completely reformed that institution. His rigor- us asceticism acquiring for him great ascendency over minine minds, his fame and influence increased with great apidity, and he soon began to number among his disciples members of the highest classes of society, and to have as is personal friends some of the chief dignitaries of church nd state. Soon, however, his enemies came to be as numerous as his friends. His rigid and domineering dis- position began to alienate from him many of his disciples; nd, taking a leading part in the Jansenist controversy, he xcited against himself the peculiar animosity of the Jesuits. At last his views came to be suspected by Richelieu, and e was arrested and thrown into prison at Vincennes, 14th arch 1638. No evidence could be obtained from his apers sufficient to criminate him, but to limit his influence e was retained in durance at Vincennes—where, however, e was able to keep up intercourse with his penitents and isciples. On the death of Richelieu he regained his liberty, nd resumed his religious duties and his war with the esuits with the same energy as before; but he enjoyed nly six months of freedom, dying from a stroke of apoplexy, th October 1643.

DWÂRAKÂ, Dwarka, or Jigat, a town of British dia, in Guzerat, near the extremity of the peninsula of attywar, in 22° 15′ N. lat. and 69° 1′ E. long. It is sur- unded by a wall, has about 2000 permanent inhabitants, d trades in chalk. As the birthplace and residence of rishna, it is the most sacred spot in this part of India, and principal temple is visited annually by many thousand lgrims. The approach from the sea is by a fine flight stone steps, and the great pyramid rises to a height 140 feet. Dwârakâ is of course frequently mentioned the *Mahâbhârata*. It was occupied by the British in 16.

DWARF (Saxon *dwerg*, *dweorg*; German, *Zwerg*), a term plied to men, animals, and plants that fail to reach even mediocrity of growth natural to their respective classes. is also otherwise applied. In France, for instance, a lkless egg is termed "un œuf nain," or dwarf egg; and imitation of fine English cloth is called "nain Londrin," hnically "London dwarf."

The *nanus* or *pumilo* of the Romans might be a dwarf nature or a person dwarfed by cruel art. In the former e, his lack of height found compensation in increased ength, as exemplified in the line by Propertius, "Nanus et e suos breviter concretus in artus," &c.; in the latter, ere growth had been early suppressed by the dealers o manufactured monstrosities for fashionable people in me, weakness bred contempt. The *nanus*, or, if he were re than usually diminutive, the *nanium*, was exposed to application of the proverb, "nanus cum sis, cede," equivalent to "little people must not be in our way!"

Various have been the recipes for dwarfing children from birth. The most effective, according to report, was anointing the back bone with the grease of moles, bats, and dormice. It is also said that pups were dwarfed by frequently washing their feet and backbone; the consequent drying and hardening of those parts hindered, it was alleged, their extension. In England, the growth of boys intended for riders in horse-races is kept down to some extent by the weakening process of "sweating."

There is a familiar story of a partnership entered into between a dwarf and a giant. The dwarf had the intellect, the giant had the strength; the result of this limited liability was that the giant received all the blows, and the dwarf all the profits. The partnership was consequently broken up. A fact, of which we are reminded by this fiction, occurred in Austria in the 17th century. To please the caprice of an empress, all the giants and dwarfs in the empire were brought together to Vienna, and were lodged in one building. The dwarfs were told they had nothing to fear from the giants; but the latter were soon put in bodily fear of the dwarfs, who made the life of their stupendous companions unbearable by teazing them, molesting them, tripping them up, and unscrupulously robbing them. The giants, with tears as big as pearls in their eyes, prayed the authorities to relieve them from the persecution of their tiny enemies, and the prayer was granted. At a later period, another German princess promoted marriages among dwarfs, but without succeeding in the object she had in view. When Lady Mary Wortley Montague was in Germany, in the last century, she found that a dwarf was a necessary appendage to every noble family. At that time English ladies kept monkeys. The imperial dwarfs at the Viennese court were described by Lady Mary as "as ugly as devils" and "bedaubed with diamonds." They had succeeded the court fools, and exercised some part of the more ancient office. Absolute princes could not stoop to familiar discourse with mankind of less degree. Therefore did they hold dwarfs to be outside humanity, made intimate associates of them, and allowed them an unrestrained freedom of speech, by the exercise of which the dwarfs imparted to their masters wholesome truths which on the lips of ordinary men would have been treason. One of the kings of Denmark is said to have made a prime-minister of his dwarf, in order to get at rough truths which a minister of ordinary stature would have been afraid to utter.

It could not have been for this reason that Stanislas, ex-king of Poland and duke of Lorraine, was so attached to his dwarf, Nicholas Ferry, otherwise known as "Bébé," for this dwarf was weak in mind and body. Bébé was one of three dwarf children of peasant parents in the Vosges. He was 3 feet in height, and his fame has not died out at Nancy and the department of the Meurthe. At his death in 1764 he was in his twenty-third year; and, among the fine phrases of which his epitaph is composed, the world is still assured that Bébé was "chéri du nouvel Antonin."

But Bébé was not so remarkable a dwarf as Richebourg, who died in Paris in 1858, at the age of ninety. He was only 23 inches in height. In his childhood he was a servant (without especial duty) in the Orleans family. In later years, Richebourg was their pensioner. He is said to have been put to strange use in the Revolutionary period,—passing in and out of Paris as an infant in a nurse's arms, but with despatches, dangerous to carry, in the little man's baby wrappings! At present, on the Continent, Russia and Turkey alone have a common sympathy for dwarfs. At the court of the sultan, should the dwarf, besides being of elfish height, be deaf, dumb, and qualified to hold a place among the official eunuchs, the poor creature is accounted as a priceless treasure.

The early history of British dwarfs is less studded with wonders than the record of dwarfs of the classical times. Britain has nothing to compare with Philetas of Cos, the little tutor of Ptolemy Philadelphus. Ælian would have us believe that Philetas was so light as well as diminutive that he wore leaden weights in his pockets to prevent his being blown away. Nor does any British chronicle register such minute marvels as the couple of dwarfs possessed by Julia, the niece of Augustus, namely, Coropas and Julia's little handmaid Andromeda. The height of both was 2 feet 4 inches. This, however, was little less than the stature of the Aztec dwarfs who were exhibited (and were publicly married) in London some twenty years ago. It is not that British annals or tradition can be said to be entirely silent on dwarfs as wonderful as Ælian's. The earliest, known by the now generic name of "Tom Thumb," presents himself to us in the ancient ballad which begins with the record that "In Arthur's court Tom Thumb did live." Antiquaries, on probably no better foundation, are content with placing the proto-Thumb at the court of King Edgar. It is certain that such shrunken samples of humanity figured in great festivals, as we see their foreign brethren in some of the pictures of the Italian and Spanish masters. The first English dwarf of whom there is authentic history was presented to Queen Henrietta by the duchess of Buckingham, as he stept out of a pie at a banquet. This was Jeffery Hudson of Rutlandshire. He was born in 1619, and was only 1½ feet high from his eighth year to his thirtieth, after which he grew to the stature of 3 feet 9 inches, and never went beyond it. His life was not made up of court pleasures. He fought two duels,—one with a turkey-cock, a battle recorded by Davenant, and a second with Mr Crofts, who came to the meeting with a squirt, but who in the more serious encounter which ensued was shot dead by little Hudson, who fired from horseback, the saddle putting him on a level with his lofty but unlucky antagonist. Twice was Jeffery made prisoner,—once by the Dunkirkers as he was returning from France, whither he had been on homely business for the queen; the second time was when he fell into the hands of Barbary corsairs. In each case his liberty was soon purchased. But Jeffery died in prison, nevertheless. He was accused of participation in the "Popish Plot," and in 1682 this dwarf died in the Gate House, in the sixty-third year of his age.

Contemporary with Hudson were the two dwarfs of Henrietta Maria, Gibson and his wife Anne. They were married by the queen's wish; and the two together measured only a couple of inches over 7 feet. They had nine children, five of whom, who lived, were of ordinary stature. Edmund Waller celebrated the nuptials, Evelyn designated the husband as the "compendium of a man," and Lely painted them hand in hand. Gibson was miniature painter to Charles I., and drawing-master to the daughters of James II., the Princesses Mary and Anne, when they were children. This Cumberland pigmy, who began his career as a page, first in a "gentle," next in the royal family, died in 1690, in his seventy-fifth year, and is buried in St Paul's, Covent Garden. The last court dwarf in England was Coppernin, a lively little imp in the service of the Princess (Augusta) of Wales, the mother of George III. The last dwarf retainer in a gentleman's family was the one kept by Mr Beckford, the author of *Vathek* and builder of Fonthill. He was rather too big to be flung from one guest to another, as used to be done at after-dinner tables, when the wine had got the better of common sense.

Of exhibited dwarfs in England, the most celebrated was the Pole, Borulwaski, whom fashion patronized in the last century and forgot in the present one. He was then [illegible] yard and 3 inches in height, and he had a sister shorter than himself by the head and shoulders. Borulwaski was a handsome man, a wit, and something of a scholar. H travelled over all Europe; and he—born in the reign George II., 1739—died in his well-earned retirement [illegible] Durham, in the reign of Victoria, 1837. Borulwaski buried in the above-named city, lies by the side of the Falstaffian Stephen Kemble. The companionship reminds one of that of the dwarf skeleton of Jonathan Wild by the side of that of the Irish Giant, at the Royal College Surgeons, London.

In the year in which Borulwaski died, 1837, the line publicly exhibited dwarfs was continued by the birth the existing American pigmy, Charles Stratton, better known as "General Tom Thumb." In 1844 he appeared in England, where his grace, vivacity, and good humour made him popular, from the royal family to the general public, before whom he acted at the Lyceum Theatre. He also made his appearance on the stage in Paris. After extensive travel in both hemispheres, he again visited England in 1857, but the dwarf man, despite many personal and intellectual qualities, was less attractive than the dwarf boy. In the year 1863 the "General" married the very minute American lady, Lavinia Warren (born in 1842), with whom he has seen many lands, and they are now enjoying honourable retirement in their own. (J. DO.)

DWIGHT, TIMOTHY (1752–1817), an eminent American divine, was born at Northampton, Massachusetts, 14th May 1752. His father, though educated at Yale College, was a merchant, and his mother the third daughter of Jonathan Edwards. His mother began to instruct him almost as soon as he was able to speak, and it is said that he learned the alphabet at a single lesson, and before he was four years old was able to read the Bible. In 1765 he entered Yale College, and received his B.A. degree in 1769, shortly after which he went to take charge of a grammar school at Newhaven, where he remained two years. In September 1771 he was appointed tutor in Yale College, where he distinguished himself by the skill with which he taught the higher mathematics. In the same year he began an epic poem entitled the *Conquest of Canaan*, which was published in 1785. He received his degree of M.A. in 1772, and afterwards pursued his studies with the view of adopting law as his profession, but, changing his intention, was licensed as a preacher of the gospel in 1777, and accepted the office of chaplain to the forces, which post he held for some time. In 1783 he was ordained minister of Greenfield in Connecticut, when he opened an academy which speedily acquired a very high reputation, and attracted scholars from all parts of the Union. He received the degree of D.D. from Princeton College in 1785, and that of LL.D. from New Jersey in 1810. In 1795 he was elected president of Yale College, and by his judicious management restored that institution to the high place from which it had fallen before his appointment. He died at Philadelphia on the 11th January 1817. Dr Dwight was the author of a considerable number of essays and sermons; and his *Theology Explained and Defended in a series of Sermons* was published in 5 vols., with a life of the author, in 1818. Two additional volumes of sermons were published in 1827, and had an extensive circulation both in the United States and in England.

DWINA, a name common to two important rivers of European Russia.

(1.) The NORTHERN DWINA, or *Dwina Sievernaya*, belongs to the basin of the White Sea, and is formed by the junction of the Sukhona and the Yuk, which, rising the former in the south-east and the latter in the south-west of the government of Vologda, meet in the neighbourhood ki Ustyug, at a height of 300 feet above the sea, 46′ N. lat. and 46° 20′ E. long. From its mouth, in lf of Archangel, the distance to the confluence of the itary streams is about 400 miles, and to the source Sukhona 750 miles. The drainage area is estimated 140,000 to 145,000 square miles. Except at the the current of the Dwina is comparatively slow, as rage fall per mile is only 9 inches. Till its union e Viuchegda, a river which exceeds it in volume, it for the most part in a single, well-defined, and ent channel; but below that point it often breaks several branches, and not unfrequently alters its

In the neighbourhood of Archangel it divides into listinct arms, which form a regular delta; but of that of Berezoff alone is navigable for seafaring , and even it is crossed by a bar at the mouth with re than 14½ or 15½ feet of water at full tide. Above nfluence of the Viuchegda the breadth is about 1750 below that point it widens out to 3500; and near gel it attains more than three times that measure. ver affords a valuable means of inland navigation. Vologda to Archangel the ordinary passage requires 0 to 12 days, and the return journey from 6 to 8

The channel is free from ice for about 174 days in ar.

The Southern Dwina, or *Dvina Zapadnaya*, n *Düna*, belongs to the Baltic basin, and takes its a small lake about 800 feet above the level of the the government of Tver, not far from the sources Volga and the Dnieper. In its whole course of 600 miles it waters the seven governments of Tver, Vitebsk, Mogileff, Vilna, Curland, and Livonia; and alculated that it drains an area of about 65,000 miles. From Dünaburg to Riga, a distance of 204 there is altogether a fall of 295 feet, of which 105 are 46½ miles from Jakobstadt to Friedrichstadt. In wer part of its course the river attains an ordinary of 30 feet, and an average breadth of 1400 feet; but the spring flood it sometimes rises 14 feet above its level, and extends its waters for about a mile. The ation lasts at Riga from two to ten days. Near the the river is usually free from ice 245 days in the and in the government of Vitebsk for 229. It is ble from the confluence of the Mezha downwards, e number of rapids and shallows greatly diminishes lue. No fewer than 62 of the former are counted Jakobstadt, and among these are some of the most rous of all. The passage to Riga from Velish usually thirteen days, from Disna seven, from Dünaburg from Friedrichstadt one. Navigation can also be d on by the following tributaries of the Dwina—the a, the Usviat, the Mezha and Obshei, the Kasplia, lla, and the Bolder-aa. By Ptolemy and Marcian eraclea the river is mentioned as the Rhubon or on; at a later date it is called the Khezin or Turunt, ll the present day has the name of Polot among the Russians. The modern designation is said to be o the Schleswig and Bremen sailors, who were struck e sandstone hills at the mouth of the river.

CE, Alexander, (1798–1869), a distinguished atic editor and literary historian, was born at Edin- on the 30th June 1798, and, after receiving his education at the High School of his native city, e a student at Exeter College, Oxford, where he ated as B.A. Having adopted the clerical profession, iciated as curate at Lantegloss, in Cornwall, and subse- ly at Nayland, in Suffolk; and, in 1827, he settled ndon. His first books were *Select Translations from us Smyrnæus*, an edition of Collins, and *Specimens of h Poetesses*. He issued annotated editions of George Peele, Robert Greene, John Webster, Thomas Middleton, and Beaumont and Fletcher, with lives of the authors and much illustrative matter. He completed an edition of Shirley left unfinished by Gifford, and contributed biographies of Shakespeare, Pope, Akenside, and Beattie to Pickering's Aldine Poets. He has also edited several of Bentley's works, and *Specimens of British Sonnets;* and his carefully revised edition of John Skelton, which appeared in 1843, did much to revive interest in that trenchant satirist. In 1857 his edition of Shakespeare was published by Moxon; and the second edition, a great improvement on the old one, was issued by Chapman and Hall in 1866. Dyce's interest in Shakespeare manifested itself further in such works as *Remarks on Collier's and Knight's Editions of Shakespeare, A Few Notes on Shakespeare, and Strictures on Collier's new Edition of Shakespeare.* He was intimately connected with several literary societies, and undertook the publication of Kempe's *Nine Days' Wonder* for the Camden Society; and the old plays of *Timon* and *Sir Thomas More* were published by him for the Shakespeare Society. He was associated with Halliwell, Collier, and Wright as one of the founders of the Percy Society, which aims at publishing old English poetry. Dyce also issued *Recollections of the Table-Talk of Samuel Rogers*, which has been several times reprinted both in Britain and in the United States. The editions of the dramatists already mentioned were re-issued with many improvements. Dyce died on the 15th May 1869. His reputation rests on his contributions to English literary biography, and on the untiring industry, abundant learning, and admirable critical acumen displayed in his editions of the old English poets. His wide reading in Elizabethan literature enabled him to explain much that was formerly obscure in Shakespeare; while his sound judgment was a sure check to anything like extravagance in emendation. His labours resulted in the best text of Shakespeare we possess. While preserving all that is valuable in former editions, Dyce has added much fresh matter. The *Glossary*, which consists of a large volume of 500 pages, is the most exhaustive that has appeared. Not only rare words are explained, but common words when employed with an unusual meaning, phrases, proverbs, old customs, and difficult allusions. The book is, therefore, an important contribution to philology and to the history of the English language, as well as to the elucidation of the text. The mere number of words in Dyce's *Glossary* shows a great advance in comprehensiveness. It is calculated that the *Globe Glossary* has about 2000 words, and Staunton's 2500, while Dyce's has upwards of 5000. The meanings of the words, as used by the poet, are accurately given, and are illustrated by literary quotation and linguistic comment. Altogether Dyce's Shakespeare is likely long to remain the standard edition of our English dramatist.

DYCE, William (1806–1864), a distinguished painter, was born in Aberdeen, where his father, a fellow of the Royal Society, was a physician of some repute. He attended Marischal College, took the degree of M.A. at sixteen years of age, and was destined for one of the learned professions. Showing a turn for design instead, he studied in the school of the Royal Scottish Academy in Edinburgh, then as a probationer (not a full student) in the Royal Academy of London, and thence, in 1825, proceeded to Rome, where he spent nine months. He returned to Aberdeen in 1826, and painted several pictures; one of these, Bacchus nursed by the Nymphs of Nysa, was exhibited in 1827. In the autumn of that year he went back to Italy, showing from the first a strong sympathy with the earlier masters of the Florentine and allied schools. A Virgin and Child which he painted in Rome in 1828 was much noticed by Overbeck and other foreign artists. In 1829 Dyce settled in

Edinburgh, taking at once a good rank in his profession, and showing considerable versatility in subject-matter. Portrait-painting for some years occupied much of his time; and he was particularly prized for likenesses of ladies and children. In February 1837 he was appointed master of the school of design of the Board of Manufactures, Edinburgh. In the same year he published a pamphlet on the management of schools of this description, which led to his transfer from Edinburgh, after eighteen months' service there, to London, as superintendent and secretary of the then recently established school of design at Somerset House. Mr J. R. Herbert was head-master about the same time. Dyce was sent by the Board of Trade to the Continent to examine the organization of foreign schools; and a report which he eventually printed, 1840, led to a remodelling of the London establishment. In 1842 he was made a member of the council and inspector of provincial schools, a post which he resigned in 1844. In this latter year, being appointed professor of fine art in King's College, London, he delivered a noticeable lecture, *The Theory of the Fine Arts*. In 1835 he had been elected an associate of the Royal Scottish Academy; this honour he relinquished upon settling in London, and he was then made an honorary R.S.A. In 1844 he became an associate, in 1848 a full member, of the London Royal Academy; he also was elected a member of the Academy of Arts in Philadelphia. He was active in the deliberations of the Royal Academy, and it is said that his tongue was the dread of the urbane President, Sir Charles Eastlake, for Dyce was keen in speech as in visage; it was on his proposal that the class of retired Academicians was established. In January 1850 Dyce married Jane, daughter of Mr James Brand, of Bedford Hill, Surrey. He died of a cancerous disease in his house at Streatham on 14th February 1864, leaving two sons and two daughters.

Such is a brief outline of the honourable and prosperous career of one of the most learned and accomplished of British painters—one of the highest in aim, and most consistently self-respecting in workmanship. His finest productions, the frescoes in the Queen's Robing-room in the Houses of Parliament, may rightly be called great, and an honour to the country and time which produced them; these frescoes, and the water-glass paintings of Maclise in the same building, would find few rivals in contemporary Continental labours. Generally, however, there is in Dyce's work more of earnestness, right conception, and grave, sensitive, but rather restricted powers of realization, than of authentic greatness. He has elevation, draughtsmanship, expression, and on occasion fine colour; along with all these, a certain leaning on precedent, and castigated semi-conventionalized type of form and treatment, which bespeak rather the scholarly than the originating mind in art. The following are among his principal or most interesting works (oil pictures, unless otherwise stated). 1829: The Daughters of Jethro defended by Moses; Puck. 1830: The Golden Age; the Infant Hercules strangling the Serpents (now in the National Gallery, Edinburgh); Christ crowned with Thorns. 1835: A Dead Christ (large lunette altar-piece). 1836: The Descent of Venus, from Ben Jonson's "Triumph of Love;" The Judgment of Solomon, prize cartoon in tempera for tapestry (National Gallery, Edinburgh). 1837: Francesca da Rimini (National Gallery, Edinburgh). 1838, and again 1846: The Madonna and Child. 1839: Dunstan separating Edwy and Elgiva. 1844: Joash shooting the Arrow of Deliverance (the finest perhaps of the oil-paintings). 1850: The Meeting of Jacob and Rachel. 1851: King Lear and the Fool in the Storm. 1855: Christabel. 1857: Titian's first Essay in Colouring. 1859: The Good Shepherd. 1860: St John bringing Home his Adopted Mother; Pegwell Bay (a coast scene of remarkably minute detail, showing the painter's partial adhesion to the so-called "pre-Raphaelite" movement of that time). 1861: George Herbert at Bemerton. Dyce executed some excellent cartoons for stained glass:—that for the choristers' window, Ely Cathedral, and that for a vast window at Alnwick in memory of a duke of Northumberland; the design of Paul rejected by the Jews, now at South Kensington, belongs to the latter. In fresco-painting his first work appears to have been the Consecration of Archbishop Parker, painted in Lambeth Palace. In one of the Westminster Hall competitions for the decoration of the Houses of Parliament, he displayed two heads from this composition; and it is related that the great German fresco-painter Cornelius, who had come over to England to give advice, with a prospect of himself taking the chief direction of the pictorial scheme, told the Prince Consort frankly that the English ought not to be asking for him, when they had such a painter of their own as Mr Dyce. The cartoon by Dyce of the Baptism of Ethelbert was approved and commissioned for the House of Lords, and is the first of the works done there, 1846, in fresco. In 1848 he began his great frescos in the Robing-room—subjects from the legend of King Arthur, exhibiting chivalric virtue. The whole room was to have been finished in eight years; but ill-health and other vexations trammelled the artist, and the series remains uncompleted. The largest picture figures Hospitality, the admission of Sir Tristram into the fellowship of the Round Table. Then follow—Religion, the Vision of Sir Galahad and his Companions; Generosity, Arthur unhorsed, and spared by the Victor; Courtesy, Sir Tristram harping to la Belle Yseult: Mercy, Sir Gawaine's Vow. The frescos of sacred subjects in All Saints' Church, Margaret Street, London; of Comus, in the summer-house of Buckingham Palace; and of Neptune and Britannia, at Osborne House, are also by this painter.

Dyce was an elegant scholar in more ways than one. In 1828 he obtained the Blackwell prize at Aberdeen for an essay on animal magnetism. In 1843–4 he published an edition of the Book of Common Prayer, with a dissertation on Gregorian music, and its adaptation to English words. He founded the Motett Society, for revival of ancient church-music, was a fine organist, and composed a "non nobis" which has appropriately been sung at Royal Academy banquets. His last considerable writing relating to his own art was published in 1853, *The National Gallery: its Formation and Management*. (W. M. R.)

DYEING is the art of colouring in a permanent manner porous or absorbent substances by impregnating them with colouring bodies. Most vegetable and animal bodies are porous or absorbent, and can be dyed; some minerals also, such as marble, can absorb liquid colouring matters; but the term dyeing is usually confined to the colouring of textile fibrous materials by penetration. The superficial application of pigments to tissues by means of adhesive vehicles, such as oil or albumen, as in painting or in some kinds of calico-printing, is not considered as a case of dyeing, because the colouring bodies so applied do not penetrate the fibre, and are not intimately incorporated with it. The mere saturation of textile fibre with a solution of some coloured body and subsequent drying do not constitute a case of dyeing, unless the colour becomes in so far permanently attached to the fibre that it cannot be washed out again by the solvent employed or by common water. In the present article dyeing will be considered only with relation to the vegetable and animal fibrous substances which are commonly used in clothing or furniture,—the less important arts of dyeing feathers, skins, ivory, wood, marble, &c., being left over for treatment under other headings.

HISTORICAL SKETCH.

g was practised in the most ancient times is
oved by the frequent mention of dyed colours
xtant writings; that it was not a common art
t from the uses to which coloured garments
and the distinction which they conferred
rers. It is probable that such definite and
as the "blue, and purple, and scarlet"
eral times in the book of Exodus, as well as
rple so often referred to by Roman writers of
age, were so costly as not to be available for
ommon use. Pliny is the only one of the
from whom we might have expected some
processes of dyeing employed at his time;
eference to two or three tinctorial substances,
ion of a process of obtaining several colours
operation, which he saw practised in Egypt (see
NG, vol. iv. p. 684), there is nothing detailed
s;—he in fact formally excuses himself from
the subject as one not worthy of his atten-
rian purple is the only dye treated of at some
y and contemporary authors; its discovery
ent gave wealth and prosperity to Tyre and
an 1000 years B.C. In the days of the Roman
he East it was reserved under penal statutes
use; its production then declined, and
th the material and the art of using it were
liny's description, modern investigators were
iscover the shell-fish which yielded the dye,
s furnished by it were neither so bright nor
as those obtainable from much less costly
als; and there is reason to conclude that the
ly tinted garments of an Egyptian priest of
or the mantle of a Roman emperor, were poor
ue compared with those within reach of a
nt of the present time.

y independent sources—Homer, Strabo,
,—it is clearly shown that the manufacture
sues was carried on by the Oriental nations.
of the art spread slowly westward, but there
s of its existence to be found from the time
out the 13th century. It would appear that
the secret or the monopoly of the dyeing art
ong period. According to Mrs Merrifield,
udela relates that when he visited Jerusalem
and 1173 he found only 200 Jews resident
nd these were all engaged in wool-dyeing,
as entirely in their hands. Beckmann shows
ame epoch the art of dyeing in Italy was
ried on by Israelites. It is in Sicily that we
ctly discern the practice of dyeing in Europe;
Italians generally practised it; and in the
dyers formed important guilds in Florence,
her cities. It is not to be supposed that the
g was ever completely lost; the records of
s of the art only indicate that at such places
xcellence had been acquired which gave them
utation than was enjoyed by others. The
ds of all modern nations speak of dyers and
Among the ancient laws of Ireland are some
n the number of colours that may be employed
various classes of society, the monarch alone
ed to wear seven colours; from which it may
at if the Irish at a very early period were not
least had variously dyed garments. Similar
dduced of all countries that possess an early

perishable nature of textile substances and
tively small intrinsic value, very few ancient
examples of the dyer's art have been preserved. We have, however, one account of a cloth containing dyed yarn which may have been in the dyer's hands in Egypt 1000 years before the Christian era; and we have still in good preservation ecclesiastical vestments containing dyed silks which are certainly 600 to 700 years old. The late Mr Thomson of Clitheroe examined numerous mummy cloths, some of which had a border of blue and fawn-colour made by coloured threads introduced into the loom. The blue, upon examination, was proved to have been dyed with indigo; other specimens of mummy cloth of a reddish colour appeared to have been dyed with safflower, though this colouring matter could not be recognized with the same certainty as indigo. Dr Rock, in his catalogue of the textile fabrics in the South Kensington Museum, attributes many of the church vestments there preserved to the 12th and 13th centuries, and in these can be seen silks of all the colours known to dyers up to the middle of the present century, which, though in most cases changed and faded, still present sufficient evidence that dyeing, upon this material at least, was successfully practised in the Middle Ages. It is interesting further to note that in inventories of vestments of the 13th century the silks in the vestments are often designated by their colours, as in a chasuble at St Paul's, London, 1295, which is set down as "purpureo aliquantulum sanguineo," of a purple inclining to blood red. This, as Dr Rock says, is intelligible; but other definitions are not, as "pannus Tarsici coloris," a Tarsus-coloured cloth; it can only be conjectured that it was a purple dyed at Tarsus, and something like the Tyrian purple; sky-blue silk is named "indicus," probably because it was dyed with indigo.

The earliest account of the processes and materials used by dyers is to be found in a collection of manuscripts in the French National Library, No 6741, known as the manuscripts of Jehan le Begne. These mostly refer to the art of painting and the making of artists' colours and the modes of applying them, but some describe the preparation and use of dyes. The most interesting of these manuscripts is by Jehan Alcherius (Le Begne was only the copier or compiler), which from internal evidence cannot be dated later than the year 1410, and some parts of which refer to a period at least thirty years earlier. Among the colouring matters and mordants there mentioned we find iron (the dust or mud from grindstones on which knives are ground) dissolved in vinegar and mixed with alum, green copperas, and gall nuts prescribed as a black colour; and methods are given for the use of Brazil wood, litmus, indigo, in conjunction with lime and honey, verdigris, alkalies, oxide of tin, kermes, &c., much in the same way as those employed four centuries later by dyers and calico-printers. There are also eleven receipts for preparing colours, for painting on cloth to imitate tapestry,—examples of which (*toiles peintes*) of the 15th century were exhibited in Paris in 1876. Curiously enough, a certain Fleming named Theodore in 1410 brought these receipts to Alcherius from London, where they were in regular use. They are all chemical dyes, and seem to be the prototypes of the same class of colours employed long subsequently by calico-printers in England and other countries.

The first printed account of dyeing processes was an Italian work. It is referred to under the title *Mariegola dell' arte dei Tintori*, published at Venice in 1429. The writer has never seen a copy of this work, nor does it appear that any exists in the chief libraries of Europe; an enlarged edition was published in 1510. In 1548 Rosetti wrote an account of dyeing, which was also published at Venice. Copies of this are not very scarce; it is the only one of these early books which is actually known. The so-called Bolognese manuscript translated in Merrifield's

Ancient Practice of Painting, is preserved in the convent of St Salvatore at Bologna, and is said not to be of later date than the middle of the 15th century—that is, about 100 years anterior to the date of Rosetti's work. In this manuscript, in addition to the materials enumerated by Alcherius, mention is made of woad and methods of making indigo from it; of indigo imported from India, called *bagadon* and *bagadel;* of sumach, gall nuts, and lac; of the berries of buckthorn, similar to the Avignon or Persian berries, to be used for yellow; and of Brazil wood or *verzino*, sandal wood, and madder for red; and archil for purple. The use of nitric acid to give a yellow colour to silk, and of alum for preparing and mordanting that material, and the subsequent dyeing of it by Brazil wood, are also clearly pointed out. The receipt No. 362 of this manuscript is of interest as showing that the Italian dyers early possessed the method of dissolving indigo by means of the action of honey and quick lime upon it, and used the solution for the blue required in dyeing silk green.

It is very clear, then, from these accounts, and from numerous existing samples of coloured stuffs, that dyeing was well understood in Europe in the 15th century, and that the materials at the command of the dyer were sufficiently numerous and varied to enable him to produce all desired shades of colour. The improvements which took place in the dyeing art from this time until the commencement of the present era of artificial colouring matters were no doubt important in detail, but not very striking in principle.

The discovery of America was soon followed by the introduction of cochineal (see vol. vi. p. 97), but this did not enable the dyer to produce any new colours, since it differed from the ancient kermes, frequently called *grana* or grains, only in being ten or twelve times as rich in colouring matter. Logwood or Campeachy was also an introduction from the New World, and greatly enlarged the power of the dyer, though, from the looseness of the colours it yielded, it brought his art into some disrepute; it was in many respects a new colouring matter, but eventually settled down as the principal ingredient in the common black dye. In mordants, the discovery in Holland in the 17th century of the use of solutions of tin in acid, especially for the scarlet dye with cochineal, was one of the greatest utility. The gradual introduction of the acetates of aluminium and iron to replace the respective sulphates was of more importance to calico-printing than dyeing proper. At the close of the last century Dr Bancroft discovered and introduced quercitron bark from America for dyeing yellows, and this, from its superior richness and less cost, displaced other materials used for that purpose. Of the natural dyes introduced in the present century probably the most important is catechu. The discovery of the use of bichromate of potash as a mordant for woollen goods belongs to the latter half of this century, and has been of the highest benefit to the dyer. We shall not speak in detail of a number of dye-stuffs used by dyers of the present day, which were probably unknown to their predecessors, because most of them are only varieties of what have been long employed. Such, for example, are valonia, divi-divi, and myrobalans, which have no properties different from galls or sumach, and the different red woods, which are merely varieties of the anciently known Brazil woods.

Artificial Colouring Matters.—In the year 1858 commenced the discovery and application of a series of artificial colouring matters, which have created a distinct era in the history of dyeing. Up to that date the colouring matters used in dyeing were either the spontaneous productions of nature or simple preparations of the same. An exception, however, must be made to this statement in respect of Prussian blue and the so-called sulphate of indigo, which have been largely used as colours in dyeing since the middle of the last century, and are as truly products of art as any of the modern creations of chemistry. The purple of murexide had only a brief existence as a dye. Mr Perkin was the first to practically produce a dyeing material from aniline, the well-known mauve or purple shade so much in vogue for several years, for a history of which see vol. ii. p. 48 of the present work. Other discoveries rapidly followed, and in the course of a few years it may be said that a hundred patents were taken out for methods of making artificial colouring matters from aniline and its homologues; these alkaloid bases, under the transforming hands of chemists, supplied the dyer with every shade and hue which could be desired. Up to 1869 the artificial colours were of one general family, and had many characters in common; they were very brilliant, very easily applied on fibre of animal origin (silk and wool), required no mordant, and for the most part were very loose and unstable. Imitating more or less closely the colours obtained on tissues from natural colouring matters, they had no similarity of chemical composition, and were in every other respect fundamentally different from them. In 1868 two German chemists, Graebe and Liebermann, by means of a severe synthetical investigation, succeeded in transforming anthracene into alizarin, the latter being identical in chemical composition as well as tinctorial properties with the colouring matter of madder, one of the most anciently known and most valuable of all natural dye-stuffs (see vol. i. p. 577). This was the first instance in which chemistry had produced one of the old and well-known colours of the dyer; in a short time after its discovery it was made practically available for the trade, and has at this date (1877) almost entirely driven from the market the native product,—accomplishing a revolution which has no parallel in the history of colouring matters, and which is one of the most signal triumphs of modern chemistry. Other natural colouring matters have since then been produced by art, such as indigo and archil, but from some difficulties in their manufacture they have not yet become commercially available.

Mechanical Improvements.—In the art of dyeing, steam power has proved no less serviceable than in other important industries. Its applications are not further alluded to in this article, but in the article upon CALICO-PRINTING (vol. iv. p. 684) some illustrations of modern machinery may be seen.

GENERAL PRINCIPLES OF DYEING.

Although many eminent chemists have worked and written upon the subject, there still remains much difference of opinion as to what actually takes place in dyeing operations. The following general account of the chief cases of dyeing will illustrate the principal methods in use, and serve as an introduction to a description of actual processes practised in dye-houses. Afterwards, the attempts made to construct a general theory will be briefly considered. The simplest cases of dyeing are those in which only two substances are employed—the fibre to be dyed and the colouring matter—and where the process of dyeing consists in nothing more than leaving the two materials in contact for a certain time at a convenient temperature. Of natural colouring matters few can be practically used in this simple way without some previous chemical treatment. The artificial colouring matters from aniline, however, illustrate this kind of dyeing very well. To obtain the finest shades of mauve, magenta, purple, and numerous other colours upon wool and silk fibre the whole process consists in placing the material in a solution of the requisite colour and of sufficient quantity to give the desired shade; it absorbs the

r, becoming dyed, while the solution is rendered nearly
rless. During the process the fibrous material is kept
constant state of movement, so that the dye solution
have equal access to all portions, the temperature
oyed and time allowed being regulated according to
necessities of the case. The colour absorbed by the
has entered into an intimate state of combination with
nce it cannot be washed out again; a true dyeing has
place. Besides the aniline colours, the older artificial
—sulphindigotic acid, picric acid, and one or two
s—have the same property of combining directly with
and silk.

nere are other cases of dyeing closely resembling the
oing, in which the resulting dyed stuff may be considered
ing a binary compound of fibre and colouring matter,
in which the methods of application are less simple.
e may be taken generally as consisting in the use of
rials or processes which bring a previously insoluble
uring matter into a soluble state; thus the pink colours
fflower are obtained by the action of an alkali; and
dyes yielded by archil, arnotto, and indigo are also the
lt of the action of solvents. It is possible that during
process of solution important internal changes may take
e in the composition of the above dyes, but if so, they
only of a temporary nature, for there is no reason to sup-
that the colouring matter attached to the fibre differs
hemical composition from that which is free.

'ith regard to nearly all other colouring matters, the above
ple processes are quite powerless to induce a permanent
bination with the fibre. Let wool or silk be immersed
boiling temperature in decoctions of any of the best
wn natural dye-stuffs, such as cochineal, logwood, madder,
rcitron bark, &c., and then washed in water, it will be
d that the fibres are simply discoloured, or stained of
lefinite shade; they have taken up but a small portion
olour from the decoction, and no real dyeing has taken
e.

'se of Mordants.—To obtain permanent dyes from the
t majority of native colouring materials the intervention
another class of bodies entirely different from either
ous or colouring matter is found necessary; these bodies
called *mordants*. The term mordant is found in Latin
Italian manuscripts of the 12th and 13th century, as
name of an adhesive composition by means of which
leaf could be attached to wood, marble, or metal;
y dyers appropriated the word to designate a substance
means of which colouring matters could be made to
ere to fibre, and it has been retained in that sense in all
lern treatises upon dyeing.

'he chief mordants used in dyeing are salts of aluminium,
, tin, chromium, copper, and a few other metals. When
coction of a colouring matter, say logwood or cochineal,
eated with a small quantity of a properly chosen salt of
of these metals, it is found that the colouring principle
s its solubility, forms a combination with the metallic
or its bases, and precipitates to the bottom of the solu-
, leaving the supernatant liquid nearly or quite colourless.
precipitate is usually called the "lake" of the particular
al and colouring matter, which are probably in a state
hemical combination; the lakes are insoluble in water,
are only split up again into their constituents by the
on of somewhat powerful chemical agents.

'ibre cannot usually be dyed by means of ready formed
s, for the reason that they are insoluble in water and
easily soluble in any menstruum which can be safely
lied to such material; they are themselves of too coarse
gross a nature to penetrate the fibre, and when applied
rest for the most part on the surface, and are therefore
ly removable by washing or mechanical friction. It
nown, however, that for some colours in calico-printing lakes can be applied, but that is only in conjunction with acid salts and at a high temperature, by means of which a sort of solution is obtained while in contact with the fibre itself. The art of the dyer consists in so arranging these three elements—fibre, metallic salts, and colouring matter—that he may obtain the formation of the insoluble coloured lake in the body of the fibre itself, whereby either by the lake being mechanically retained or chemically combined the fibre is permanently coloured.

Application of Mordants.—There are three principal ways in which the mordant and colouring matter can be put into contact with the fibre, the developments and modifications of which constitute the whole art of dyeing.

1. By the first method, which is by far the most common, the fibrous matter is separately impregnated with the mordant, which is by various means decomposed, so as to deposit its base in an insoluble state upon or within the fibre, and afterwards the colouring matter is applied. Take, for example, the case of dyeing a common black from logwood upon calico, which has no affinity for the colouring matter of the logwood. The first process is to pass the calico through a hot aqueous solution of sulphate of iron, sometimes mixed with acetate of iron, and to remove the excess by passing the cloth through rollers; the cloth, either previously dried or not, is then passed through a mixture of lime and water which has the effect of decomposing the iron salts and liberating oxide of iron. A washing in water to remove the excess of lime or any loosely attached oxide of iron prepares the calico for coming into contact with the logwood. The calico, which has now a buff colour, owing to the attached mordant of oxide of iron, when placed in a hot decoction of logwood speedily acquires a dark hue and in about half an hour has become dyed of a dense black colour, and, when smoothed and finished, forms the common black calico of the shops. A variety of other cases might be adduced; woollen cloth boiled for some time in bichromate of potash solution acquires a certain amount of a salt of chromium, which enables it to take a black colour from logwood, and other colours from other dye-stuffs. Woollen, boiled with salts of tin, is enabled to dye up a brillant scarlet in decoction of cochineal; boiled with alum, it will take a great variety of colours in various dye-stuffs. The practice of calico-printing illustrates in a very forcible manner the action of mordants; by the aid of apparatus described in the article upon that subject, portions of a piece of calico are impregnated with mordants, and these portions alone acquire colour from the dyeing solution, and thus designs or patterns are produced upon a white ground. The most usual method of impregnating the fibrous matter with mordant, consists in heating it with the required metallic salts, and it will be seen hereafter that easily decomposed salts are those preferably used; or substances such as chalk, alkalies, or tartar are added to some more stable salt, such as alum, to induce the formation of comparatively unstable compounds, which, under the influence of a high temperature and contact with fibrous matter undergo decomposition,—the metallic oxide or some basic insoluble compound of it becoming intimately combined with the fibre, which is then said to be mordanted.

2. A second method, less general than that above described, is to apply the colouring matter before the mordant. It is resorted to only with heavy goods which absorb a large quantity of liquid, or with light colours upon other fabrics; dyes produced in this way are superficial in their character, and not so permanent as those produced by the first method. In dyeing by that method it is in many cases customary to add a small quantity of mordant to the dye-bath when the process is quite or nearly finished, or to pass the dyed goods, as a final operation, through a diluted mordant.

3. A third method is to apply the mordant and the colouring matter together to the fibrous substance. In common piece-dyeing in weak liquids this plan is seldom followed, on account of the tendency to form insoluble lakes in the solution, which, depositing only on the external part of the fibres, give inferior results, alike as to stability of colour, depth of shade, and evenness or regularity of the dye. In calico printing or in padding, this method is of extended application and the inconveniences experienced in common dyeing are not perecptible, owing to the greater concentration of the mordanting salts and the use of thickening matter. Lakes are very probably formed to some extent during the preparation of the mixtures, but, the combination taking place in the presence of a fluid made viscous with gum or starch, the insoluble lake is in an extremely fine state of division; in such a mixture there is always present an acid or an acid salt, such as acetic acid, oxalic acid, tartaric acid, or alum, chloride of tin, cream of tartar, or binoxalate of potash. These tend, in the first instance, to restrain the formation of a lake, and afterwards, when the fibre and the mixture of mordant and colouring matter are submitted to heat, as in the process of steaming or stoving, facilitate the solution of any lake formed, which thus finds entrance into the fibrous matter, and there undergoes combination with it,

owing to decomposition of the mordanting salts, a true dyeing taking place.

Practical Dyeing Processes.

By the foregoing preliminary observations the reader will have been prepared to comprehend the *rationale* of the practical processes of dyeing. In order to give a fairly comprehensive account of these, it has been found convenient to take the colours in the old arrangement of simple and compound colours. Red, blue, and yellow are supposed to be simple or primitive colours; the methods of obtaining these being given, then follow the colours from mixtures of two of the elementary colours, as green from yellow and blue; orange from red and yellow, and purple from red and blue. The colours not included in the above, and in the dyer's philosophy made by mixing the three elementary colours, red, blue, and yellow, in different proportions—namely, the browns, greys, and chocolates, and black—will be conveniently treated of after those supposed to result from the mixture of two of the primary colours.

This arrangement, though perfectly arbitrary, is both convenient and consistent as far as regards dyeing; for though modern discoveries in optics may show that pure blue and yellow do not make green, and may in other respects disturb the older ideas concerning primitive and secondary colours, yet the dyer has sufficient justification for retaining the old system, because he can show that his blue and yellow always make green, and that the proper mixture of the so-called simple colours produces a compound shade which can be calculated beforehand from the proportion of the respective colours employed.

Red Colours.

The most important of the red colours produced by dyeing are obtained from cochineal and from madder, the former being used for woollen and the latter for cotton goods. They are both old colours, and have arrived at their present excellence by slow degrees; they are deep and brilliant, and, as far as regards permanency, hold the highest position among all dyed colours. The processes employed are instructive as illustrating the diversity of treatment required by different fibres and colouring matters.

Red upon wool from cochineal.—Let it be assumed that the shade of red required is fine scarlet, such as is worn by officers of the British army, and that the woollen cloth is of finest quality. The cloth first requires purifying from all the adventitious substances which it has acquired in the process of manufacture, in order to prevent irregularity and unevenness in the shade of colour; this is done by methods described in the article BLEACHING. The only materials required to produce a fast scarlet upon wool are oxide of tin and the colouring matter of cochineal, but it requires much practical skill to bring them into contact properly. After the cloth is cleaned, and while it is still wet from its last washing, it is mordanted by boiling it in a solution of a salt of tin with or without cream of tartar. The parts of the boilers not in actual contact with the fire are frequently constructed of pure block tin, or at least all parts out of water should be of this metal, or else protected by wood, or the dyeing vessel should be made entirely of wood and heated by steam pipes; for if the cloth containing the acid solution of tin comes in contact with a copper or brass surface it acquires a stain which afterwards dyes up an impure colour. What takes place in the course of boiling is that eventually a certain portion of tin, probably in the state of stannic oxide, becomes fixed upon or within the fibres of the wool, and this in a perfectly uniform manner. The tin not in intimate combination with the wool, or held merely by capillary attraction, is washed off by water before the cloth is brought into contact with the colouring matter.

The mordanted cloth is now brought into a boiler containing finely ground cochineal diffused through a sufficient quantity of water, to which it is usual to add some more tin mordant and tartar; the cloth is turned continually to prevent folds or creases from interfering with the free access of the dye to all parts of it. The contents of the boiler are heated to the boiling point, and in half an hour or so the liquid becomes nearly colourless, and the cloth is found dyed of a bright red.

The above may suffice to furnish a general view of the procedure usually followed, and to illustrate the principles involved with regard to numerous other dyes besides cochineal. To give the general reader a further idea of certain operations practised in the use of that colour (and the description applies more or less others), the following particulars may be noted.

The tin mordant used for scarlet on wool.—It is now 200 years since the discovery was made of the use of tin with cochineal dyeing scarlet; it might be thought that by this time the [illegible] kind and quantity of tin solution to be used would have been settled; there exists, however, the greatest diversity upon this point among practical dyers. The two salts of tin met with in commerce, designated by chemists stannous and stannic chlorides, have received various names from dyers. Crystallized stannous chloride is generally known as "tin crystal;" the solution of the same as muriate of tin. A single muriate and a double muriate of tin are also distinguished, the difference being in the degree of concentration; but in some parts of the country double muriate of tin is the name given to a solution of stannic chloride, elsewhere called bichloride of tin, and a good deal of confusion is sometimes caused by the various uses of the trivial names of the solution of tin. Experience teaches the dyer that there are scarcely two dye-works in the world in exactly the same condition with regard to either water and air, or apparatus, or quality of materials, and that the nature and quantities of drugs, mordants, and dye-stuffs used, and the duration and temperatures of the operations which secure admirable results in one place are altogether unsuitable in another. It is, however, clear that by far the greater part of the variations introduced by practical dyers are not really founded upon necessity. Thus although the best colours can be obtained by the use of simple tin solutions manufactured on the large scale, in nine cases out of ten the operative dyer of scarlet insists upon preparing his own solution, and pretends that he employs special methods and preparations without which it would never be fit to use; and hence a countless number of tin solutions are in use.

Tin spirits.—The solution of tin used by dyers for the scarlet and for many other colours upon wool, silks, and cotton, are commonly called spirits, or "tin spirits," a name which is very old, and appears to have originated in the use of nitric and hydrochloric acids to dissolve the tin, which acids were formerly, and are even at present, called spirits of nitre and spirits of salts. One solution which is a favourite, from the ease with which its metal goes to the wool, is the so-called nitrate of tin (sometimes called "bowl spirits," from being prepared in an earthenware bowl) made by dissolving thin metallic tin in moderately strong nitric acid. This is an operation requiring great care and some experience to prevent the formation of insoluble metastannic acid; the tin is added by small portions and gradually, so that the acid does not become hot; the solution takes place quietly, inodorous nitrous oxide is evolved, and ammonia is formed. If the tin be added too rapidly to the acid, red fumes of nitric oxide are evolved, the liquid boils up, becomes thick from separation of metastannic acid, and is utterly useless as a mordant. This so-called nitrate of tin is a very unstable compound, decomposing spontaneously in a few days, so that it has to be prepared just as it is wanted; it is therefore not an article of commerce. The other very numerous "tin spirits" may be said to be solutions of tin in a mixture of nitric and hydrochloric acids; but the latter acid is sometimes replaced by the chlorides of sodium and ammonium, the resulting mordant being essentially a stannic chloride mixed with stannous chloride. Closely woven and loose woollen fabrics, such as yarn and flannel, require different tin mordants, as some mordants are more quickly decomposed than others. The result of using an easily decomposable mordant such as the nitrate of tin upon closely woven cloth would be the formation of a deposit upon the external fibres of the wool, the interior of the cloth being unaffected. For such cloth, therefore, a tin spirit which is only slowly decomposed, such as the muriate alone or mixed with tartar, must be chosen, so as to allow of a tolerably thorough saturation of the cloth before the breaking up of the mordant during the boiling. Here it may be observed that good, thick, and finely woven cloth which is dyed in the piece, that is, after weaving, is hardly ever completely dyed through; this can easily be shown by cutting through the cloth with a sharp knife, when the interior will be seen sometimes nearly white and generally much paler than the exterior; hence the preference which is given to cloth made from yarn dyed before weaving, the colours of which do not fade so readily as those of piece-dyed goods. Imperfection in the dyeing of the latter can by care, however, be reduced to a minimum, and in dark goods is hardly discernible.

Use of tartar along with tin mordant.—The "tartar" of the dyer is a more or less impure form of the cream of tartar of the shops, or the acid potassium tartrate of chemists. It is in very general use for wool dyeing, and when employed with dye-stuffs plays the part of an acid, and could in fact be replaced by an acid; in other cases, when used in mordanting, it no doubt acts as a salt, contributing to neutralize the strong mineral acids of the mordant, and rendering them more ready to decompose in the presence of the cloth. In a particular receipt for dyeing scarlet the proportions of materials are as follows:—20 ℔ of tin solution, containing about 20 ounces of metallic tin dissolved in nitric acid, with the addition of a little common salt, are used to 100 ℔ of woollen cloth. Of the 20 ℔ of mordant, 13 ℔ are taken and mixed with a solution in water of 8 ℔ of crude tartar, and about 8 ounces of cochineal are added to enable the dyer to form a judgment of the progress of the mordanting. The ingredients having been boiled for a couple of hours, the cloth is rinsed in clean water and placed in another boiler, containing the residual 7 ℔ of mordant and 6 ℔ of ground cochineal, which are sufficient to dye up a full scarlet colour; but if the scarlet is required to be very bright, or what is called "fiery" coloured, a further quantity of tartar is added; this has the effect of somewhat reducing the depth of colour, and at the same time giving it a yellowish or orange hue, which for certain purposes is much desired.

Use of yellow in scarlet.—It appears that Bancroft, who wrote about the end of the last century, was the first to suggest that the bright fiery scarlet, which the dyers found they could best obtain by using a large quantity of tartar, might be produced more cheaply by adding some yellow colouring matter to the cochineal, or by first dyeing the cloth a light yellow; he tried the yellow from quercitron bark, and succeeded as far perhaps as was possible with that material. At any rate from his time it has been customary for dyers who do not aim at the highest degree of excellence in the scarlet colour to use a purified preparation of quercitron bark, commercially known as flavine, in conjunction with cochineal; other yellow colouring matters, such as fustic and turmeric, are also used. An admixture of these substances cheapens the cost of the colour, which can be made nearly equal in appearance to that obtained with cochineal alone, but it does not stand wear so well, and is more readily stained by various influences. The best scarlets are still dyed exclusively with cochineal.

Scarlets on wool from lac-dye.—The colouring matter of lac-dye is in its chemical properties and composition very similar to, if not quite identical with that of cochineal. As it is imported into this country from India, it is, however, less pure than average qualities of cochineal; and it is probably on account of its impurities that the dyer cannot obtain quite so good results as the best cochineal colours, although if skilful he may approach them very closely. Having been submitted to a preliminary treatment with acid to free it from alumina and other earthy matters used in its preparation, it is then applied exactly in the same way as cochineal. It is extensively used for a second class scarlet, and is believed to be somewhat more durable and stable even than cochineal. The red cloth so much used for military dress is reputed to be prepared mainly with lac-dye.

Crimson red on wool.—This colour is also dyed with cochineal, but with a mordant of alum instead of tin. It is a far less important colour than the scarlet, and compared with it is dull and flat; it is, however, rich and durable, and combines excellently with other colours.

The mordanting of cloth by means of alum, an operation of capital importance for a large series of colours derived from all varieties of dye-stuffs, must now be noticed.

Aluming of wool.—The method of mordanting with alum, generally called aluming, is practically a simple process, but the chemical principles involved have given rise to much debate amongst experimenters. The aluming is usually performed by boiling the wool for one or two hours in a solution of common alum mixed with tartar; a certain portion of alumina, or, it may be, of some compound of aluminium, becomes thus intimately combined with the wool, and forms a basis upon which a coloured lake may be produced with solutions of colouring matters. The chemical conditions are somewhat different here from those which obtain n the case of mordanting with tin; for the disposition of tin salts n dilute solutions to decompose even spontaneously is so manifest hat it may readily be supposed that some action on the part of the wool takes place which induces the formation of oxide of tin. The great apparent stability of alum caused the explanation of its action given by Thenard and Roard to be for a long time accepted. They held that it was absorbed whole or unchanged by wool, which retained it by some undefined power, so that it could not be removed by cold water, and required to be heated twenty times with boiling water to dissolve it out. In the light of modern researches this explanation may be safely rejected as erroneous. What appears to be the true state of the case was mainly brought out by experiments of Havrez, suggested by the celebrated Belgian chemist Stas, and supported by further knowledge of the properties of alum discovered by Tichbourne and Naumann. In fact, alum, contrary to what was formerly thought, is particularly liable to decomposition, even when not in contact with fibrous matters which might possibly have an influence upon it. Naumann has shown that by simply heating a solution of alum, saturated in the cold to ts boiling point, an insoluble basic compound is soon produced, so that, after prolonged heating, as much as 25 per cent. of the alumina is precipitated, and the liquid is found to have become acid. Beyond this fact it is proved that wool when placed in a solution of alum, containing pure sulphuric acid, has the property of absorbing more acid than alum; this unequal absorption is attributed by Havrez to a kind of dialysis, which, together with the tendency of the alum to decompose, sufficiently explains the deposition of alumina upon the wool. The action of tartar in aluming, according to the same authority, is that of an acid salt, and its addition influences the nature of the mordant deposited in the same way as if an excess of alum were present, or as if other acid bodies, such as sulphuric acid, oxalic acid, &c., were added. The insoluble aluminous compound which separates from solution of alum on prolonged boiling in a glass flask could not act as a mordant, being indifferent or passive to colouring matters; when deposited on fibrous matter it does not adhere, but can be washed off, or when dry may be shaken off like dust; this, therefore, is not the alumina mordant, nor do the researches of Havrez really point out what the alumina mordant is, though they are valuable and suggestive as showing under what conditions either a basic or an acid aluminous deposit is formed. With the former, which is unfavourable for dyeing, a blue colour is given with logwood, and a purplish red with Brazil wood; with the latter, the wool dyes up a violet with logwood, and a purer red with Brazil wood. The basic state of the aluming results, it is supposed, from the deposition of hydrate of aluminium upon the wool, and is caused by having too little alum or too much water, by boiling for too long a time, or by the use of salts which have a neutralizing action upon the alum. It is easily induced, when the weight of wool is more than 15 times greater than that of the alum. In other circumstances the acid state results, in which the wool is said to fix first hydrate of alumina, and also hydrated sulphuric acid from the sulphate of alumina. These conclusions of Havrez cannot, however, be accepted as final or satisfactory; and there is still much to learn upon the principles of aluming and mordanting generally.

The wool being successfully alumed acquires a crimson colour by dyeing in cochineal, but, as before stated, this shade is not of much value.

The shades of red between scarlet and crimson reds proper, or cherry reds, are also dyed with tin mordant and cochineal in nearly the same way as the scarlet; but in order to avoid a yellowish tone, the natural cochineal may be mixed with the manufactured or modified material known as ammoniacal cochineal.

Ammoniacal cochineal.—This is made by treating ground cochineal with concentrated aqueous ammonia for several days; the colouring matter undergoes important changes by this process, an amide is formed, and the effect upon the colouring matter is that tin mordants give with it no longer a scarlet, but rather a violet tone. Ammoniacal cochineal is much used in fine dyeing for pinks; and according to the proportion in which it is added to ordinary cochineal, the normal scarlet shade is gradually brought over to the red and even to the crimson.

Pink or rose colour upon wool.—This shade is obtained from ammoniacal cochineal, mordanting previously in a mixture of tin solution, alum, and tartar; the quantity of tin mordant used is small, the alum being the essential basis.

Other red colours upon wool.—The colours mentioned above are from cochineal or its congener lac-dye; there are several reds obtainable from other colouring matters, which, though less important, are still worthy of mention.

Madder red upon wool.—This colour is wanting in brightness, but it is valuable for its stability, and has at times been largely used for common red military cloth. As a basis for browns, chocolates, and other dark colours, it is very suitable when its comparatively high cost is not an objection. To obtain madder red, the wool is boiled for two hours with a mixture of alum, tartar, and tin salt,—3 ℔ alum, 1 ℔ tartar, and 4 ounces of the tin solution being taken for 10 ℔ of cloth; after boiling, the cloth is rinsed in water to remove uncombined mordant, and then dyed with madder, or preferably its derivative garancin, with addition of a portion of tartar; the dyeing may be accomplished in an hour, the depth of colour varying with the amount of colouring matter used.

Artificial alizarin on wool.—By employing artificial alizarin somewhat better shades of colour can be obtained, and even pink colours of much solidity produced. A process for obtaining a fast red on woollen yarn, from alizarin, is as follows:—boil 10 ℔ wool for an hour and a half with 1½ ℔ sulphate of alumina and ½ ℔ tartar; rinse in water, and then dye with 6 to 7 ounces of artificial alizarin paste containing 10 per cent. of dry matter; commence the dyeing cold, and gradually heat to boiling. Alizarin can be used as a basis for producing fast brown shades, by adding fustic and extract of indigo after the red has been developed, and if necessary, a further quantity of sulphate of alumina and tartar.

Red colours can also be obtained by using Brazil wood or other red woods instead of madder; they are, however, of a low class and seldom employed. Archil alone, without mordant, can yield a full crimson upon wool, but it is not very stable, and is, moreover, expensive.

Aniline reds upon wool.—There are several artificial red dye-stuffs, which may be used for wool, but none possesses great excellence. The only one which resembles cochineal in its qualities is the recently discovered eosine; this, with an alumina mordant, gives upon wool a very good imitation of cochineal scarlet, but an imitation only, for the colour fades rapidly in sunlight, and is easily washed out by soap and water. Substances similar to eosine, which have even still more recently appeared in trade, are called coccine and nopaline; they yield beautiful but perishable red colours on wool and silk.

Red colours on cotton.—Turkey red.—Cochineal, which is so suitable a colouring matter for wool, does not dye satisfactory colours upon vegetable fibres; but from very remote times the Hindus have possessed a process for dyeing a brilliant and extremely permanent red upon cotton fabrics by means of madder. This process travelled westward through the Levant into Turkey and Greece, the date of its introduction into Western Europe going no further back than the middle of the 18th century, at which period Greek dyers were induced to settle in France and make known the methods in use for the production of this much desired colour. The name Turkey red, or Adrianople red, was applied to calico dyed with it at the time that such goods could be obtained only from the East, and it still retains the name. So much was the colour esteemed that in 1765 the French Government circulated a pamphlet describing the best known methods of dyeing it on yarns, and some years afterwards, the British Government paid a sum of money to a Frenchman named Papillon, for disclosing the whole process of obtaining it. The dyeing of Turkey red upon cloth and yarn is now extensively carried on in Great Britain, and with great success. Turkey red is essentially a madder red with an aluminous basis, but differs from a common madder red by containing oil, and it is the fixing and combining of the oil with the fibre and the colour which constitutes its peculiarity. Divested of details the process of producing Turkey red may be divided into four stages:—(1) the oiling of the cloth; (2) mordanting with a salt of aluminium; (3) dyeing with madder, or its equivalents garancin or alizarin; and (4) the brightening of the dyed colour. The preparation of the cloth with oil is a process used in no other kind of dyeing; of its utility there can be no doubt, but all the attempts of chemists to explain the *rationale* of its action have failed. There are many modifications of the method of applying the oil, but the older and more commonly used process is to mix the oil with a dilute solution of potash or soda ash, so as to diffuse it uniformly through the liquid, forming an emulsion; the oil is not dissolved by the alkalies, nor is it supposed to combine with them, but is simply held in a state of excessively fine mechanical division. A low quality of olive oil is most generally used in Europe, that from Mogador, in the north of Africa, being very suitable. Certain kinds of oil do not answer for Turkey red, only those being suitable which, probably from containing free fatty acids or albuminous matters, readily form a milky emulsion with weak alkaline solutions; other kinds are, however, in use in some places. The cloth to be dyed is steeped in the oily emulsion, wrung out, and dried in a warm stove; this process is repeated six or eight times, and the cloth is finally washed in weak alkali to remove from it all the oil not intimately united to the fibre. The result of this treatment, which is the most delicate and important in the Turkey red process, is that the cloth becomes impregnated with a fatty matter, which by the contact of alkalies and heated air has undergone some change from its original state, which is usually called an oxidation, but the nature of which is really unknown. The cloth now possesses a power of attraction for mordants and colouring matters greatly superior to untreated cloth; and further, its physical condition is changed so that colours upon it are more transparent and more vivid than upon ordinary cotton.

The cloth in this state is ready for mordanting, which is done by passing it through a bath of alum, partly neutralized with carbonate of soda or by chalk, or in a bath of acetate of alumina, the object being to obtain a regular deposition of the aluminous base upon the fibre; the excess of mordant is carefully washed away from the cloth, which is now ready for dyeing.

The dyeing is accomplished in the ordinary way, by keeping the cloth in continual motion in a vessel containing heated water and the dye stuff, which may be madder, garancin, or artificial alizarin. It is a very general practice to add a quantity of ox-blood to the water used in dyeing Turkey red. What purpose this fulfils is not known; its colouring matter cannot be supposed to be of any use; its albuminous constituents may have some useful action, but this seems very doubtful; probably its addition is quite superfluous, and is retained from older times, when dyeing was less understood than at present. When the dyeing is completed the colour is a full and deep but dull red, which requires brightening. The brightening operations consist in removing brownish matters from the dye by boiling in soap and alkalies. To give a still more brilliant colour, the goods are boiled for several hours in a closed copper boiler with a mixture of salt of tin with the soap used in the last process of brightening,—occasionally under a pressure greater than that of the atmosphere, in order to obtain a temperature some degrees higher than 212° F.

In many processes of Turkey red dyeing, the cloth is treated with decoction of gall-nuts, or with sumach, after the preparation with oil and before the mordanting; this enables it more easily to absorb and fix the aluminous mordant, but it is not essential, and is most generally omitted.

No allusion has been made to a number of excrementitious and other animal matters, which the old dyers used in the oiling process, such as sheep-dung, cow-dung, ox-bile, &c.; they can be dispensed with, and were employed probably from caprice and ignorance.

Barwood red.—An imitation of Turkey red is obtained from barwood; it is much inferior both in beauty and stability to the real colour, but the ease with which it can be dyed, and the less costly nature of the materials employed, enable it to be sold at a much lower price, and for some purposes it is largely used. Barwood is one of the red dye-stuffs of which the colouring matter is very slightly soluble in water; it is used in a state of fine powder. The cotton to be dyed is impregnated with a tin mordant by any of the means known to dyers, and then boiled with the dye-stuff; the colouring matter as it dissolves is fixed by the mordant, and the process is continued until the required shade is obtained. This wood and a similar material called camwood, are also employed in woollen dyeing to give brownish reds, and to dye a "bottom" or foundation for indigo blue colours, by which some economy in indigo is effected and a peculiar bloom on the blue is produced.

The class of woods represented by Brazil wood, do not yield good reds upon cotton.

Blue Colours.

The most important of the blue colouring matters is indigo. This may be said indeed to be the most important of all colouring matters, both as regards the large quantity and monetary value of what is produced and sold, and the permanence and solidity of the dyed colours which it yields. The indigo dye is a manufactured article, prepared in the place of growth of the plant which produces it. The indigo plant could itself be used for dyeing, but from 200 to 250 ℔ of it would be required to produce the effect of a single pound of the prepared indigo. In England, and many other countries possessing a temperate climate, the species *Isatis tinctoria*, or woad, has been cultivated, and has been used from time immemorial for dyeing blue. Its comparative poverty in colouring matter has caused it long since to be disused by dyers as a source of colour; it is, however, employed by them in the preparation of their indigo vats, but rather as a convenient material to induce fermentation then as a dye.

Indigo is distinguished from nearly all other colouring matters by its complete insolubility *per se* in water and other ordinary solvents. It dissolves to a very slight extent in heated aniline, petroleum, and acetic acid, which upon cooling redeposit it; the only real solvent for it is anhydrous acetic acid mixed with a little sulphuric acid, from which water precipitates it unchanged, but this solvent is inapplicable in dyeing. But solubility is an essential condition for dyeing, and means have been found to obtain satisfactory solutions of indigo by circuitous methods which involve the temporary destruction of its blue colour and a change in its chemical composition. By various deoxidizing agents, indigo blue can be changed into a white substance, indigo white, which dissolves with facility in all alkaline liquids, forming a colourless or slightly yellow solution. On exposure to the air or other sources of oxygen, the solution yields the insoluble blue indigo, and permanently dyes any fibre which has been saturated with it.

This is the only case in which such a method of dyeing is applicable, and on that account it possesses much interest. We shall now proceed to describe some of the practical methods in use for indigo dyeing.

Fermentation process.—The oldest of these, and one naturally suggested by the method employed in preparing the dye-stuff, is the process of fermentation in contact with lime, or sometimes soda or potash. During this process, gaseous or liquid substances are formed, which have the power of reducing indigo from the blue to the white state, and fitting it for dyeing. This ancient method has not been superseded in England at least, being employed at the present day for nearly all woollen goods dyed with indigo, the consumption of which is greater for woollen than for all other kinds of cloth.

woad vat.—To a course of lectures upon dyeing, recently
red by Mr Jarmain before the Society of Arts, we are indebted
substance of the following account of the woad vat used by the
hire dyers. The materials employed are indigo, woad, madder,
and lime. For this process as for every other in which it is
yed, the indigo must be reduced to the finest possible powder.
enerally ground mixed with water, in closed revolving cast-
ylinders containing iron rollers or balls, for several days, or
the slime or pulp formed contains no visible particles of the
uff. The proportions of materials employed are:

Lincolnshire woad	5 cwt.
Wheaten bran	18 ℔
Slaked lime in dry powder	22 "
Madder	2½ "
Indigo	24 "

woad is first placed in the dyeing vat nearly filled with water,
is heated to between 140° and 150° F.; after some hours
ired to soften the woad), the bran, madder, and indigo are added,
alf of the whole quantity of lime. In a few hours, if all is
signs of commotion produced by fermentation will be visible,
quid will become greenish, and a blue scum will be visible on
rface; a piece of wool is put in as a test, and if in a short time it
nes dyed blue the process is proceeding well; a little more lime is
l, but at intervals, so as not to check the progressing fermenta-
and, if it should become necessary, the vat is heated up by steam
original temperature; on the third day the vat should be ready
lyeing. Such a vat as this requires skilful management to
ol the fermentation; without lime the reduced indigo would
be dissolved; with too much lime the fermentation would be
ed. The woad acts as an easily fermentable matter, and
shes a portion of blue colour; the bran also no doubt is useful,
ccount of the ease with which it begins and promotes fermen-
n; the madder is probably of no use at all, its employment
still continued from an old unfounded notion that it gives some
red colouring matter to the indigo-dyed goods, for the small
nt of saccharine matter present in 2½ ℔ of madder cannot be
of any importance in the presence of 5 cwt. of woad.

woad vat, when ready for dyeing, consists of a certain depth of
lerably clear solution of white indigo in lime, and a somewhat
minous semi-solid mass at the bottom, consisting of the bulk
e woad, the excess of the lime, the insoluble part of the madder,
the impurities always present in indigo. To keep the cloth to
lyed from contact with the muddy bottoms an iron hoop, of
internal diameter of the vat, covered with a network of open
hes is lowered into it and secured at a safe distance from the
om.

he pieces to be dyed, after being well cleansed, are placed in the
or, and kept in constant movement to insure full access of the
ur to all parts. The time required to dye, varying from 20 min-
to two hours, will depend upon the fineness and weight of the
h, and upon the depth of colour required; if the goods require it,
are dyed a second time. In moving the pieces about, they must
be brought above the surface of the liquid, for the oxygen
he air would restore the dissolved white indigo to its blue in-
ble state. When the pieces are found to be sufficiently impreg-
d with the dye, they are withdrawn from the vat; at the
nent of leaving the dyeing liquor they are seen to be of a
owish colour, which almost instantly changes into a bright
n, then darker green, and finally becomes blue through the
rption of oxygen by the white indigo. Loose wool or yarn is
d by inclosing it in an open and movable network bag.

he vat above described can of course dye only a limited quantity
naterial, becoming after every operation poorer in indigo; but it
ot necessary to re-set a vat. The strength of its contents is kept
by constant additions of indigo, lime, and bran; no more woad
dded, the quantity used at first being sufficient for about its
weight of indigo.

ran and molasses vat.—Another kind of indigo dye vat, very
nsively used on the Continent, and highly spoken of by practical
, is prepared as follows. A vat 6 feet in diameter and 7 feet
p is filled with water warmed to 130° F.; then 4½ ℔ of ground
igo, 34 ℔ crystals of soda (or instead 16 ℔ soda ash) and 67 ℔ of
n, and twelve hours afterwards 2 ℔ slacked lime, are added;
4 hours the indigo should commence to be dissolved, and a test
p of stuff plunged in the liquid should be speedily dyed, but some
rs longer and the gradual addition of 18 or 20 ℔ more of lime
required to bring the liquor into its best condition. In this vat, as
he woad vat, the lime controls the fermentation of the bran, and
to be added with care. With each pound of indigo added to
ace what has been removed from the vat during a day's dyeing
of molasses and ½ ℔ crystals of soda and 3 or 4 ℔ lime must be
l. By daily replenishing the vat it can be used continually for
r or five months; at the expiration of that time the bottoms
st be removed; the supernatant liquor containing indigo in solu-
may be used instead of water for setting a fresh vat. This vat is
l to have quite supplanted the old woad and madder vat, molasses
ng preferable on the score of cheapness and also of solubility.
The soda not being necessary for the solution of the indigo could be omitted in the setting of the vat, but it is reckoned useful in assisting the wool to take the dye; for the wool, however well it be bleached, is said to retain some greasy matters that yield to the soda, which thus enables the indigo to give fuller and faster colours than when lime alone is used.

It is to be observed that the two vats just described are what are distinguished as "warm vats," being made and worked at a temperature considerably above that of the air,—a condition held necessary for dyeing wool and some kinds of heavy cotton goods. For ordinary cotton dyeing the vats are used cold or at the ordinary temperature of the air, and are prepared in quite a different manner.

Copperas and lime vat.—A strong copperas and lime vat is composed as follows:—

900 gallons of water.
60 ℔ green copperas
36 ℔ ground indigo.
80 to 90 ℔ dry slaked lime.

These materials are well mixed together and raked up at intervals for say 24 hours, when the vat is ready for use. The lime decomposes the salt, liberating ferrous oxide, which acts upon the indigo, converting it into white indigo, which dissolves in the lime water. In large establishments for dyeing calico blue, it is usual to have a series of such vats in a row; the pieces to be dyed are tightly stretched on a frame and dipped in the liquid for from seven to ten minutes, after which they are believed to be as fully saturated as possible; the frames are next raised into the air, and in a few minutes the blue colour becomes developed; the same process is then repeated until the required depth of colour is obtained. By printing certain resisting compositions on the cloth previous to the dipping, white figures can be obtained upon a blue ground, producing what is known as the navy-blue style of print, formerly much worn by the lower classes in England. By combining suitable mordants with the resisting composition, not only white, but orange, yellow, and green coloured figures can be obtained upon the blue ground; but the production of these is rather a branch of calico printing than of dyeing proper.

Although this kind of vat is most generally used for the lighter qualities of calicoes, it can also be applied to such woollen goods as merinoes, which are not very closely woven, and also to silks.

Hydrosulphite of soda vat.—In 1871 Schützenberger and Lalande introduced a new reducing agent applicable to indigo dyeing, the so-called hydrosulphite of soda, obtained by acting upon acid sulphite of soda with metallic zinc. It possesses the most energetic deoxidizing powers, and in the presence of alkalies almost immediately reduces and dissolves indigo. It has been applied both in dyeing and in printing indigo colours, but cannot be said to have succeeded in displacing the older kinds of vats, having the disadvantage of costing much more without producing any apparent improvement in the colour yielded.

By preparing a very strong indigo vat, and thickening the fluid with gum, it is possible to print indigo blue colours in designs, but the many difficulties attending the process have very much restricted its application.

The colour yielded by indigo, though far from brilliant, is extraordinarily permanent, and is much used for articles intended to withstand much wear and rough usage, and also as a basis for the best quality of black upon fine woollen cloth.

Sulphate of indigo.—When indigo is acted upon by concentrated sulphuric acid it forms a solution of the so-called sulphate or extract of indigo, which, though possessing an intensely blue colour, cannot by any means be made to furnish the original dye. This preparation of indigo is applied only in wool and silk dyeing; it gives blues which are tolerably bright, but possess none of the stability of those obtained from real indigo. For vegetable fibre it has no affinity whatever either with or without mordants.

Prussian blue.—This, perhaps the earliest of artificial dye-stuffs, was accidentally discovered in 1710, though not used in dyeing for some time afterwards. The simplest method of employing it consists in first impregnating the material to be dyed with peroxide of iron, and then passing it into a solution of yellow prussiate of potash acidified slightly with sulphuric acid. Prussian blue upon silks is thus dyed. The most convenient way of obtaining a deposit of the oxide of iron consists in soaking the silk in a somewhat strong solution of the ordinary dyers' nitrate of iron; in the course of two or three hours a certain quantity of the oxide is found to be intimately combined with the silk; the excess of nitrate is then washed away and the silk worked in the acidified prussiate bath, when it immediately assumes a light azure shade; by repeating the treatment several times any depth of colour may be obtained.

Calico can be dyed in the same way, but both for that and for silk it is usual to add to the iron solution a small quantity of salt of tin, which is useful in giving a purplish tone to the blue and preventing the production of a disagreeable greenish tinge.

A deep colour cannot in this way be satisfactorily given to woollen, for which a treatment is adopted depending upon a decomposition of the prussiate by means of heat and acids. For dyeing say 110 ℔ of merino the following proportions and methods may be used. Dissolve 9 ℔ of yellow prussiate of potash in hot water, and add the solution to the required quantity of water; then add 14 ℔ sulphuric acid, 6 ℔ sal-ammoniac, and about 6 oz. of crystals of protochloride of tin; the merino is placed in the mixture, and the temperature of the dye-bath gradually raised to the boiling point in five hours. The blue gradually formed on the cloth requires brightening in a fresh bath consisting of alum, persalt of tin, and cream of tartar, heated to nearly the boiling point. Red prussiate of potash is used in nearly the same way to dye dark Prussian blues upon wool, but as it is more easily decomposed than the yellow prussiate a weaker acid-bath suffices. These blues are frequently finished off with logwood to give them a deeper tone.

Prussian blues can also be obtained on such woollen goods as merinoes, by a process of padding, and the use of a colour nearly identical with the so-called French or royal blue used by calico printers. A mixture is prepared as follows. Half a pound of wheaten starch is boiled with about half a gallon of water; in the thin paste thus made 13 oz. of powdered yellow prussiate are dissolved, and afterwards 6 oz. of tartaric acid; when the mixture is quite cold 1 ℔ of prussiate of tin in paste is added, 1½ oz. oxalic acid, and 3 oz. sulphuric acid; the whole is well mixed and strained. The woollens to be treated are first "prepared," as it is called, by impregnating them uniformly with oxide of tin, and then the above thickened mixture is applied by means of rollers, so that it shall be evenly and smoothly spread over the whole stuff; the cloth is then dried and exposed to the action of steam, which causes the acids to react upon the prussiates, and from a nearly colourless mixture develops an intense blue, which is found to be permanently fixed in the fibre.

Aniline blues.—There are several artificial blue dyes made from aniline and similar bodies, which yield very brilliant colours on wool and silk. They can be easily applied, the goods simply requiring to be worked in their aqueous solution until they have acquired a sufficiently dark tinge. An artificial dye called Nicholson's blue is differently applied; it is dissolved in an alkaline liquid, and forms then a colourless or nearly colourless solution, with which the goods to be dyed are impregnated; they are then passed into dilute acids, which develop the blue colour.

Litmus and logwood blues.—The other substances which have been used for blue colours, such, for example, as litmus, are of little importance, and are now nearly unknown to the practical dyer. A blue can be obtained from logwood which has some resemblance to indigo blue upon wool, but it is of a very low character both as to stability and shade, and is hardly ever employed by respectable dyers.

Yellow Colours.

Yellow textiles, being less pleasing to the eye, and more readily soiled, are not nearly so much in use as those dyed with the two simple colours blue and red. The chief yellow dyes, besides fustic, are quercitron bark or its concentrated extract flavine, Avignon or Persian berries, and the now almost disused indigenous product, weld. The general mordant for these is tin, sometimes with addition of alum. One or two illustrations will suffice to show the methods of using them.

Fustic yellow.—Fustic is probably the most generally employed yellow dye-stuff for wool; it gives yellows inclined to orange. For light shades it is not necessary to mordant the wool; it is simply well cleansed, and then heated with fustic decoction and some cream of tartar. For darker shades the wool is boiled with solution of tin and tartar, washed, and then worked in the decoction of fustic.

Picric acid yellow.—Picric acid, one of the artificial colouring matters, gives pure though not deep yellow shades upon silk and wool without the aid of a mordant, the cleansed material being dyed by working it in a warm solution of the acid.

Chromate of lead yellow.—The yellow most commonly employed for cotton goods is obtained by the use of salts of lead and bichromate of potash. The method of obtaining this colour differs somewhat from any previously described. The cotton, having been properly bleached, is impregnated with a salt of lead, usually by employing a solution of the acetate or sub-acetate of lead. The goods are next passed into a milk of lime solution, to which it is prudent to add some acetate of lead, in order to prevent the lime from dissolving the oxide of lead at first precipitated; the result of the lime treatment is that oxide of lead is evenly fixed upon the cotton, the excess of lime and lead is then well washed away, and the goods are passed into a solution of bichromate of potash, where they quickly acquire a bright and deep yellow colour, owing to the formation of the well-known pigment chrome yellow. To facilitate the combination, the bichromate of potash is mixed with as much sulphuric acid as suffices to liberate the whole of its chromium as chromic acid. The yellow-dyed goods require no further treatment than a good washing, the colour being quite fast. This yellow is, however, in very little demand, and in ninety-nine cases out of a hundred it is immediately converted into an orange, by passing it through boiling lime-water, which produces the basic chromate known as chrome orange, which has alway been in demand for many articles of wear

Compound Colours.

The so-called simple colours—red, blue, and yellow—having now been dealt with, it remains to treat of their combinations, and this may be done briefly, the processes employed being for the most part similar to those already described. The compound shades in Chevreul's chromatic nomenclature amount to nearly 15,000, and it is very probable that fully that number are produced by the dyers of the present day. For practical treatment, however, the compound colours can be reduced to comparatively few classes. Mixing the simple colours one and one we obtain three compound colours,—blue and yellow give green, blue and red give purple, yellow and red give orange; while there may be a normal green, purple, and orange, it is evident that all the varieties of these several colours will depend upon the proportions of their constituents. If the three simple colours be mixed together, say in equal proportions, we may get a normal brown, or even a black; but if in unequal proportions, an immense number of shades, varying from the imagined normal brown to grey and drab, are produced. Although in many cases compound shades are produced by means of two or more simple colours, there are many natural as well as artificial dye stuffs which yield them ready formed, and frequently purer than they can be otherwise obtained. Most of these will be found mentioned in the following brief notice of practical processes in use.

GREEN COLOURS.

Lo-kao or Chinese green.—Until about the middle of the present century there was not an instance known of any green on textiles which was not composed of the two separate colours blue and yellow. About that time some green-dyed cottons, imported into France from China, attracted the attention of chemists, who were surprised that they could not separate the green into blue and yellow constituents. Inquiries showed that the Chinese employed a green colouring matter called Lo-kao, until then unknown in Europe. It was a costly dye-stuff, selling in China for its weight of silver. Some quantity of it was imported and used in silk-dyeing by the French; it was not, however, found altogether satisfactory, and has at length been quite abandoned for the aniline greens, which are in every respect preferable.

Aniline green.—There are two or three kinds of artificial green dyes in use, of which that known as methyl-aniline green, applied in silk dyeing, is most in request. The so-called iodine green has also been somewhat extensively employed for all kinds of fabrics.

These artificial and unstable materials are the only dye-stuffs for green possessed by the dyer, who is compelled to produce the colour by means of blue and yellow elements. The arsenical mineral green and the oxide of chromium green may be just mentioned as of extremely limited employ. The blues used in dyeing green are indigo, Prussian blue, and the sulphate of indigo. The yellows are afforded by Persian berries, quercitron, fustic, or the yellow chromate of lead. The processes employed consist, for the most part, in the separate application of the blue and yellow: for example, in dyeing a fast green upon wool from indigo and any of the yellow dye-stuffs, the blue is first produced as previously described, and the proper mordant for the yellow is then applied to the cloth, which is afterwards placed in the yellow colouring matter; the two colours are so intimately mixed as to be indistinguishable even by high magnifying powers. It may be observed that the reception of the blue does not to any perceptible extent diminish the power of the cloth to combine with the yellow.

Prussiate green.—Prussian blue is employed as a basis in the same manner, only not being capable of resisting chemical agents so well as indigo blue, it demands more care. The greens with Prussian blue bases are more lively than those made with indigo, but are not so fast. Sulphate of indigo is even less stable than Prussian blue. It is, however, cheap and easy of application, and gives rich colours. The greens made with chromate of lead are for the most part confined to cotton goods, and are not in much demand.

ORANGE COLOURS.

For cotton the chief orange-dye is the chromate of lead compound already described. For other materials the orange colours employed are nearly always composed of some of the red and yellow dyes mentioned in the preceding pages, such, for instance, as cochineal and fustic, which are applied in one bath, the same mordant serving for both.

Arnotto orange.—A warm solution of arnotto in weak alkalies is used without mordant to impart to silk an agreeable orange shade. Its colour is generally considered too yellow, but may be made redder by treatment with weak acids, or by previously giving the silk a light red foundation.

Picric acid orange.—Another orange on silk can be dyed by superimposing on a light pink a yellow obtained from picric acid.

Nitric acid orange.—Silk can also be permanently stained of a yellowish orange by means of moderately strong nitric acid, which must, however, be applied with great care, since a more than momentary contact would be very injurious to the strength of the fibre. This method of dyeing silk was formerly much used for handkerchiefs; by protecting certain parts from the acid with melted wax or similar resists, white designs were produced upon an orange ground.

PURPLE COLOURS.

The purple colours may be held to include all shades produced by an admixture of red and blue, such for example as lilac, violet, mauve, &c., and are of immense variety.

Aniline purples.—Since their discovery aniline colours have been almost exclusively employed for dyeing silk and wool purple, yielding as they do shades which for lustre and purity surpass any obtainable from the older colouring matters, and possessing also a fair amount of stability. An aqueous solution of the dye without mordant is all that is required, and the goods when dyed need very little subsequent treatment. The aniline purples, violets, and mauves do not dye upon cotton without previous mordanting, and even then are so loose and unstable that they are only fitted for use where great fixity is not demanded, as for linings of clothing, &c. The most general mordant for the aniline purple colours on cotton consists of a tannate of tin obtained by first steeping the cotton in a solution of tannic acid, or in decoction of gall-nuts, sumach, or myrobalans, all of which contain tannic acid; after a few hours' contact a considerable quantity of tannic acid has become firmly attached to the cotton, and the goods, being now treated successively with stannate of soda and dilute sulphuric acid or in other ways, acquire a certain proportion of oxide of tin, and are prepared to receive the colours.

Madder purple.—But the purple colour *par excellence* upon cotton is obtained from madder or alizarin, the mordant being oxide of iron or a sub-salt of iron deposited on the fibre by treatment with the commercial pyrolignite of iron, commonly called iron liquor. This purple is remarkable for great permanency. It is very largely used in combination with black and white in the best kind of printed calicoes.

Archil purple.—Archil and cudbear are sources of purple colours on wool and silk. The shades produced are rich and beautiful; they are not, however, very permanent, and have been nearly superseded by the aniline colours. Of the few instances that can be cited of stuffs dyed purple by the direct union of red and blue colouring matters, the violet or purple woollen cloth used for ecclesiastical purposes is an example. The indigo colour is first fixed and cleansed, and then the cloth is dyed with cochineal and tin mordants in the way already described for dyeing scarlet. The purple thus obtained is a fast colour, but is very costly, and on that account is not much worked.

The common shades of purple, violet, lilac, &c., upon wool are obtained from logwood with a mordant of alum and tartar: the red woods are sometimes employed in conjunction with logwood for these colours, which are "topped" with archil to give them more brilliancy.

The extensive range of colours, comprising all the shades of brown, bronze, chocolate, nut, wood, drab, and grey, which may be considered as compounded of the three elementary colours, some one of the three predominating, can only be briefly treated of in this article. Most of them are actually produced by the use of dye-stuffs yielding the three simple colours; but there are colouring matters like catechu, which themselves yield brown colours, and others, such as logwood, which may be held to contain two or more of the simple colours, the blue predominating. A few illustrations will show how these triply compounded colours are produced by the dyer.

BROWN COLOURS.

Bronze brown on wool.—The wool is mordanted with alum and tartar in the usual way, and is then dyed in a mixture of fustic and madder or other equivalent red and yellow dye-stuffs; for fast colours a blue part can be communicated to it by the indigo vat. For a lower class of colours no indigo is used, but instead, a mixture of yellow wood (fustic or quercitron) with madder for the red, and logwood for the blue part; or again, the sulphate of indigo may be employed for the blue.

Tan brown.—According to Mr Jarmain, the wool is mordanted by boiling it for an hour with one per cent. of its weight of bichromate of potash; it is then washed, and transferred to the dyeing vessel, with the following percentages of its weight of materials:—madder, 3·2; fustic, 4·8; camwood, 2; barwood, 1·75; sumach, 2·1; with these materials it is boiled for two hours.

Dark drab.—From the same authority we take the following as the weights required to dye 100 lb wool, previously mordanted with 1 lb of bichromate of potash:—camwood, 6¼ lb; sumach, 2 lb; madder, 2½ lb; fustic, 4 lb; logwood, 2½ lb; boil for one hour and a half, and afterwards, to darken the colour, pass into water containing 1 lb of sulphate of iron.

BLACK COLOURS.

Black, from a dyer's point of view, is compounded of the three simple colours, red, yellow, and blue, in a state of concentration; but in reality the blue predominates in all good black colours, and gives them their density and at the same time their lustre. What is called a dead black, crape black, or jet black, is the nearest approach to a neutral black, but even this would be brownish if the blue did not predominate. It is often extremely difficult to obtain a black dye to suit a particular market. Of ten pieces appearing equally black to the uninitiated, an expert would, perhaps, pronounce one to be sooty, another purple, another red, another brown, another green, and so on.

We should have to go back some years in the history of dyeing, to find a time when black was actually dyed with the three elementary colours. In some processes blue from indigo was first applied, and then, upon an alum mordant, red and yellow from madder and weld respectively; such a colour was unexceptionable for stability, but its great cost caused it to be disused.

At the present day, logwood is the chief dye-stuff for blacks upon wool or cotton, and gall-nuts and other astringents for silks. Aniline black, on account of obstacles to its application, cannot be said to have yet established itself in dyeing proper, though it is much and highly valued in calico printing.

Black dye upon silk.—Silk easily takes a black by treatment first with decoction of gall-nuts, and subsequently with a salt of iron. For blue blacks the silk is usually first dyed with Prussian blue, and then with gall-nut black. Extract of chestnut-wood with an iron mordant gives a good black. In modern black silk dyeing, materials are heaped upon the fibre which are not necessary to its colour, but which increase its weight in an extraordinary manner, so as not only to compensate for the loss of 25 per cent. of natural gum in the silk, but even, in some cases, to double or treble the original weight. The silk is, of course, much injured by the accumulation of foreign matters upon it, the fibre becoming harsh and brittle, and soon showing the effects of wear. The chief substances used for weighting are lead salts, catechu, iron, and galls, with soap or fatty matter, to soften in some degree the harshness these occasion.

Black upon wool.—Upon woollen cloth of fine quality, the black is dyed upon a basis of indigo blue, and, from the use of woad for this colour, such blacks are in England called "woaded blacks." The first process, therefore, in producing the best black is to dye the wool in the indigo vat of a tolerably deep shade of blue, and afterwards boil it in a mixture of logwood and sumach, treating it with sulphate of iron; the latter process being two or three times repeated, a very perfect and durable black is obtained, provided the indigo basis is sufficiently deep, and only a minimum quantity of logwood has been employed, say about one-fourth the weight of the sumach.

Common black.—Common blacks upon wool have no indigo in their composition, but are dyed chiefly with logwood and iron salts; the wool and logwood are heated together for some time, and then sulphate of iron is added to the dye-bath. In other blacks of somewhat better quality, the woollen is boiled for some time with solution of iron, copper, and aluminium salts, together with tartar, and when the mordanting oxides have been fixed, the colour is dyed up in logwood. The bichromate of potash mordant can also be used for the black dye, and the cloth can be "bottomed" with camwood or barwood; it is then dyed up with logwood, to which fustic or sumach may be added.

Black upon cotton.—Almost the only ordinary black in cotton dyeing is obtained from logwood with iron mordant; sumach is sometimes used, and very rarely the black is dyed upon an indigo blue basis by means of sumach or galls and iron. As before stated, aniline black has not yet been practically applied in dyeing cotton. A common method is to first beat the goods for some hours with decoction of sumach, wash mordant in sulphate of iron, and then dye in logwood; another method consists in fixing an iron basis upon the cotton by the method given above (page 573), and dyeing in logwood, along with a portion of sumach or fustic, according to the shade required.

Velvet dyeing.—The most important branch of black dyeing upon cotton goods, is that employed for cotton velvets and velveteens, in which it is desired to produce a rich lustrous effect: the process is long, tedious, and uncertain, consisting of successive applications of sumach, sulphate or acetate of iron, sulphate of copper, logwood, and fustic,—the end chiefly aimed at being the production of a black with blush or violet bloom. The Manchester dyers formerly held a monopoly of this blue-black upon velvet, as it is called, but of late years the German dyers have shown themselves very formidable competitors in dyeing this class of goods.

THEORY OF DYEING.

When the great variety of processes employed in dyeing is taken into consideration, it is apparent that there must be some difficulty in constructing a general theory which shall be applicable to every case.

The earlier writers who endeavoured to generalize the principles of the art considered that the particles of colour were mechanically deposited in the pores of the fibre. The use of chemical substances in dyeing was held necessary only to dilate the pores for the admission of the particles, to prepare the particles for entrance into the pores, or to close up the pores after the colouring particles had entered. Mordants were held to be necessary because they formed cavities in the fibre adapted by their size and shape to receive and retain different kinds of coloured particles. About the middle of the last century Bergmann, observing the dyeing of wool by sulphate of indigo, considered that what took place was a purely chemical action, and that the matter of the wool entered into chemical combination with the dye-stuff, changing it from a soluble into an insoluble substance, and showing therein the power of chemical affinity. From this time the mechanical or physical theory of dyeing was supplanted by a chemical theory, in which all the observed facts were explained by the assumption that chemical forces operated between the fibre and the mordant, or the fibre and the colouring matter. A closer consideration by a later generation of chemists of all the phenomena of dyeing and of the nature of the materials employed did not tend to support this theory. About 1840 Dumas, the celebrated French chemist, and Crum of Thornliebank, a skilful chemist and a practical dyer, formally disputed the existence of a chemical action in dyeing, and referred the phenomena to physical causes of attraction on the part of the fibre. Crum confined himself to the single case of the dyeing of cotton, and expressed himself convinced that it was owing either to surface contact of the dye stuff with the cotton or to its entrance into the hollow tubes of the same, the colours produced in the first case not being so stable as in the other, as far as resisting friction went. The power which cotton fibre evidently possesses of appropriating oxides from solutions, as well as colouring matters, such as indigo, was viewed by Crum as a case of surface attraction, similar to the power residing in charcoal of abstracting oxides and colouring matters from solutions, and he declared there was no such thing as a chemical combination between the cellulose of the cotton fibre and any of the chemical substances or dye materials. To controvert this statement is difficult, for, though the forces at work seem to be chemical forces, the products cannot be proved to be definite chemical compounds. On the other hand, the forces of catalysis, surface attraction, and powers of porous substances which Crum substitutes for the chemical forces of the older theories of dyeing, may be said to be merely names, without definite meaning, for indicating the existence of a class of phenomena not at all understood even at the present day. Dumas views the questions more broadly, and simply declines to accept as chemical phenomena actions which do not produce real chemical compounds. He considers that dyeing is more probably owing to a physical property of fibres by which they are enabled to attract and retain coloured bodies, much in the same way that animal charcoal does, and simply because the nature of the powers exercised by charcoal are not accepted as chemical, and no one knows what they are, dyeing cannot be considered as an effect of chemical attraction or affinity. He admits, however, that there are some powers at work different from that possessed by charcoal. How is it, he asks, that wool takes up the scarlet dye so well under conditions where silk and cotton are barely tinged with colour? How is it that wool unites with the black precipitate formed with tannin and iron salts, while silk under the same circumstances is so difficult to dye? He asks, finally, how it is that certain colours can be fixed better on some fibres than others; and whether it is not by some special action, not correctly called affinity, but which at any rate is an important force, or the resultant of several forces, that this is affected. But, he continues, to confound chemical affinity, properly so called, with the phenomena of dyeing is to confound two very different things. When silk unites with Prussian blue, or wool with indigo, the action is quite distinct from what takes place when sulphur combines with lead. But, on the other hand, again, fibres are not to be looked upon as acting simply the part of a filter in retaining colours.

Chevreul, at a later date, insists that in the present state of our knowledge the phenomena of dyeing can be explained only upon chemical principles. He admits that colour may be and in practice is frequently deposited upon the external parts of fibres, but there are numerous cases in which a soluble salt is decomposed by fibrous matters, as when silk is steeped in persulphate of iron; and he cannot consider as anything else than chemical affinity that power which enables a solid body to decompose a solution of elements, themselves united by chemical affinity, and which without the contact of the solid body would have remained in perfect union. Many other chemists, physicists, and microscopists have occupied themselves upon this vexed question, but without evolving any generally acceptable theory of dyeing. The balance of opinion may be said to be in favour of the supposition that as far as regards the animal fibres, wool and silk, there are many cases of dyeing which can only be regarded as effected by chemical power; with respect to the vegetable materials cotton and linen, the evidence is less certain, and we must wait for further research and investigation to settle the disputed question.

Books of Reference.—Of the numerous works upon dyeing it may be sufficient to mention Bancroft's *Philosophy of Permanent Colours* (2d ed. 1813); Berthollet's *Éléments de la Teinture*, and Ure's translation of the same into English (1841); Persoz's *Traité de l'impression des Tissus* (1846),—a most complete and accurate work for its date; O'Neill's *Chemistry of Calico Printing and Dyeing* (1860), and *Dictionary of Dyeing* (1862); Napier's *Manual of Dyeing* (3d ed. 1875); Schützenberger's *Traité des Matières Colorantes* (1867); Crookes's *Dyeing and Calico Printing* (1874); and Crace-Calvert's *Dyeing and Calico Printing* (1875). Of periodicals specially devoted to the application of colouring matters to textiles there is only one in Great Britain, *The Textile Colourist*; Germany has the *Färber-Zeitung* and the *Muster-Zeitung*; in France there are the *Moniteur de la Teinture* and *Le Teinturier pratique*. Original articles upon the subject occasionally appear in the chemical journals, and especially in the Bulletins of the Industrial Societies of Mulhouse and Rouen. (C. O'N.)

DYER, JOHN, English poet, was born in 1699 or 1700 at Aberglasney, in Carmarthenshire, where his father, Robert Dyer, successfully practised as a solicitor. He was sent to Westminster school to be educated under Dr Friend, and was destined to succeed to his father's business. He showed, however, an inveterate dislike to the study of the law, and, having a taste for design, he induced his parents to allow him to adopt the profession of an artist. He wandered about South Wales, sketching landscapes and occasionally painting portraits. In 1726 his first poem, *Grongar Hill*, appeared in a miscellany published by Richard Savage, the poet. It was an irregular ode in the so-called Pindaric style, but Dyer entirely rewrote it into a loose measure of four cadences, and printed it separately in 1727. It had an immediate and brilliant success. *Grongar Hill*, as it now stands, is a short poem of only 150 lines, describing in language of much freshness and picturesque charm the view from a hill overlooking the poet's native vale of Towy. Artless in an affected age, the natural images which crowd upon one another in this charming little poem are as admirable now as when they were written, and hold an assured place in English literature. Dyer's ambition to succeed as a painter impelled him to visit Italy, and about ten years after the publication of *Grongar Hill* he seems to have attained this great desire, and to have spent some time in the south of Europe. It was in consequence of this tour that he wrote his next poem, *The Ruins of Rome*, a descriptive piece in about 600 lines of Miltonic blank verse. In this work the phraseology is pompous and conventional, but there is considerable knowledge displayed, and the ardour of a true lover of antiquity. *The Ruins of Rome* appeared in 1740, and increased its author's reputation. Having fallen into bad health while painting in the Campagna, and finding that he was not destined to excel in the practice of art, he determined to enter into holy orders. In 1741 he was ordained by the bishop of Lincoln, and presented with the living of Calthorpe, in Leicestershire. He was married about this time to a lady descended from the brother of Shakespeare. In 1751 he was translated to the living of Belchford, in Lincolnshire, to which was added in 1752 that of Coningsby. In 1756 he exchanged Belchford for the wealthier incumbency of Kirby-on-Bane. In 1757 he published his longest work, the didactic epic of *The Fleece*, in four books, of which the first discoursed of the tending of sheep, the second of the shearing and preparation of the wool, the third of weaving, and the fourth of trade in woollen manufactures. The subject was prosy, and the stately blank verse in which it was discussed gave the poem a ridiculous air. The town took no interest in it, and the wits facetiously prophesied that "Mr Dyer would be buried in flannel." He did, in fact, very shortly afterwards follow his poem to the grave, for he died of consumption on the 24th of July 1758, leaving a wife and four children. After his death his genius was defended and his writings analyzed by Scott of Amwell, who published a commentary on Dyer's poems. The latter were collected by Dodsley in 1770, but they only form one small volume. *Grongar Hill* has been compared with Sir John Denham's *Cooper's Hill*, which may in some measure have suggested it. These two pieces remain the most important topographical poems in English literature, if we exclude Ben Jonson's *Penshurst*.

DYNAMICS properly means that science which treats of the action of force. Defining force as that which affects the motion of matter, it appears that the study of dynamics will lead to the consideration of the motion of material systems, and the laws in accordance with which this motion is changed by the mutual actions of the bodies forming such systems. But there is a sense in which we may contemplate the geometrical results of the motion of bodies without studying the forces under which, or the time during which, it takes place; and hence there are many problems which at first sight we might be disposed to include under the head of dynamics, but which also belong to the domain of pure mathematics, and may therefore more properly be considered as a branch of geometry. On the other hand, there is a branch of dynamics which treats of pure motion without taking any account of its subject or the means by which it is produced or changed. In this branch, to which the term kinematics, though first employed by Ampère in a wider sense, may with propriety be confined, it may seem that no consideration of matter or of force is involved; but, unlike the class just alluded to, the problems which come under this head involve explicitly the element of time, and it is only after studying the laws of dynamics that we are able to furnish a theoretical measure of time satisfying the demands of the human mind. Thus any subject in which the measurement of time is involved enters on this account into the domain of dynamics.

Measurement of Time.—For ordinary purposes the rotation of the earth furnishes a sufficiently exact means of measuring time, and the observation of the transit of a known star is the best method we possess of determining the error of a clock; but that the fundamental conception of the measurement of intervals of time is based upon other foundation than the diurnal rotation of our planet at once appears from the fact that we see no inconsistency in asking whether the length of the day is the same now as it was 2000 years ago. If our primary conceptions of the measurement of time were derived from the earth's rotation, the absolute constancy of the length of the day would be a matter of definition. But it is not to the motion of the earth or of any other single body that we are indebted for our highest conception of the measurement of time—it is rather to the dynamical principle expressed in the first law of motion; and hence it is that the theoretical measurement of time, and of other physical quantities which explicitly involve time, must find a place under the head of dynamics. Kinematics may therefore properly be treated as a branch of dynamics, and for its discussion, as well as for the enunication and explanation of the laws of motion, the reader is referred to the article on MECHANICS.

Perhaps there is nothing which appears to present a subject for study simpler than that afforded by the properties of space, and hence it is that geometry attained so high a reputation and made such rapid advances among the ancients. It was easy to construct material standards of length and by their means to measure approximately the linear dimensions of limited portions of space, the human mind being only too ready to believe in the constancy of the dimensions of the standards constructed; and thus the properties of space presented a subject which, at the very outset, afforded a facility for investigation which was wanting in the study of other physical quantities. The great simplification introduced by this belief in the permanence of the dimensions of material standards will be apparent if we consider the position in which we should be placed by the adoption of a different hypothesis. Once admit the supposition that the properties of a figure, as regards dimensions or form, depend explicitly on its position in space, or upon time, either by a process of growth in themselves or because space is changing its character, and the whole subject of geometry will require reconsideration.

Displacement.—A number of points or figures may be connected in accordance with such geometrical conditions that if one or more be displaced in a given manner the displacements of all the others may be determined. The determination of the displacement of each in terms of the given displacements is a problem in pure mathematics, and the branch of geometry which treats of such questions may be called the science of displacement. If we suppose the figures here contemplated to be material bodies, and the geometrical conditions to be determined by means of material constraints such as links, guides, teeth, and the like, the science of displacement thus applied becomes that of mechanism, and it is only necesary here to call attention to the following statements. First, in the study of displacements, or of pure mechanism, no account is taken of any but the geometrical properties of the bodies displaced, while the forces engaged in producing the displacement are entirely neglected: the consideration of the mechanical properties of the materials of which the parts of a machine are constructed, the forces acting between those parts, and the best means of "fitting" them, belongs to applied mechanics and machine construction. Secondly, the element of time is altogether left out of consideration; for, although it may be argued that the displacement of each part of the system takes place in the same interval of time, and that the geometrical conditions enable us to compare the displacements experienced by different parts during the same time, and thus lead us to a comparison of velocities, yet it must be observed that this is *only* a comparison amounting simply to a relation between corresponding displacements, and does not involve time explicitly, since the whole displacement may take place in a time as long or as short as we please, for we do not consider it. Moreover, the actual motion of any part may be made uniform or varying in any arbitrary manner without any account being taken of it. In fact it is simply two or more configurations of the material system which are compared together, and, though for the sake of distinction we call one the initial and another the final configuration, we might as well distinguish them in any other manner and without stating which follows the other. Indeed we contemplate them as co-existent during the act of comparison. Hence we may complete the science of displacement or pure mechanism without ever considering force, or being able to measure time or even to define equal intervals.

Kinematics.—If to our conceptions of space and of displacement we couple that of time *as a measurable quantity*, we are led to compare the rates of non-simultaneous as well as of simultaneous displacements, and are consequently obliged to measure the *rate* at which displacement occurs by the change of position experienced in a *definite interval of time* by the body, figure, or point we are regarding. Rate of change of position measured thus we call *velocity*. The next step in the same direction is the consideration of the rate at which velocity changes, or *acceleration*, and thus the association of our conception of space with that of time as a measurable quantity opens up to us that branch of dynamics which we call kinematics.

Matter.—Having considered displacement in connection with the time during which it occurs, the next step leads us to take account of the thing displaced, and here we are obliged to contemplate matter directly. Matter, like time and space, we do not attempt to define, but treat it as a primary conception, its more obvious properties making themselves known to all through daily experience.

Force.—The change of the motion of material bodies brings us at once, through the introduction furnished by the first law of motion, to the conception of force, which may be defined in terms of three primary quantities, viz., space, time, and matter. The second law of motion expresses the manner in which matter is affected by force, and teaches us how to measure force by the observation of its effects.

The science of dynamics in its restricted sense is that which treats of the consequences arising from the relations of matter to force, and before we can proceed in this science beyond the first step we must become acquainted with the second law of motion, while kinematics requires for its complete development only the first law of motion, its range being thereby sharply defined and separated from that of the rest of dynamics. The laws of motion, like other natural laws, must be understood to express merely the properties of natural bodies as we find them, and within the degree of accuracy to which our experiments can be relied on. We might, of course, have started with any hypotheses we liked respecting the relations of force to matter, and upon these hypotheses and our conceptions of time and space have constructed a purely theoretical system of dynamics which would have been perfectly self-consistent; but our conclusions might, or might not, have agreed with observations of natural phenomena. If we found an agreement between the results of the application of our theory to special problems and the solutions of the corresponding problems as worked out objectively in nature, we should have reason to believe that our hypotheses agreed with the facts, or, in other words, that they were true, and we should then raise them to the dignity of natural laws. It is on evidence of this kind that our acceptation of all natural laws is based. If our conclusions were inconsistent with natural phenomena our system of dynamics would be an abstract, instead of a natural, science—if, indeed, it might be called a science at all—and would be valuable merely as an intellectual exercise. In the case of such an abstract science we are not even bound to adopt the axioms respecting the properties of space which are usually accepted, but may confer upon our "space" any number of dimensions and any properties we please.

Stress.—Though the conception of a single force is convenient, it nevertheless results from a mere process of mental abstraction. We never meet with a single isolated force in nature, but each is accompanied by an equal and opposite force acting in the same straight line, and when we speak of one without the other we do so merely for the sake of brevity. The third law of motion implies this statement, though it has also a wider signification. The action and reaction which are thus always inseparably linked together may be conveniently called a stress, of which the two forces are opposite aspects. Thus it appears that there is nothing in nature corresponding to what we are accustomed to call a single force; stresses, indeed, abound, and may be produced whenever we please, but we are completely ignorant of their existence except when they change the relative velocities of different portions of matter. Then, and then only, do they appeal to our senses.

Statics.—The investigation of the conditions under which a system of stresses produces no displacement of the bodies between which they act constitutes the science of statics, and will be discussed under the head of MECHANICS.

Measurement of Force.—Since force can be defined in terms of space, time, and matter, it follows that the measurement of a force ought to involve measurements of these three quantities and of them only. Now it is plain that any force whatever may be chosen as the unit in terms of which other forces should be expressed, provided it is capable of being reproduced at all times and in all places with precision. We all now believe that the quantity of matter in a body is unchanged by changing its position or by the simple lapse of time, and we also believe that the region of space which we inhabit is sufficiently homoloidal to allow us to compare distances in different directions, at different places, and at different times. Moreover, the first law of motion, as has been stated above, provides, when proper precautions are taken, a method of measuring time which satisfies the requirements of the mind, while the rotation of the earth affords a practical measure of time sufficiently exact for the most refined experiments we can execute. Therefore a unit of force which depends only on the units of length, mass, and time will be the same at all places, and, so far as our experience allows us to judge, at all times. Such a unit is termed an absolute unit. Not only force but every other quantity dealt with in dynamical science, as well as every physical quantity whose relations to space, mass, and time are known, can be measured in terms of a unit of its own kind which depends only on the fundamental units of length, mass, and time, and is then said to be expressed in *absolute measure*. The three primary units must be chosen in an arbitrary manner, and their permanence must be considered a matter of definition; but when these have been once fixed, all the absolute units derived from them are perfectly determinate and invariable. If a foot, a pound, and a second be chosen as units, the corresponding absolute unit of force is called a *poundal*; while if the primary units be a centimetre, a gramme, and a second, the unit of force is called a *dyne*.

For the definitions of the derived dynamical units and the investigation of their dependence on the fundamental units, the reader may refer to the article on MECHANICS.

From what has been said it will appear that the whole difficulty in fixing upon a system of dynamical units lies in the determination of the fundamental units of length, mass, and time in such a manner that their constancy can be relied upon. The unit of mass offers very little difficulty in this respect. Long experience has taught us which are the most permanent of the varieties of matter we have at command. We have good reason to believe that a piece of platinum or an alloy of platinum and iridium may be exposed to pure air at ordinary temperatures for an indefinite time without any increase or diminution of its mass whatever. Such a piece of metal may therefore with propriety be chosen as a national standard of mass, the *absolute* constancy of the quantity of matter constituting it being accepted on definition, as we are unable to test it by any standard in which we have more confidence than we have in itself. The British and French national standards of mass are of platinum, but the new standards recently constructed in Paris consist of an alloy of platinum and iridium.

The determination of a unit of length is not so simple as that of the unit of mass. In this case, as in the preceding, we avail ourselves of the properties of a material standard, but we know that however indestructible the standard itself may be its dimensions depend upon the pressure to which it is exposed, its temperature, and in some cases upon other accidents, such as the magnetic force in the neighbourhood, &c. Hence the only course open to us is to determine as far as possible all the causes of variation in the length of our standard, and carefully to define its condition with respect to these variables, so that it shall be a standard only under the circumstances thus defined. Having thus defined the condition of the material standard with respect to all the variables upon which we know its length to depend, we must consider the *absolute* constancy of its length at all times and places to be a matter of definition until we have discovered other causes which affect it. It has been proposed that the wave length *in vacuo* of a particular kind of light, as for instance that corresponding to one of the sodium lines, should be taken as the unit of length, and its period as the unit of time. These units are probably more constant than those afforded by any material standards or vibrating springs which we can construct; but a belief in their *absolute* constancy implies complete confidence in the constancy of the properties of the interstellar medium, and of the sodium molecule.

The determination of a satisfactory means of measuring time seems to offer greater difficulties than the measurement of mass or of space, though the difficulties are of the same character as those we have just considered. The great difficulty consists in defining what is meant by the equality of two intervals of time which do not commence simultaneously. Remembering that it is upon the properties of matter alone that we can rely for assistance, we might construct a spring and define as equal lapses of time those intervals during which this spring executes the same number of vibrations, the temperature, &c., being kept constant. But if we were to construct a number of such springs, though a perfect agreement might obtain between them at first, we should find after a considerable period that the measurements of time derived from different springs did not agree, while our knowledge is insufficient to enable us to apply to each the corrections necessary to lead us to a consistent result. Now there may be no reason why we should prefer one spring above all the others, and thus it appears that a definition of equal intervals of time based upon the behaviour of any single spring is too arbitrary to be satisfactory. If, however, we found a large number of springs, constructed of different materials and differently affected by temperature and other known causes of variation, continue to give perfectly consistent results, the theory of probability would lead us to place a high value upon the measure of time thus afforded. Now, we have stated that our highest conception of the measurement of time is derived from the dynamical principle expressed in the first law of motion, but when we come to apply this it is impossible to determine *a priori* whether in the case of two given bodies there is no stress acting between them or between one of them and some third object. Consequently, the only course open to us is to examine the motion of a large number of material systems, making such corrections for the action of stresses which we know to be in operation as our theoretical dynamics will enable us to determine; and, if after this we find that several independent systems afford the same measurement of time, while those systems which lead to a different result disagree also among themselves, we must accept the measurement of time afforded by the first set as the true measure, and attribute the discrepancies manifested by the other systems to some unknown stresses, which it should be our subsequent business to discover.

Work.—The contemplation of a stress, together with a relative displacement of theportions of matter between which it acts, introduces us to the conception of *work*. If we consider a stress, together with the distance through which the solicited bodies are capable of moving relative to one another in obedience to the stress, the object of our contemplation is the work which may be done under the given conditions of the system, and this we call *energy*. The subject of which natural philosophy treats is the transformation of energy, which in all its phases takes place in accordance with two great principles, known respectively as the principles of the conservation and the dissipation of energy. Of these two principles the former rests upon a much higher scientific basis than the latter. In order to lose our faith in the principle of the conservation of energy we must give up our belief in the fundamental principles of dynamics expressed in the laws of motion; but as regards the dissipation of energy we can say little more than that all the operations of nature with which we are acquainted take place in accordance with this principle. Clerk Maxwell has, however, shown that it is possible to subvert the principle of the dissipation of energy by the simple exercise of a sufficiently high order of intelligence. For the statement and discussion of these two principles see ENERGY.

It is the work of the natural philosopher to explain the operations of nature in accordance with the principles of dynamics, and we consider that we understand any phenomenon when we have shown it to consist of a motion of matter and determined the character of this motion. Thus it is that dynamics forms the foundation of every branch of natural philosophy, and a thorough appreciation of the principles of conservation and dissipation of energy is the only safe guide in physical investigations. (W. G.)

DYNAMITE (δύναμις, strength), the name applied to various explosive preparations containing nitroglycerin. The first practical application of nitroglycerin, discovered by Sobrero in 1847, was made by Alfred Nobel, who in 1863 used gunpowder soaked with it for blasting. In 1864 he found that it could be exploded by the initiative detonation of fulminating materials; and in 1867, owing to the uncertainty and danger attending its employment, he conceived the idea of mixing it with some solid and absorbent inert substance. The siliceous infusorial earth called in Germany *Kieselguhr* proved to be well adapted for this purpose, since it took up as much as three times its weight of nitroglycerin without becoming more than damp to the touch. The mixture of earth and nitroglycerin, to which was added a little alkaline material to neutralize any acid that might be set free by the latter, was termed by Nobel dynamite. Ignited in the open air, dynamite burns slowly, but it is as readily exploded as nitroglycerin itself by means of a detonating fuze; and, though not equal in bursting or breaking power to uncombined nitroglycerin, on account of the absorption by its inert constituents of part of the heat developed by the exploding shock, it is greatly superior to gunpowder, instead of which or gun-cotton it is employed in blasting coal and stone, removing piles, felling trees, and clearing stumps from forest-land. It may also be used with advantage for the destruction of cannon and for breaking up large iron castings (see *Compt. rend.*, lxxii. 770). For filling bore-holes its pasty consistency renders it a very convenient material.

In continuous masses dynamite transmits detonation at the rate of from 19,500 to 21,600 feet a second. Confinement is not requisite for its explosion, and it can be used in damp situations without to any great extent impairing its action. It explodes if heated in a closed brass case, also on sharp percussion when placed between two metallic surfaces; it should not, therefore, be kept in hermetically sealed receptacles of metal or other very solid material. At a low temperature dynamite loses its tendency to explode by detonation. Another defect is its liability to part with a portion of its nitroglycerin, especially when in contact with porous substances, such as the paper of cartridges and wrappers (see Guyot, *Compt. rend.*, lxxii. 688). MM. Girard, Millot, and Vogt have shown (*Moniteur scientifique*, xiii. 58) that for the manufacture of dynamite the best absorbents are kaolin, tripoli, alumina, and sugar; the last, like alum, the material employed in Mr Horsley's preparation, has the advantage of being separable from associated nitroglycerin by solution in water. Dynamite as made by M. P. Champion consisted of 20 to 25 parts of nitroglycerin with 75 to 80 parts of finely pulverized burnt clay from glass works (*Monit. scient.*, xiii. 91); and in some explosives sold as dynamite a mixture of sawdust and chalk is substituted for siliceous substances.

See F. A. Abel, *On Recent Investigations and Applications of Explosive Agents*, 1871; J. Trauzl, *Die Dynamite, ihre Eigenschaften und Gebrauchsweise*, Berlin, 1876.

DYNAMOMETER (δύναμις, strength, and μέτρον, a measure), an instrument for measuring force exerted by men, animals, and machines. One of the simplest forms, namely, that devised by the mechanician Graham, and improved by Desaguliers, was essentially a steel-yard in which the position of the weight on the longer arm indicated the force exerted on the shorter in order to produce equilibrium. The dynamometer invented by Leroy of the French Academy consisted of a metallic tube 10 to 12 inches long, in which was a spiral spring with an attached graduated rod terminating above in a globe. Pressure being applied to the globe, the rod sank into the tube, and thus marked the force employed in compressing the spring. M. Regnier's dynamometer (see *Journ. de l'École Polytechnique*, tom. ii.) consists of an elliptical steel spring having fixed to one of its arms a semicircular graduated brass plate with central index, and to the other a small lever, which, acting on the index, shows the amount of force exerted in effecting a greater or less approximation of the arms to each other. In a similar instrument contrived by M. Poncelet, the springs are hinged together at the extremities, and separated from each other in proportion to the tension brought to bear upon them. A dynamometer for therapeutical purposes, invented by Dr Hamilton of Long Island College Hospital, consists of an india rubber bulb filled with coloured water, into which dips a tube closed at the upper end. Pressure being applied to the bulb, some of the water is forced up into the tube, the graduations upon which show the amount of pressure upon the air within it which is exerted by the water. By the dynamometer of Colonel Morin a curve is drawn, the area of which represents the product of the force exerted into the space through which it acts, or, in other words, the quantity of work performed in a given time. Details with respect to Morin's, Watt's, and other dynamometers will be found in vol. i. of Laboulaye's *Dictionnaire des Arts et Manufactures*.

DYRRACHIUM. See DURAZZO.

DYSART, a seaport town and royal and parliamentary burgh of Scotland, in the county of Fife, nine miles north-east of Burntisland, with a station on the North British Railway. It consists mainly of three narrow streets with a square in the centre, and on the whole has rather a dull and deserted appearance. In the High Street there are a number of antique houses with inscriptions and dates; and towards the south side of the town there are remains of an ancient chapel. Besides the old parish church with its tower, there are six places of worship, an old town-house, a mechanics' institute, and a combination poorhouse. The harbour is tolerably good, and there is a wet dock attached. The staple industry is the manufacture of linens and ticks; but flax-spinning and ship-building are also carried on, and there is a large export of coal. To the west of the town is Dysart House, the residence of the earl of Rosslyn. As a parliamentary borough Dysart is a member of the Kirkcaldy district. The population of the town in 1871 was 2476.

Dysart is mentioned as early as 874 at the time of a Danish invasion. Its name is said to be a corruption of the Latin *desertum*, a desert, applied to a cave on the sea-shore which was occupied about 440 by St Serf or Sanctus Servanus, to whom at a later date the church was dedicated. From James V. the town received the rights of a royal burgh. In the 15th and 16th centuries it was the seat of a great manufacture of salt, and besides dealing in this article with Holland and other countries, it had a large general trade. For several months in 1559 it was the headquarters of the Lords of the Congregation, and in 1607 it was the scene of those remarkable meetings of the synod of Fife known in ecclesiastical history as the Three Synods of Dysart. William Murray, a native of the town, was made earl of Dysart either by Charles I. or Charles II., and his eldest daughter afterwards assumed the title of countess, and transmitted the dignity to her descendants by the earl of Lauderdale, her second husband.

DYSENTERY (from the prefix δυς, and ἔντερον, the intestine), also called Bloody Flux, an infectious disease with a local lesion in the form of inflammation and ulceration of the lower portion of the bowels.

Although at one time a common disease in Great Britain, dysentery is now very rarely met with there, and is for the most part confined to warm countries, where it is the cause of a large amount of mortality.

Dysentery in a sporadic form may occur anywhere, but this variety of the disease is believed to depend on a different cause from that to which it is due where it prevails endemically or spreads as an epidemic; for, while isolated cases appear capable of being excited by irritating causes which act locally on the alimentary canal, and may thus be developed out of an ordinary intestinal catarrh, the dysentery of tropical climates is generally regarded as owing its origin to a specific poison of the nature of a miasm or germ, somewhat analogous to that which is believed to be the cause of malignant cholera. How, and under what circumstances, the dysentery poison is generated is still a matter of uncertainty. The frequent association of dysentery with intermittent fever has long been remarked, and has led to the belief on the part of many in a malarial origin for this disease. It is, however, doubtful whether any necessary relationship can be established between them (although a malarial form of dysentery is a well marked variety of the disease), since dysentery may be found prevailing where no evidence of malaria can be detected. At the same time certain characters of climate and soil are known to favour the increase and propagation of dysentery. Long continued high temperature of the air and ground, such as exists in the tropics, together with a soil of swampy character, are the conditions generally present where dysentery prevails endemically, and where it is propagated as an epidemic these factors are seldom absent. Among other causes well recognized as favouring the spread of epidemic dysentery are impure air and water, improper and insufficient food, unripe fruit, excessive indulgence in alcoholic liquors, and exposure to chills in warm weather, all or many of which have been often found connected with the propagation of dysentery among large bodies of people, as in the case of armies, where also the disease has been frequently associated with outbreaks of scurvy.

The contagiousness of epidemic dysentery is generally admitted, and it is probable that in this disease as in cholera the vehicle of its transmission is contained in the matter discharged from the bowels of those affected.

Dysentery manifests itself with varying degrees of intensity, but in well-marked cases the following are the chief symptoms. The attack is commonly preceded by certain premonitory indications in the form of general illness, loss of appetite, and some amount of diarrhœa, which gradually increases in severity, and is accompanied with griping pains in the abdomen (tormina). The discharges from the bowels succeed each other with great frequency, and the painful feeling of pressure downwards (tenesmus) becomes so intense that the patient is constantly desiring to defecate. The matters passed from the bowels, which at first resemble those of ordinary diarrhœa, soon change their character, becoming scanty, mucous or slimy, and subsequently mixed with, or consisting wholly of, blood, along with shreds of exudation thrown off from the mucous membrane of the intestine. The evacuations possess a peculiarly offensive odour characteristic of the disease. Although the constitutional disturbance is at first comparatively slight, it increases with the advance of the disease, and febrile symptoms come on attended with urgent thirst and scanty and painful flow of urine. Along with this the nervous depression is very marked, and the state of prostration to which the patient is reduced can scarcely be exceeded. Should no improvement occur death may take place in from one to three weeks, either from repeated losses of blood, or from gradual exhaustion consequent on the continuance of the symptoms, in which case the discharges from the bowels become more offensive and are passed involuntarily.

When, on the other hand, the disease is checked. the signs of improvement are shown in the cessation of the pain, in the evacuations being less frequent and more natural, and in relief from the state of extreme depression. Convalescence is, however, generally slow, and recovery may be imperfect—the disease continuing in a chronic form, which may exist for a variable length of time, giving rise to much suffering, and not unfrequently leading to an ultimately fatal result.

Several varieties of dysentery are described in which the symptoms are modified by the association of the disease with other morbid conditions. Thus the form known as Malarial Dysentery is complicated with febrile attacks of an intermittent character, and is frequently attended with hepatic, splenic, and renal affections; while it is most successfully treated by remedies which are of value in malarial diseases, such as quinine. Again, in Scorbutic Dysentery the attack is accompanied with the great prostration characteristic of scorbutus, and also with dangerous hemorrhage. Malignant Dysentery is the term applied to those cases where all the symptoms are present in great intensity, and progress rapidly to a fatal termination. Such cases are often attended with gangrene and sloughing of the mucous membrane of the affected portion of the bowel.

The dysentery poison appears to exert its effects upon the glandular structures of the large intestine, particularly in its lower part. In the milder forms of the disease there is simply a congested or inflamed condition of the mucous membrane, with perhaps some inflammatory exudation on its surface, which is passed off by the discharges from the bowels. But in the more severe forms ulceration of the mucous membrane takes place. Commencing in and around the solitary glands of the large intestine in the form of exudations, these ulcers, small at first, enlarge and run into each other, till a large portion of the bowel may be implicated in the ulcerative process. Should the disease be arrested these ulcers may heal entirely, but occasionally they remain, causing more or less disorganization of the coats of the intestines, as is often found in chronic dysentery. Sometimes, though rarely, the ulcers perforate the intestines, causing rapidly fatal inflammation of the peritoneum, or they may erode a blood vessel and produce violent hemorrhage. Even where they undergo healing they may cause such a stricture of the calibre of the intestinal canal as to give rise to the symptoms of obstruction which ultimately prove fatal.

The occurrence of abscess of the liver in connection with attacks of dysentery is frequently observed. It has been ascribed to the passage of morbid material from the diseased intestine into the liver, but by many high authorities is regarded more as a coincidence, depending upon the same climatic causes as those which predispose to the dysentery.

Treatment.—Where the disease is endemic or is prevailing epidemically, it is of great importance to use all preventive measures, and for this purpose the avoidance of all causes likely to precipitate an attack is to be enjoined. Exposure to cold after heat, the use of unripe fruit, and intemperance in eating and drinking should be forbidden; and the utmost care taken as to the quality of the food and drinking water. In houses or hospitals where cases of the disease are under treatment, disinfectants should be freely employed, and the evacuations of the patients removed as speedily as possible. In the milder varieties of this complaint, such as those occurring sporadically, and where the symptoms are probably due to matters in the bowels setting up the dysenteric irritation, the employment of diaphoretic medicines is to be recommended, and the administration of such a laxative as castor-oil, to which a small quantity of laudanum has been added, will often, by removing the source of the mischief, arrest the attack. In the severer forms of the disease, those, namely, occurring in warm climates, the remedy most to be relied on is ipecacuanha. This drug, which has long been known as possessing special efficacy in dysentery (and was originally introduced into this country from Peru as the *radix anti-dysenterica*), has proved of signal value in the treatment of the disease in India, and, as shown by Dr Maclean, has diminished the mortality to a remarkable extent. It is administered in full doses of 25–30 grains of the powder, which are repeated in from six to ten hours, gradually lessening the quantity; the effect observable is a diminution in the pain, and in the frequency and offensive character of the stools, along with the accession of profuse perspiration and quiet sleep. Hot opiate fomentations applied to the abdomen are of use in relieving the tenesmus. Ice may be freely taken to allay thirst. The diet should be light, consisting of soups and farinaceous food. In malarial dysentery quinine is the most successful remedy, ipecacuanha being generally found to be unsuitable; while in scorbutic dysentery the treatment must bear reference to the depraved condition of the general health characteristic of scorbutus. In this form of the disease the fresh bael or bhel fruit (*Ægle Marmelos*) is largely used in India. In chronic dysentery the administration of astringents such as Dover's powder may be of service, but the chief points to be attended to are the nourishing of the patient and the observance of judicious hygienic measures, such as the due clothing of the body, the use of tonics, baths, &c. A change to a cooler climate often proves of great value. (J. O. A.)

DYSPEPSIA (from δυς-, and πέπτω, to digest), or Indigestion, is one of the most common of all complaints, but, from its intimate connection with various other morbid conditions, the term is somewhat vaguely employed. There are comparatively few diseases of any moment where some of the phenomena of dyspepsia are not present as associated symptoms, and not unfrequently these exist to such a degree as to mask the real disease of which they are only complications. This is especially the case in many organic diseases of the alimentary canal, in which the symptoms of dyspepsia are often the most prominent. In its restricted meaning, however (and it is to this that the present brief notice applies), the term is used to describe a functional derangement of the natural process of digestion, apart from any structural change in the organs concerned in the act. The causes of this ailment are very numerous, but are generally regarded as bearing reference either to the food, the condition of the gastric juice, or the movements of the stomach during the process of digestion.

Among the causes connected with the food are not only the indulgence in indigestible articles of diet, but the too common practice of eating too much of what may be otherwise quite wholesome and digestible, irregular or too frequent meals, and imperfect mastication of the food. Substances which are badly cooked, or too hot or too cold, the excessive use of condiments, the partaking of too much liquid with a meal, and over indulgence in tea, tobacco, and alcoholic liquors are likewise fruitful sources of dyspepsia. Morbid states of the gastric juice readily give rise to dyspepsia. This fluid may be diminished in quantity, or be altered in character by the presence of too much acid, or by deficiency in its active digestive principle, pepsine. These conditions are often connected with actual disease of the mucous membrane of the stomach, but they may also exist in advanced life, in depraved states of the general health (as in rheumatism, gout, Bright's disease, anæmia, &c.), or in constitutions weakened by fatigue, over-anxiety, or debauchery. It must, however, be borne in mind that not only the gastric juice but the other digestive fluids, such as the saliva, bile, pancreatic and intestinal juices, may by defects in their amount or quality materially hinder the process of digestion. Further, dyspepsia may be the result of a perverted condition of the natural movements of the stomach during digestion,—whereby, on the one hand, owing to increased activity of its propulsive power, the food may be carried into the intestines in a half dissolved state, and give rise to many of the symptoms of indigestion, or, on the other hand, from a weakened or atonic state of the muscular coats of the stomach digestion may be retarded, and the food retained and excite discomfort and pain consequent on its undergoing fermentive and putrefactive changes.

The symptoms of dyspepsia, even when due to a like cause, are so numerous and diversified in different individuals that probably no description could exactly represent them as they occur in any given case. All that can be here attempted is to mention some of the more prominent morbid phenomena usually present in greater or less degree.

When the attack is dependent on some error in diet, and the dyspepsia consequently more of an acute character, there is often pain followed with sickness and vomiting of the offensive matters, after which the patient soon regains his former healthy state. What are commonly known as "bilious attacks" are frequently of this character. In the more chronic cases of dyspepsia the symptoms are somewhat different. A sensation of discomfort comes on shortly after a meal, and is more of the nature of weight and distension in the stomach than of actual pain, although this too may be present. These feelings may come on after each meal, or only after certain meals, and they may arise irrespective of the kind of food taken, or only after certain articles of diet. As in most of such cases the food is long retained in the stomach, it is apt to undergo fermentive changes, one of the results of which is the accumulation of gases which cause flatulence and eructations of an acid or foul character. Occasionally quantities of hot, sour, tasteless, or bitter fluid, or mouthfuls of half-digested food, regurgitate from the stomach. Temporary relief may be obtained when another meal is taken, but soon the uncomfortable sensations return as before. The appetite is often diminished, but may be little impaired; the tongue is in general large and flabby, and more or less furred. In some forms of this complaint, however, particularly where there is great irritability of the stomach, the tongue is abnormally red. There is generally obstinate constipation.

Numerous disagreeable and painful sensations in other parts are experienced, and are indeed often more distressing than the merely gastric symptoms. Pains in the chest, shortness of breathing, palpitation, headache, giddiness, affections of vision, coldness of the extremities, and general languor are common accompaniments of dyspepsia; while the nervous phenomena are specially troublesome in the form of sleeplessness, irritability, despondency, and hypochondriasis.

A disease of this nature, interfering as it does with the assimilative and nutritive processes, must necessarily exert an evil influence on the general health, and there is reason to believe that many serious ailments owe their origin to persistent dyspepsia. This is notably the case as regards phthisis; for although dyspeptic symptoms often present themselves as complications induced by the disease, yet it cannot be doubted that long-continued indigestion, particularly in youth, must have the effect of favouring the occurrence of consumption in persons at all predisposed to it.

Dyspepsia appears to be in some cases hereditary. In its chronic form, this disease may long resist treatment, but it is always in some measure influenced by the diet and regimen and by the occupation of the patient. As a rule persons of sedentary pursuits and brain-workers suffer more from dyspepsia than those leading active lives.

As regards *treatment* only a few general observations can be made. The careful arrangement of the diet is a matter of first importance. Quantity must be regulated by the digestive capabilities of the individual, his age, and the demands made upon his strength by work. There is little doubt that the danger is in most instances on the side of excess, and the rule which enjoins the cessation from eating before the appetite is satisfied is a safe one for dyspeptics. Due time, too, must be given for the digestion of a meal, and from four to six hours are in general required for this purpose. Long fasts, however, are nearly as hurtful as too frequent meals. Of no less importance is the kind of food taken, and on this point those who suffer from indigestion must ever exercise the greatest care. Every article of diet which past experience has proved to disagree should be shunned, since what may appear trifling indiscretions in this respect are often productive of great and prolonged suffering. The tables which have been framed to show the relative digestibility of various kinds of food, and which have been founded largely on the observations of Dr Beaumont in the celebrated case of Alexis St Martin, are only valuable within certain limits when applied to the treatment of dyspepsia. It must be borne in mind that idiosyncrasy often plays an important part in digestion, some persons being unable to partake without injury of substances which are generally regarded as wholesome and digestible. Difficulty, too, is often experienced in dealing with dyspeptics from their aversion to, or want of appetite for, those forms of diet which appear most suitable for them. Experience has shown that in this complaint no particular kind of food is absolutely to be relied on, but that in general the best diet is one of a mixed animal and vegetable kind simply but well cooked. The partaking of many dishes, of highly seasoned or salted meats, raw vegetables, newly baked bread, pastry, and confectionery, are all well known common causes of dyspepsia, and should be avoided. When even the simple diet usually taken is found to disagree, it may be necessary to change it temporarily for a still lighter form, such as a milk diet, and that even in very moderate quantity.

General hygienic measures are highly important, since whatever improves the state of the health will have a favourable influence on digestion. Hence regular exercise in the open air, early rising, and the cold bath are to be strongly recommended.

The medicinal remedies for dyspepsia are exceedingly numerous, and a few only of them can be mentioned. Attacks brought on by errors in diet are generally relieved by small doses of rhubarb and bismuth, and by the use of small quantities of light and bland food. In chronic dyspepsia the treatment must depend on the cause of the disorder, so far as that can be ascertained. When the dyspepsia is of the atonic form without much irritability of stomach, bitter tonics such as nux vomica, calumba, gentian, or quassia, along with some of the mineral acids taken before, with, or immediately after a meal will be found highly serviceable; while on the other hand, when there is gastric irritation with acid eructations, sickness, and pain, the medicinal hydrocyanic acid along with bismuth, and antacids taken after food will often afford relief. Pepsine is a remedy of undoubted value in many cases of dyspepsia, and appears to supply the place of that ingredient of the gastric juice when it is deficient in amount. It may be given along with a meal, alone, or in conjunction with diluted hydrochloric acid, which also is a remedy of great efficacy in indigestion. Strict attention must ever be paid to the regular action of the bowels, and where laxatives are required an aloetic dinner pill, or, what is often better, one of the mineral bitter waters (such as that of Frederickshall) which are now so commonly used, should be had recourse to.

The employment of alcoholic stimulants to assist digestion is largely resorted to both with and without medical advice. While it seems probable that in certain cases of atonic dyspepsia, particularly in the feeble and aged, the moderate administration of alcohol has the effect of stimulating the secretion of gastric juice, and is an important adjuvant to other remedies, the advantages of its habitual use as an aid to digestion by the young and otherwise healthy is more than questionable, and it will generally be found that among them those are least troubled with indigestion who abstain from it. See PHYSIOLOGY and DIETETICS. (J.O.A.)

DYVEKE, in German often *Düveke*, and in the Latin chronicles *Columbella*, the "Little Dove," the name by which the mistress of Christian II. of Denmark is invariably designated. Her father was a certain Sigbrit Villums, who had been obliged for political reasons to leave his native country of Holland. Settling at Bergen, he opened an inn, which soon became known for something more than the hospitality of the host or the excellence of his cheer: his daughter's beauty was bush enough for his weakest wine. Valkendorp, the chancellor, did not think it unbecoming of his priestly character to sound her praise in the ears of the young crown-prince; and accordingly, when he visited Bergen in 1507, the prince made a point of seeing the "Little Dove" for himself. In matters of this sort there is unquestionably a royal road; and so having danced with her at a ball or two, he had little difficulty in getting her to leave the inn for a house of her own at Oslo. She followed him to Copenhagen on his accession in 1513, and both her father and mother obtained unusual influence at court. In 1515 the young king, indeed, was constrained from reasons of state to marry Isabella, the sister of Charles V.; but in spite of the emperor's remonstrance, his relations with Dyveke and her parents underwent no real alteration till her sudden death in 1517. That she had been poisoned was the natural verdict of the popular feeling; and the royal suspicion fell on Torben Oxa, warden of the castle of Copenhagen, who was known to have made love to the girl before she was carried off by the prince; and was it not true that two days before her death he had sent her a present of cherries? It mattered not that the culprit was declared innocent by the royal council: "though his neck were as thick as the neck of a bull it should not save his head," raged the king; and he kept his word. Such is the story, not altogether authenticated, which has furnished a favourite theme to dramatist and novelist. Samsoë the Danish poet, published his well-known tragedy "Dyveke" in the close of the 18th century, and it was translated by Manthey into German in 1798. Münch treated the subject in a semi-historical manner in his *Biograph.-histor. Studien*; Hermann Marggraff's tragedy of *Das Taübchen von Amsterdam* appeared in 1839, Rickhoff's *Düveke* in 1842, Hauch's *Wilhelm Zabern* in 1834, Ida Frick's *Sybrecht Willums* in 1843, and Mosenthal's *Düveke* in 1860.

DZUNGARIA, DSONGARIA, or SONGARIA, a former Mongolian kingdom of Central Asia, raised to its highest pitch by Kaldan or Bushtu Khan in the latter half of the 17th century, but completely destroyed by Chinese invasion about 1757–59. It derived its name from the Dsongars, or Songars, who were so called because they formed the left wing (*dson*, left; *gar*, hand) of the Mongolian army. Its widest limit included Kashgar, Yarkand, Khotan, the whole region of the Thian Shan Mountains, and in short the greater proportion of that part of Central Asia which extends from 35° to 50° N. lat. and from 72° to 97° E. long. The name, however, is more properly applied only to the present Chinese province of Thian-Shan-pe-lu and the country watered by the Ili. As a political or geographical term it has practically disappeared from the map; but the range of mountains stretching north-east along the southern frontier of the Land of the Seven Streams—as the district to the south-east of the Balkhash Lake is called—preserves the name of the Dzungarian Range.

E

E is the second vowel-symbol and the fifth letter in our alphabet. In its original form among the Phoenicians it represented the rough breathing—our *h*: we have seen that A represented the smooth breathing. As the Greeks had the sound *h* at a very early period, it might have been expected that this symbol would have been taken by them with its original value. But the want of symbols to denote the vowels was apparently felt to be more imperative; therefore all the Phœnician symbols (corresponding to the Hebrew aleph, he, ayin) were taken to denote the vowel-sounds *a*, *e*, *o* respectively. The form of the symbol E has varied little from the earliest Greek times to our own. In old Latin it is sometimes, but rarely, found in the form ||. The typical sound of E in almost all languages is one of those which we denote generally by *a* in English, *e.g.*, in the word *fate*—that is, one of the simple sounds between A (English *ah*) and I (English *ee*), which are produced by raising the tongue gradually from its lowest position (at A) to its highest position (at I): in this scale of sounds the lips are not employed. The most clearly distinguished of these sounds are (1) that in *men*, (2) that in *fair*, (3) that in *fate*. It will be observed that these sounds have here different symbols; and if these were consistently employed in English we should not have much reason to complain of our spelling; but *e* has also the I-sound in *here* and *see*; *ai* in *wait* has the same sound as *a* in *fate*; and *a* has many sounds. Other languages employ diacritical marks to distinguish these sounds; thus in Italian we have *è* and *é*, called "open" and "close" *e* respectively; these correspond very nearly to (2) and (3) mentioned above. It is probable that the same distinction of sound was given in Latin by employing *ae* to express the open *e*: at least open *e* is commonly found in Italian words which were written in Latin with *ae*, or with *e* short. It is possible that in Greece a similar distinction of close open *e* was expressed in early times by the symbols ε (epsilon) and η (eta), but in Attica, at least after 403 B.C., the distinction seems to have been rather quantitative than qualitative. For the history of eta see article H. It is clear that in a perfect alphabet we ought to have at least three distinct symbols between A and I: we ought not to be compelled to distinguish the simple sounds by diphthongs or other modifications. Indeed yet more symbols would be desirable, for there are other sounds in this scale, which, however, are not easily distinguished from the above except by a practised ear.

It is probable that *ee* in English of the 16th and 17th centuries had the sound still heard in Scotland in words like *ell*, *i.e.*, the simple *e* in our *men* pronounced long: this is not unlike the open *e*, but the back of the tongue is lower. But *ee* had acquired its present I sound in the last century.

EACHARD, JOHN (1636–1697), an English divine, was born in Suffolk in 1636, and was educated at Catherine Hall, Cambridge, of which he became master in 1675 in succession to Lightfoot. He was created a doctor of divinity in 1676 by royal mandate, and was twice (in 1679 and 1695) vice-chancellor of the university. He died on the 7th July 1697. In 1670 he had published anonymously a humorous satire entitled *The Ground and Occasions of the Contempt of the Clergy enquired into in a letter to R. L.*, which excited much attention and provoked several replies, one of them being from John Owen. These were met by *Some Observations, etc., in a second letter to R. L.* (1671), written in the same bantering tone as the original work. Eachard attributed the contempt into which the clergy had fallen to their imperfect education, their insufficient incomes, and the want of a true vocation. He gave amusing illustrations of the absurdity and poverty of the current pulpit oratory of his day, some of them being taken from the sermons of his own father. He attacked the philosophy of Hobbes in his *Mr Hobbs's State of Nature considered; in a dialogue between Philautus and Timothy* (1672), and in his *Some Opinions of Mr Hobbs considered in a second dialogue* (1673). These were written in their author's chosen vein of light satire, and Dryden praised them as highly effective within their own range. It is noteworthy that Eachard's own sermons were not superior to those he satirised. Swift alludes to him as a signal instance of a successful humorist who entirely failed as a serious writer. A collected edition of his works in three volumes, with a notice of his life, was published in 1774.

EADIE, JOHN (1810–1876), theologian and biblical critic, was born at Alva, in Stirlingshire, on the 9th May 1810. Having manifested unusual ability at school, he was sent to the university of Glasgow, where he passed through the usual curriculum in arts. Immediately afterwards he commenced to study for the ministry at the Divinity Hall of the Secession Church, a dissenting body which, on its union a few years later with the Relief Church, adopted the denomination United Presbyterian. In 1835 he was ordained to the pastoral charge of the Cambridge Street Secession church in Glasgow. Here he speedily attained a position of great eminence and usefulness, and for many years before the close of his life he was generally regarded as the leading representative of his denomination in the city which has always been its stronghold. Though he had little claim to be called eloquent, and his style was often slovenly, he had many of the other qualities that secure the most useful and enduring kind of popularity. As a preacher he was distinguished by invariable good sense, frequent flashes of happy illustration, masculine piety, deep spiritual earnestness, breadth of sympathy both intellectual and emotional, and—most specifically of all—by the power he had in his expository discourses of conveying the best results of biblical criticism in an intelligible form to a general audience. Behind the carelessness and apparent indifference of his manner, it was not difficult to detect the quick sensibility and tender feeling which were eminently characteristic of the man. Though more than once invited to an important charge elsewhere, Dr Eadie refused to leave Glasgow, in which he found a sphere more exactly suited to his pastoral gifts than he could expect in any other place. In 1863 he removed with a portion of his congregation to a new and beautiful church at Lansdowne Crescent, where his influence continued unabated until his death.

From his student days Eadie bore a reputation for extensive, if not profound and accurate, scholarship, which he justified and increased during the earlier years of his ministry to such an extent that in 1843 the church to which he belonged appointed him professor of biblical literature and hermeneutics in its Divinity Hall. He held this appointment along with his ministerial charge till the close of his life, and discharged its duties with an efficiency that was universally acknowledged. While his scholarship was not minute or thorough, he was surpassed by few biblical commentators of his day in range of learning, and by still fewer in the soundness of judgment with which his learning was applied. As a critic he was acute and painstaking;

as an interpreter he was eminently fair-minded. In the professor's chair, as in the pulpit, his strength lay in the tact with which he selected the soundest results of biblical criticism, whether his own or that of others, and presented them in a clear and connected form, with a constant view to their practical bearing. If this last fact gave a non-academic aspect to some portions of his lectures, it rendered them not less interesting and probably not less useful to his auditors. Eadie's merits as a scholar were early acknowledged by the usual honorary university distinctions. He received the degree of LL.D. from Glasgow in 1844, and that of D.D. from St Andrews in 1850.

Busily engaged as he was in two distinct offices, either of which might well of itself have employed all his energies, Eadie nevertheless found time for an amount of work in a third sphere, of which the same thing might be said. His labours as an author would have been more than creditable to one who had no other occupation. Most of his works were connected with biblical criticism and interpretation, some of them being designed for popular use and others being more strictly scientific. To the former class belong the *Biblical Cyclopædia*, his edition of *Cruden's Concordance*, his *Early Oriental History*, and his discourses on *The Divine Love* and on *Paul the Preacher*; to the latter belong his commentaries on the Greek text of St Paul's epistles to the Ephesians, Colossians, Philippians, and Galatians, published at intervals in four volumes, which take a high rank among exegetical works. His *Life of Dr Kitto* obtained a deserved popularity. His last work, the *History of the English Bible* (2 vols. 1876), will probably be the most enduring memorial of his ability as an author. Though not unimpeachable in point of arrangement and style, it contains a fuller and more accurate account of the subject than is to be found anywhere else, and almost every page bears marks of the life-long interest and loving research of the author. His almost unrivalled knowledge of the various English versions, as well as his ability as a critic and interpreter of the original, led to his being selected as one of the company for the revision of the authorized version of the New Testament, and in this capacity it is understood that he rendered excellent service. Dr Eadie died at Glasgow on the 3d June 1876.

EADMER, or Edmer (in Latin Eadmerus, and by mistake Edimerus and Edinerus), an English ecclesiastic and historian of the Norman period, probably, as his name suggests, of English as opposed to Norman parentage. At an early age he was sent to the Benedictine monastery at Canterbury; and there he became acquainted with Anselm, at the time of the latter's first visit to England as abbot of Bec. The intimacy was renewed when Anselm was raised to the episcopal see; and thenceforward Eadmer was not so much the archbishop's disciple and follower as his friend and director, and that at last not only by Anselm's private recognition, but by the formal appointment of Pope Urban II. So complete, indeed, was the obedience shown by the great scholastic philosopher and head of the English Church to his self-elected tutor, that—according to William of Malmesbury, *De gestis pontificum Anglorum*, lib. i.—he is said to have waited for his express permission before he rose from his bed, or even turned from one side to the other. After Anselm's death Eadmer accompanied Radulph, the new archbishop, to Rome in 1119; and on their return in 1120 he was nominated to the see of St Andrews in Scotland. Owing, however, to the refusal of the Scotch to recognize the claims put forward by Eadmer and his patron in support of the episcopal authority of the see of Canterbury, he was never formally inducted into the office. He was at Canterbury in 1121, and he spent the latter part of his life as prior of the monastery there. His death is variously assigned to the year 1123 and 1137.

Eadmer has left a large number of works, of which a list is given in Wharton's *Anglia Sacra*, part ii. Most important are his *Historia Novorum*, in six books treating of his own times down to the death of Radulph in 1122, and his *Vita Anselmi*, which ranks as one of the chief authorities in regard to the primate. The former was first published by Selden in 1623, the latter at Antwerp in 1551; and both have since been several times reprinted. Of less mark are his lives of Odo, Bregwin, and Dunstan, and of Oswald and Wilfrid of York, and his treatises—formerly ascribed to Anselm—*De quatuor virtutibus quæ fuerunt in beata Maria virgine*, and *De Similitudinibus S. Anselmi*. Nearly all his works are to be found in an early MS. in the library of Corpus Christi College, Cambridge (C.C.C.C., No 371), and most of them have been reprinted as an appendix to Anselm's *Opera* by Gerberon, fol. 1675, and by the Benedictine monks of St Maure, fol. Paris, 1721. A number of his letters are preserved in MSS. Cotton., Otho, A. xii.

See especially Wright, *Biographia Brit. Lit.*, Anglo-Norman Period, 1846; Charma, *Saint Anselm*, 1853, pp. 186, 187; Burton, *History of Scotland*, vol. i. pp. 422-424.

EAGLE (French *Aigle*, from the Latin *Aquila*), the name generally given to the larger Diurnal Birds-of-prey which are not Vultures; but the limits of the subfamily *Aquilinæ* have been very variously assigned by different writers on systematic ornithology, and, as before observed (Buzzard, vol. iv. p. 603), there are Eagles smaller than certain Buzzards. By some authorities the *Læmmergeier* of the Alps, and other high mountains of Europe, North Africa, and Asia, is accounted an Eagle, but by others the genus *Gypaetus* is placed with the *Vulturidæ*, as its common English name (Bearded Vulture) shows. There are also other forms, such as the South-American *Harpyia* and its allies, which though generally called Eagles have been ranked as Buzzards. In the absence of any truly scientific definition of the family *Aquilinæ* it is best to leave these and many other more or less questionable members of the group—such as the genera *Spizaetus*, *Circaetus*, *Spilornis*, *Helotarsus*, and so forth—and, so far as space will allow, to treat here of those whose position cannot be gainsaid.

True Eagles inhabit all the Regions of the world, and some seven or eight species at least are found in Europe, of which two are resident in the British Islands. In England and in the Lowlands of Scotland Eagles only exist as stragglers; but in the Hebrides and some parts of the Highlands a good many may yet be found, and their numbers appear to have rather increased of late years than diminished; for the foresters and shepherds, finding that a high price can be got for their eggs, take care to protect the owners of the eyries, which are nearly all well known, and to keep up the stock by allowing them at times to rear their young. There are also now not a few occupiers of Scottish forests who interfere so far as they can to protect the king of birds. But hardly twenty years ago trapping, poisoning, and other destructive devices were resorted to without stint, and there was then every probability that before long not an Eagle would be left to add the wild majesty of its appearance to the associations of the mountain or the lake.[1] In Ireland the extirpation of Eagles seems to have been carried on almost unaffected by the prudent considerations which in the northern kingdom have operated so favourably for the race, and except in the wildest parts of Donegal, Mayo, and Kerry, Eagles in the sister-island are said to be almost birds of the past.

Of the two British species the Erne (Icel. *Œrn*) or Sea-

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[1] The late Lord Breadalbane was perhaps the first large landowner who set the example that has been since followed by others. On his unrivalled forest of Black Mount, Eagles—elsewhere persecuted to the death—were by him ordered to be unmolested so long as they were not numerous enough to cause considerable depredations on the farmers' flocks. He thought, and all who have an eye for the harmonies of nature will agree with him, that the spectacle of a soaring Eagle was a fitting adjunct to the grandeur of his Argyllshire mountain-scenery, and a good equivalent for the occasional loss of a lamb, or the slight deduction from the rent paid by his tenantry in consequence. How faithfully his wishes were carried out by his head-forester, Mr Peter Robertson, the present writer has abundant means of knowing.

Eagle (by some called also the White-tailed and Cinereous Eagle)—*Haliaetus albicilla*—affects chiefly the coast and neighbourhood of inland waters, living in great part on the fish and refuse that is thrown up on the shore, though it not unfrequently takes living prey, such as lambs, hares, and rabbits. On these last, indeed, young examples mostly feed when they wander southward in autumn, as they yearly do, and appear in England. The adults (fig. 1) are distinguished by their prevalent greyish-brown colour, their pale head, yellow beak, and white tail—characters, however, wanting in the immature, which do not assume the perfect plumage for some three or four years. The eyry is commonly placed in a high cliff or on an island in a lake—sometimes on the ground, at others in a tree—and consists of a vast mass of sticks, in the midst of which is formed a hollow lined with *Luzula sylvatica* (as first observed by the late Mr John Wolley) or some similar grass, and here are laid the two or three white eggs. In former days the Sea-Eagle seems to have bred in several parts of England—as the Lake district, and possibly even in the Isle of Wight and on Dartmoor. This species inhabits all the northern part of the Old World from Iceland to Kamchatka, and breeds in Europe so far to the southward as Albania. In the New World, however, it is only found in Greenland, being elsewhere replaced by the White-headed or Bald Eagle, *H. leucocephalus*, a bird of similar habits, and the chosen emblem of the United States of America. In the far east of Asia occurs a still larger and finer Sea-Eagle, *H. pelagicus*, remarkable for its white thighs and upper wing-coverts. South-eastern Europe and India furnish a much smaller species, *H. leucoryphus*, which has its representative, *H. leucogaster*, in the Malay Archipelago and Australia, and, as allies in South Africa and Madagascar, *H. vocifer* and *H. vociferoides* respectively. All these Eagles may be distinguished by their scaly tarsi, while the group next to be treated of have the tarsi feathered to the toes.

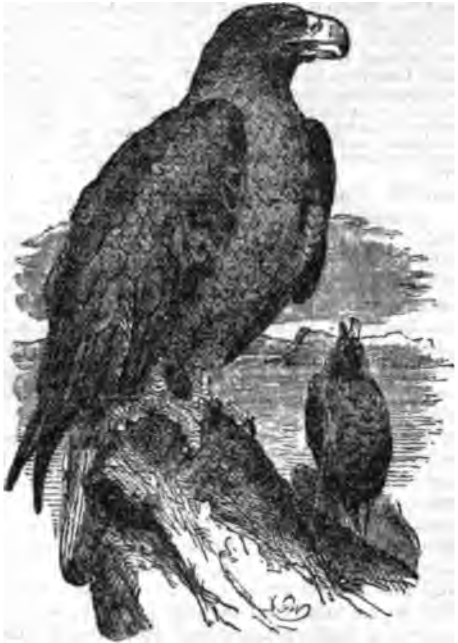

FIG. 1.—Sea-Eagle.

The Golden or Mountain-Eagle, *Aquila chrysaetus*, is the second British species. This also formerly inhabited England, and a nest, found in 1668 in the Peak of Derbyshire, is well described by Willughby, in whose time it was said to breed also in the Snowdon range. It seldom if ever frequents the coast, and is more active on the wing than the Sea-Eagle, being able to take some birds as they fly, but a large part of its sustenance is the flesh of animals that die a natural death. Its eyry is generally placed and built like that of the other British species,[1] but the neighbourhood of water is not requisite. The eggs, from two to four in number, vary from a pure white to a mottled, and often highly-coloured, surface, on which appear different shades of red and purple. The adult bird (fig. 2) is of a rich, dark brown, with the elongated feathers of the neck, especially on the nape, light tawny, in which imagination sees a "golden" hue, and the tail marbled with brown and ashy-grey. In the young the tail is white at the base, and the neck has scarcely any tawny tint. The Golden Eagle does not occur in Iceland, but occupies suitable situations over the rest of the Palæarctic Region and a considerable portion of the Nearctic—though the American bird has been, by some, considered a distinct species. Domesticated, it has many times been trained to take prey for its master in Europe, and to this species is thought to belong an Eagle habitually used by the Kirghis Tartars, who call it *Bergut* or *Bearcoot*, for the capture of antelopes, foxes, and wolves. It is carried hooded on horseback or on a perch between two men, and released when the quarry is in sight. Such a bird, when well trained, is valued, says Pallas, at the price of two camels. It is quite possible, however, that more than one kind of Eagle is thus used, and the services of *A. heliaca* (which is the Imperial Eagle of some writers[2]) and of *A. mogilnik*—

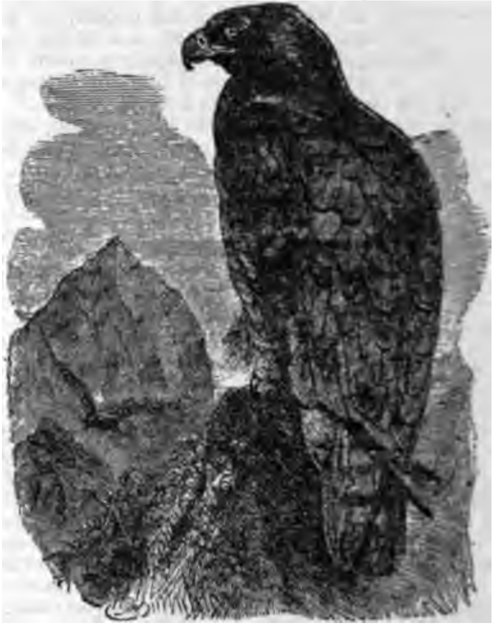

FIG. 2.—Golden Eagle.

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[1] As already stated, the site chosen varies greatly. Occasionally placed in a niche in what passes for a perpendicular cliff to which access could only be gained by a skilful cragsman with a rope, the writer has known a nest to within ten or fifteen yards of which he rode on a pony. Two beautiful views of as many Golden Eagle's nests, drawn on the spot by Mr Wolf, are given in the *Ootheca Wolleyana*, and a fine series of eggs is also figured in the same work.

[2] Which species may have been the traditional emblem of Roman power, and the *Ales Jovis*, is very uncertain.

both of which are found in Central Asia, as well as in South-eastern Europe—may also be employed.

Of the other more or less nearly allied species or races want of room forbids the consideration, but there is a smaller form on which a few words may be said. This has usually gone under the name of *A. nævia*, but is now thought by the best authorities to include three local races, or, in the eyes of some, species. They inhabit Europe, North Africa, and Western Asia to India, and two examples of one of them—*A. clanga*, the form which is somewhat plentiful in North-eastern Germany—have occurred in Cornwall. The smallest true Eagle is *A. pennata*, which inhabits Southern Europe, Africa, and India. Differing from other Eagles of their genus by its wedge-shaped tail, though otherwise greatly resembling them, is the *A. audax* of Australia. Lastly may be noticed here a small group of Eagles, characterized by their long legs, forming the genus *Nisaetus*, of which one species, *N. fasciatus*, is found in Europe. The Osprey (*Pandion*), though placed by many among the *Aquilinæ*, certainly does not belong to that subfamily. (A. N.)

EAR. The simplest form of the organ of hearing is a small sac containing fluid, with the auditory nerve expanded upon it. Sonorous vibrations are communicated to this sac either directly through the hard parts of the head, or at the same time by a membrane exposed to the surrounding medium. Such is the form of ear found in many of the Crustacea and in the Cephalopoda. In the Vertebrata, there is a progressive development and increasing complexity from the fishes up to Mammalia. For details as to the structure of the ear in the different subdivisions of the Vertebrata, reference is made to the articles treating of these, such as AMPHIBIA, BIRDS, &c.; and the structure of the human ear will be found fully described in the article ANATOMY, vol. i. p. 891. It is the object of this article to describe the phenomena of auditory sensation from the physiological point of view.

The sense of hearing is a special sensation the cause of which is an excitation of the auditory nerves by the vibrations of sonorous bodies. A description of sonorous vibrations and of their transmission is given in the article ACOUSTICS; here we shall consider, first, the transmission of such vibrations from the external ear to the auditory nerve, and secondly, the physiological characters of auditory sensation.

I.—1. *Transmission in External Ear.*—The external ear consists of the *pinna*, or auricle, and the *external auditory meatus*, or canal, at the bottom of which we find the *membrana tympani*, or drum head. In many animals the auricle is trumpet-shaped, and, being freely movable by muscles, serves to collect sonorous waves coming from various directions. The auricle of the human ear presents many irregularities of surface. If these irregularities are abolished by filling them up with a soft material such as wax or oil, leaving the entrance to the canal free, experiment shows that the intensity of sounds is weakened, and that there is more difficulty in judging of their direction. When waves of sound strike the auricle, they are partly reflected outwards, while the remainder, impinging at various angles, undergo a number of reflections so as to be directed into the auditory canal. Vibrations are transmitted along the auditory canal, partly by the air it contains and partly by its walls, to the membrana tympani. The absence of the auricle, as the result of accident or injury, has not caused diminution of hearing. In the auditory canal, waves of sound are reflected from side to side until they reach the membrana tympani. From the obliquity in position and peculiar curvature of this membrane, most of the waves must strike it nearly perpendicularly, and in the most advantageous direction.

2. *Transmission in Middle Ear.*—The middle ear is a small cavity, the walls of which are rigid with the exception of the portions consisting of the membrana tympani, and the membrane of the round window and of the apparatus filling the oval window. This cavity communicates with the pharynx by the *Eustachian tube*, which forms a kind of air-tube between the pharynx and the tympanum for the purpose of regulating pressure on the membrana tympani. It is generally supposed that during rest the tube is open, and that it is closed during the act of deglutition. As this action is frequently taking place, not only when food or drink is introduced, but when saliva is swallowed, it is evident that the pressure of the air in the tympanum will be kept in a state of equilibrium with that of the external air on the outer surface of the membrana tympani, and that thus the membrana tympani will be rendered independent of variations of atmospheric pressure such as may occur within certain limits, as when we descend in a diving bell or ascend in a balloon. By a forcible expiration, the oral and nasal cavities being closed, air may be driven into the tympanum, while a forcible inspiration (Valsalva's experiment) will draw air from that cavity. In the first case, the membrana tympani will bulge outwards, in the second case inwards, and in both, from excessive stretching of the membrane, there will be partial deafness, especially for sounds of high pitch. Permanent occlusion of the tube is one of the most common causes of deafness.

The membrana tympani is capable of being set into vibration by a sound of any pitch included in the range of perceptible sounds. It responds exactly as to number of vibrations (pitch), intensity of vibrations (intensity), and complexity of vibration (quality or timbre). Consequently we can hear a sound of any given pitch, of a certain intensity, and in its own specific timbre or quality. Generally speaking, very high tones are heard more easily than low tones of the same intensity. As the membrana tympani is not only fixed by its margin to a ring or tube of bone, but is also adherent to the handle of the malleus, which follows its movements, its vibrations meet with considerable resistance. This diminishes the intensity of its vibrations, and prevents also the continued vibration of the membrane after an external vibration has ceased, so that a sound is not heard much longer than it lasts. The tension of the membrane may be affected (1) by differences of pressure on the two surfaces of the membrana tympani, as may occur during forcible expiration or inspiration, or in a pathological condition, and (2) by muscular action, due to contraction of the *tensor tympani* muscle. This small muscle arises from the apex of the petrous temporal and the cartilage of the Eustachian tube, enters the tympanum at its anterior wall, and is inserted into the malleus near its root. The handle of the malleus is inserted between the layers of the membrana tympani, and, as the malleus and incus move round an axis passing through the neck of the malleus from before backwards, the action of the muscle is to pull the membrana tympani inwards towards the tympanic cavity in the form of a cone, the meridians of which, according to Helmholtz, are not straight but curved, with convexity outwards. When the muscle contracts, the handle of the malleus is drawn still farther inwards, and thus a greater tension of the tympanic membrane is produced. On relaxation of the muscle, the membrane returns to its position of equilibrium by its own elasticity and by the elasticity of the chain of bones. This power of varying the tension of the membrane is a kind of accommodating mechanism for receiving and transmitting sounds of different pitch. With different degrees of tension, it will respond more readily to sounds of different pitch. Thus, when the membrane is tense, it will readily respond to high sounds, while relaxation will be the condition most adapted for low sounds. In addition, increased tension of the membrane, by increasing the resistance, will diminish the intensity of vibrations. This is especially the case for sounds of low pitch.

Helmholtz has also pointed out that the peculiar form of the membrana tympani in man has the effect of increasing the force of its vibrations at the expense of their amplitude.

The vibrations of the membrana tympani are transmitted to the internal ear partly by the air which the middle ear or tympanum contains, and partly by the chain of bones, consisting of the malleus, incus, and stapes. Of these, transmission by the chain of bones is by far the most important. In birds and in the scaly amphibia, this chain is represented by a single rod-like ossicle, the *columella*, but in man the two membranes—the membrana tympani and the membrane filling the fenestra ovalis—are connected by a compound lever consisting of three bones, namely, the *malleus*, or hammer, inserted into the membrana tympani, the *incus*, or anvil, and the *stapes*, or stirrup, the base of which fits into the oval window. The lever thus formed has its fulcrum near the short process of the incus, which abuts against the tympanic wall; the power is applied at the handle of the malleus, and the resistance is at the base of the stirrup. Both by direct experimental observation and by calculation from data supplied by measurement of the lengths of the arms of the lever, Helmholtz has shown that by this arrangement vibrations are diminished in extent in the ratio of 3 to 2, but are inversely increased in force. Considering the great resistance offered to excursions of the stapes, such an arrangement must be advantageous. It must also be noted that in the transmission of vibrations of the membrana tympani to the fluid in the labyrinth or internal ear, through the oval window, the chain of ossicles vibrates as a whole and acts efficiently, although its length may be only a small fraction of the wave length of the sound transmitted.

3. *Transmission in the Internal Ear.*—The internal ear is composed of the labyrinth, formed of the vestibule or central part, the semicircular canals, and the cochlea, each of which consists of an osseous and a membranous portion (see vol. i. p. 893). The osseous labyrinth may be regarded as an osseous mould in the petrous portion of the temporal bone, lined by tesselated endothelium, and containing a small quantity of fluid called the *perilymph*. In this mould, partially surrounded by, and to some extent floating in, this fluid, there is the membranous labyrinth, in certain parts of which we find the terminal apparatus in connection with the auditory nerve, immersed in another fluid called the *endolymph*. The membranous labyrinth consists of a vestibular portion formed by two small sac-like dilatations, called the *saccule* and the *utricle*, the latter of which communicates with the semicircular canals by five openings. Each canal consists of a tube, bulging out at each extremity so as to form the so-called *ampulla*, in which, on a projecting ridge, called the *crista acoustica*, there are cells bearing or developed into long *auditory hairs*, which are to be regarded as the peripheral end-organs of the vestibular branches of the auditory nerve. The cochlear division of the membranous labyrinth consists of the *ductus cochlearis*, a tube of triangular form fitting in between the two cavities in the cochlea, called the *scala vestibuli*, because it commences in the vestibule, and the *scala tympani*, because it ends in the tympanum, at the round window. These two scalæ communicate at the apex of the cochlea. The roof of the ductus cochlearis is formed by a thin membrane called the *membrane of Reissner*, while its floor consists of the *basilar membrane*, on which we find the remarkable *organ of Corti*, which constitutes the terminal organ of the cochlear division of the auditory nerve, and which is fully described in vol. i. p. 894. It is sufficient to state here that this organ consists essentially of an arrangement of epithelial cells bearing hairs which are in communication with the terminal filaments of this portion of the auditory nerve, and that groups of these hairs pass through holes in a closely investing membrane, *membrana reticularis*, which may be supposed to act as a damping apparatus, so as quickly to stop their movements. The ductus cochlearis and the two scalæ are filled with fluid. Sonorous vibrations may reach the fluid in the labyrinth by three different ways—(1) by the osseous walls of the labyrinth, (2) by the air in the tympanum and the round window, and (3) by the base of stapes inserted into the oval window.

When the head is plunged into water, or brought direct contact with any vibrating body, vibrations must transmitted directly. Vibrations of the air in the mouth and in the nasal passages are also communicated directly to the walls of the cranium, and thus pass to the labyrinth. In like manner, we may experience peculiar auditory sensations, such as blowing, rubbing, and hissing sounds, due to muscular contraction or to the passage of blood in vessels close to the auditory organ. It has not been satisfactorily made out to what extent, if any, vibrations may be communicated to the fluid in the labyrinth by the round window. There can be no doubt, however, that in ordinary hearing vibrations are communicated chiefly by the chain of bones. When the base of the stirrup is pushed into the oval window, the pressure in the labyrinth increases, the impulse passes along the scala vestibuli to the scala tympani, and, as the only mobile part of the wall of the labyrinth is the membrane covering the round window, this membrane is forced outwards; when the base of the stirrup passes outwards, a reverse action takes place. Thus the fluid of the labyrinth may receive a series of pulses or vibrations isochronous with the movements of the base of the stirrup, and these pulses affect the terminal apparatus in connection with the auditory nerve.

Since the size of the membranous labyrinth is so small, measuring, in man, not more than $\frac{1}{2}$ inch in length by $\frac{1}{8}$th inch in diameter at its widest part, and since it is a chamber consisting partly of conduits of very irregular form, it is impossible to state accurately the course of vibrations transmitted to it by impulses communicated from the base of the stirrup. In the cochlea, vibrations must pass from the saccule along the scala vestibuli to the apex, thus affecting the membrane of Reissner, which forms its roof; then, passing through the opening at the apex (the *helicotrema*), they must descend by the scala tympani to the round window, and affect in their passage the membrana basilaris, on which the organ of Corti is situated. From the round window impulses must be reflected backwards, but how they affect the advancing impulses is not known. But the problem is even more complex when we take into account the fact that impulses are transmitted simultaneously to the utricle and to the semicircular canals communicating with it by five openings. The mode of action of these vibrations or impulses upon the nervous terminations is still unknown; but to appreciate critically the hypothesis which has been advanced to explain it, it is necessary, in the first place, to refer to some of the general characters of auditory sensation.

4. Certain conditions are necessary for excitation of the auditory nerve sufficient to produce a sensation. In the first place, the vibrations must have a certain amplitude. If too feeble, no impression will be produced. The minimum limit has been stated to be the sensation caused by the falling of a ball of pith, 1 millegramme in weight, upon a smooth surface, such as glass, from a height of 1 millimetre at a distance of 91 millimetres from the ear.

In the next place, vibrations must have a certain duration to be perceived; and lastly, to excite a sensation of a continuous musical sound, a certain number of vibrations must occur in a given interval of time. The lower limit is about 30, and the upper about 30,000 vibrations per second. Below 30, the individual impulses may be observed, and above 30,000 few ears can detect any sound at all. The extreme upper limit is not more than 35,000 vibrations per second. Auditory sensations are of two kinds—noises and musical sounds. *Noises* are caused by impulses which are not regular in intensity or duration, or are not periodic, or they may be caused by a series of musical sounds occurring instantaneously so as to produce discords, as when we place our hand at random on the key-board of a piano. *Musical tones* are produced by periodic and regular vibrations. In musical sounds three characters are prominent—intensity, pitch, and quality. *Intensity* depends on the amplitude of the vibration, and a greater or lesser amplitude of the vibration will cause a corresponding movement of the transmitting apparatus, and a corresponding intensity of excitation of the terminal apparatus. *Pitch*, as a sensation, depends on the length of time in which a single vibration is executed, or, in other words, the number of vibrations in a given interval of time. The ear is capable of appreciating the relative pitch or height of a sound as compared with another, although it may not ascertain precisely the absolute height of a sound. What we call an acute or high tone is produced by a large number of vibrations, while a grave or low tone is caused by few. The musical tones which can be used with advantage range between 40 and 4000 vibrations per second, extending thus from 6 to 7 octaves. According to E. H. Weber, practised musicians can perceive a difference of pitch amounting even to only the $\frac{1}{64}$th of a semitone, but this is far beyond average attainment. *Quality* or *timbre* (or *Klang*) is that peculiar characteristic of a musical sound by which we may identify it as proceeding from a particular instrument or from a particular human voice. It depends on the fact that many waves of sound that reach the ear are really compound wave systems, built up of constituent waves, each of which is capable of exciting a sensation of a simple tone if it be singled out and reinforced by a resonator (see ACOUSTICS), and which may sometimes be heard without a resonator, after special practice and tuition. Thus it appears that the ear must have some arrangement by which it resolves every wave system, however complex, into simple pendular vibrations. When we listen to a sound of any quality we recognize that it is of a certain pitch. This depends on the number of vibrations of one tone, predominant in intensity over the others, called the fundamental or ground tone, or first partial tone. The quality, or timbre, depends on the number and intensity of other tones added to it. These are termed *harmonic* or *partial tones*, and they are related to the first partial or fundamental tone in a very simple manner, being multiples of the fundamental tone: thus—

	Fundamental Tone.	Upper Partials or Harmonics.								
Notes..........	do^{1}	do^{2}	sol^{2}	do^{3}	mi^{3}	sol^{3}	sib^{3}	do^{4}	re^{4}	mi^{4}
Partial tones..	1	2	3	4	5	6	7	8	9	10
Number of vibrations	33	66	99	132	165	198	231	264	297	330

When a simple tone, or one free from partials, is heard, it gives rise to a simple, soft, somewhat insipid sensation, as may be obtained by blowing across the mouth of an open bottle or by a tuning fork. The lower partials added to the fundamental tone give softness combined with richness; while the higher, especially if they be very high, produce a brilliant and thrilling effect, as is caused by the brass instruments of an orchestra. Such being the facts, how may they be explained physiologically?

Little is yet known regarding the mode of action of the vibrations of the fluid in the labyrinth upon the terminal apparatus connected with the auditory nerve. There can be no doubt that it is a mechanical action, a true communication of impulses to delicate hair-like processes, by the movements of which the nervous filaments are irritated. In the human ear it has been estimated that there are about 3000 small arches formed by the *rods of Corti* (see ANATOMY). Each arch rests on the basilar membrane, and supports rows of cells having minute hair-like processes somewhat resembling cilia. It would appear also that the filaments of the auditory nerve terminate in the basilar membrane, and possibly they may be connected with the hair-cells. At one time it was supposed by Helmholtz that these fibres of Corti were elastic and that they were tuned for particular sounds, so as to form a regular series corresponding to all the tones audible to the human ear. Thus 2800 fibres distributed over the tones of seven octaves would give 400 fibres for each octave, or nearly 33 for a semitone. Helmholtz has put forward the ingenious hypothesis that, when a pendular vibration reaches the ear, it excites by sympathetic vibration the fibre of Corti which is tuned for its proper number of vibrations. If, then, different fibres are tuned to tones of different pitch, it is evident that we have here a mechanism which, by exciting different nerve fibres, will give rise to sensations of pitch. When the vibration is not simple but compound, in consequence of the blending of vibrations corresponding to various harmonics or partial tones, the ear has the power of resolving this compound vibration into its elements. It can only do so by different fibres responding to the constituent vibrations of the sound,—one for the fundamental tone being stronger, and giving the sensation of a particular pitch or height to the sound, and the others, corresponding to the upper partial tones, being weaker, and causing special though undefined sensations, which are so blended together in consciousness as to terminate in a complex sensation of a tone of a certain quality or timbre. It would appear at first sight that 33 fibres of Corti for a semitone are not sufficient to enable us to detect all the gradations of pitch in that interval, since, as has been stated above, trained musicians may distinguish a difference of $\frac{1}{64}$th of a semitone. To meet this difficulty, Helmholtz states that if a sound is produced, the pitch of which may be supposed to come between two adjacent fibres of Corti, both of these will be set into sympathetic vibration, but the one which comes nearest to the pitch of the sound will vibrate with greater intensity than the other, and that consequently the pitch of that sound would be thus appreciated. These theoretical views of Helmholtz have derived much support from remarkable experiments of Hensen, who observed that certain hairs on the antennæ of *Mysis*, a Crustacean, when observed with a low miscroscopic power, vibrated with certain tones produced by a keyed horn. It was seen that certain tones of the horn set some hairs into strong vibration, and other tones other hairs. Each hair responded also to several tones of the horn. Thus one hair responded strongly to *d*♯ and *d*″♯, more weakly to *g*, and very weakly to *c*. It was probably tuned to some pitch between *d*″ and *d*″♯. (*Studien über das Gehörorgan der Decapoden*, Leipsic, 1863.)

Recent histological researches have led to a modification of this hypothesis. It has been found that the rods or arches of Corti are stiff structures, not adapted for vibrating, but apparently consisting of a kind of support for the hair cells. It is also known that there are no rods of Corti in the cochlea of birds, which apparently are capable nevertheless of appreciating pitch. Hensen and Helmholtz have now suggested the view that not only may the segments of the membrana basilaris be stretched more in the radial than in the longitudinal direction, but different segments may be stretched radially with different degrees of tension so as to resemble a series of tense strings of gradually increasing length. Each string would then respond to a vibration of a particular pitch communicated to it by the hair-cells. The exact mechanism of the hair-cells and of the membrana reticularis, which looks like a damping apparatus, is unknown.

II. *Physiological Characters of Auditory Sensation.*—1. Under ordinary circumstances auditory sensations are referred to the outer world. When we hear a sound, we associate it with some external cause, and it appears to originate in a particular place, or to come in a particular direction. This feeling of *exteriority* of sound seems to require transmission through the membrana tympani. Sounds which are sent through the walls of the cranium, as when the head is immersed in, and the external auditory canals are filled with, water, appear to originate in the body itself. It is probable, however, that the external character of ordinary auditory sensations may be more the result of habit than due to any anatomical peculiarity of the ear itself.

2. An auditory sensation lasts a short time after the cessation of the exciting cause, so that a number of separate vibrations, each capable of exciting a distinct sensation if heard alone, may succeed each other so rapidly that they are fused into a single sensation. If we listen to the puffs of a syren, or to vibrating tongues of low pitch, the single sensation is usually produced by about 30 or 35 vibrations per second; but there can be no doubt, as was first pointed out by Helmholtz, that when we listen to beats of considerable intensity, produced by two adjacent tones of sufficiently high pitch, the ear may follow as many as 132 intermissions per second.

3. The sensibility of the ear for sounds of different pitch is not the same. It is more sensitive for acute than for grave sounds, and it is probable that the maximum degree of acuteness is for sounds produced by about 3000 vibrations per second, that is near *fa*^{5}♯. Sensibility as to pitch varies much with the individual and with the training to which he has subjected himself. Thus some musicians may detect a difference of $\frac{1}{1000}$th of the total number of vibrations, while other persons may have difficulty in appreciating a semitone. This power of appreciating differences of pitch is termed a correct or just ear, and there can be no doubt of its improvement by cultivation.

4. Hearing with two ears does not appear materially to influence auditive sensation, but probably the two organs are enabled, not only to correct each other's errors, but also to aid us in determining the locality from whence a sound originates. It is asserted by Fechner that one ear may perceive the same tone at a slightly higher pitch than the other, but this may probably be due to some slight pathological condition in one ear. If two tones, produced by two tuning forks of equal pitch, are produced one near each ear, there is a uniform single sensation; if one of the tuning forks be made to revolve round its axis in such a way that its tone increases and diminishes in intensity, neither fork is heard continuously, but both sound alternately, the fixed one being only audible when the revolving one is not. It is difficult to decide whether excitations of corresponding elements in the two ears can be distinguished from each other. It is probable that the resulting sensations may be distinguished, provided one of the generating tones differs from the other in intensity or quality, although it may be the same in pitch.

5. Hitherto we have considered only the audition of a single sound, but it is possible also to have simultaneous auditive sensations, as in musical harmony. It is difficult to ascertain what is the limit beyond which distinct auditory sensations may be perceived. We have in listening to an orchestra a multiplicity of sensations which produce a total effect, while, at the same time, we can with ease single out and notice attentively the tones of one or two special instruments. Thus the pleasure of music may arise partly from listening to simultaneous, and partly from the effect of contrast or suggestion in passing through successive, auditory sensations.

The principles of harmony belong to the subject of music, but it is necessary here briefly to refer to these from the physiological point of view. If two musical sounds reach the ear at the same moment, an agreeable or disagreeable sensation is experienced, which may be termed a *concord* or a *discord*, and it can be shown by experiment with the syren (see ACOUSTICS) that this depends upon the vibrational numbers of the two tones. The octave (1:2), the twelfth (1:3), and double octave (1:4), are absolutely consonant sounds; the fifth (2:3) is said to be perfectly consonant; then follow, in the direction of dissonance, the fourth (3:4), major sixth (3:5), major third (4:5), minor sixth (5:8), and the minor third (5:6). Helmholtz has attempted to account for this by the application of his theory of *beats*.

Beats are observed when two sounds of nearly the same pitch are produced together, and the number of beats per second is equal to the difference of the number of vibrations of the two sounds. Beats give rise to a peculiarly disagreeable intermittent sensation, comparable to what is experienced on watching a flickering light, and the painful sensation may arise from intermittent irritation of the auditory nerve filaments. The maximum roughness of beats, according to Helmholtz, is attained by 33 per second; beyond 132 per second, the individual impulses are blended into one uniform auditory sensation. When two notes are sounded, say on a piano, not only may the first, fundamental, or prime tones beat, but partial tones of each of the primaries may beat also, and as the difference of pitch of two simultaneous sounds augments, the number of beats, both of prime tones and of harmonics, augments also. The physiological effect of beats, though these may not be individually distinguishable, is to give roughness to the ear. If harmonics or partial tones of prime tones coincide, there are no beats; if they do not coincide, the beats produced will give a character of roughness to the interval. Thus in the octave and twelfth, all the partial tones of the acute sound coincide with the partial tones of the grave sound; in the fourth, major sixth, and major third, only two pairs of the partial tones coincide, while in the minor sixth, minor third, and minor seventh, only one pair of the harmonics coincide. For details, see Helmholtz, *On Sensations of Tone as a Physiological Basis for the Theory of Music*, translated by Alexander J. Ellis, London, 1875.

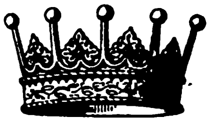
DISEASES OF THE EAR.—Deafness may arise from obstruction of the external ear occasioned by disease of various kinds; from ulceration, thickening, or perforation of the membrana tympani; from inflammatory affections, both acute and chronic, of the middle and internal ear; from obstruction of the Eustachian tube caused by inflammation of its lining membrane, leading to thickening and accumulation of mucus or pus; from diseases of the throat blocking up the end of the Eustachian tube: and, lastly, from disease of the auditory nerve or of the terminal apparatus connected with it in the membranous labyrinth. *Otitis*, or ear-ache, is an inflammation, usually of a rheumatic nature, of some portion of the external auditory canal. Most frequently occurring in weakly individuals, it causes intense pain, which shoots over the head on the affected side. It may lead to the formation of a small abscess in one of the wax glands found in the passage. Hot applications by fomentations or warm poultices give relief, and if an abscess forms, it ought to be carefully lanced. *Otorrhœa* is a muco-purulent discharge, often of a fœtid odour, from the ears of scrofulous children. It frequently occurs during teething, and it may be one of the sequelæ of scarlet fever, or measles, or small-pox. When pus flows from the ear, it may come from the membrane lining the deeper portion of the external meatus, or from the middle ear by a hole in the membrana tympani, or from diseased portions of bone near the middle, or internal ear. The treatment, of course, varies according to the cause, but generally the discharge may be lessened in quantity, and at all events rendered less offensive, by the use of weak injections of carbolic acid or of Condy's fluid. *Concretions*, consisting of accumulations of wax, often hard and adherent, may block up the external meatus. Frequently these may not impair the sense of hearing, but they give rise to distressing noises of various kinds. They may be got rid by the careful use of injections of soap and hot water. *Polypi*, usually hard and firm, but sometimes soft and gelatinous, occur in the external meatus. The external ear may become hypertrophied, as in idiots; it may contain concretions of urate of soda, as in gout; and it may be the seat of fibrous tumours. In the insane, large tumours, filled with blood, termed *hæmatoma*, sometimes occur. One of the most common causes of deafness in children is chronic enlargement of the tonsils from repeated quinseys or from a strumous habit. Frequently also the Eustachian tube is occluded, but by passing a delicate catheter along the tube, and sometimes by inflating artificially the tympanum with air, hearing may be restored. It is difficult to diagnose, and still more difficult to treat, diseases of the internal ear, in consequence of its delicacy of structure and inaccessible situation. Pathological states of the internal ear may give rise to distressing *entotic* phenomena, such as whizzing, buzzing, hissing, blowing, or clanging sounds; and if they are not relieved by washing out the external ear, or by inflating the middle ear by the Eustachian tube, or by counter-irritation by means of small blisters or the application of tincture of iodine behind the ears, nothing more can be done. (J. G. M.)

EARL (Latin, *comes*; French, *compte*), a title and rank of nobility now the third in the order of the British peerage, and, accordingly, intervening between marquis and viscount. Earl, however, was the highest title and rank of the English nobles *post conquestum* until the year 1337, when by Edward III. the Black Prince was created duke of Cornwall. The "earl" of England was identical with *comte* or *compte* of France; and, so long as Norman-French continued to be spoken in this country, the English "earls" were styled "counts" as well in England as on the Continent. These powerful barons represented and succeeded the Saxon thanes who were *ealdormen*, their own title evidently having been derived from the *jarl* of Scandinavia.

The nature of a modern earldom is readily understood, since it is a rank and dignity of nobility which, while it confers no official power or authority, is inalienable, indivisible, and descends in regular succession to all the male heirs of the body of the grantee until, on their failure, it merges in the Crown. Not so was it with either the nature or the descent of the ancient earldoms of England. In early feudal times titles independent of office did not exist. The earls, or *comites*, of those days, therefore, were actual officers, each having supreme authority in his own earldom, or "county," under the Crown; each one of them also deriving from his earldom a certain fixed revenue, the possession of which was at once an apanage of his official dignity as earl, and the evidence of his lawful and recognized title to it. But an earldom has long ceased to be endowed with any official associations whatever, and has become merely a title by which its owners in male succession inherit and hold the dignity, third in rank, of a peerage. In like manner, the descent and tenure of the ancient earldoms differed in many highly important particulars from the simple succession of the modern dignity. In the course of their chequered history, we find ancient earldoms, instead of passing by a quiet and clearly defined succession from father to son, constantly depending on the rights of female inheritance; they are seen to have been obtained by many a husband *jure uxoris;* they appear to have been transferred in an arbitrary manner, or actually to have been divided between coparceners, or to have been retained for a while by the Crown and let out to farm. At the same time, under such strange conditions as these, and amidst conflicting vicissitudes, until they finally merged in the Crown, the ancient earldoms retained their vitality. They might descend very irregularly, and become vested in successive families, but still they did not become extinct; nor were the claims of legal inheritance wholly forgotten or superseded; and, even if for a time they had been latent or had actually been superseded, they emerged under more favourable circumstances, and under fresh arrangements or modifications they were again recognized by the Crown.

An earl is "Right Honourable," and is styled "My Lord." His eldest son bears his father's "second title," and therefore, that second title being in most cases a viscounty, he generally is styled "Viscount;" under all circumstances, however, the eldest son of an earl takes precedence immediately after the viscounts. The younger sons of earls are "Honourable," but all their daughters are "Ladies." In formal documents and instruments, the sovereign, when addressing or making mention of any peer of the degree of an earl, usually designates him "trusty and well-beloved cousin,"—a form of appellation first adopted by Henry IV., who either by descent or alliance was actually related to every earl and duke in the realm. The wife of an earl is a countess; she is "Right Honourable," and is styled "My Lady."

The coronet of an earl has, rising from a golden circlet, eight lofty rays of gold, each of which upon its point supports a large pearl; also, between each pair of rays, at their bases, there is a golden conventional leaf, the stalks of all these leaves being connected with the rays and with each other so as to form a continuous wreath. In representations, five of the elevated rays with their pearls and four of the leaves are shown. The cap and lining of the coronet, if worn or represented, are the same as those of the ducal coronet. An earl's coronet without cap or lining is represented in the annexed figure.



Earl's Coronet.

In the monumental effigies of noble personages, which yet remain from the Middle Ages, there are many highly interesting representations of the varieties of coronets worn by the earls of those days and by their countesses, before this coronet had assumed its present fixed and definite character. Thus, early in the 15th century, effigies of an earl and countess of Arundel, at Arundel, have very rich coronets. The earl's has a series of leaves and of clusters of three small balls or pearls alternating, all of them being raised to a considerable height above the circlet, the clusters rising rather higher than the leaves. The coronet of the countess differs in having the raised clusters set alternately with single balls or pearls that are less elevated.[1]

The coronet of a countess now in all respects is the same as that of an earl. The scarlet parliamentary robe of an earl has three doublings of ermine. The duke of Norfolk, who is premier duke, as earl of Arundel, Surrey, and Norfolk, is premier earl of England; also he holds his earldom of Arundel, a feudal dignity (as it was adjudged by

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[1] In his effigy at Warwick, 1439, the crest of Richard Beauchamp, earl of Warwick, rises from a plain circlet that is surmounted by a series of pearls slightly raised, but without any leaves. Still later in the century, 1483, Isabel Plantagenet, countess of Essex, in her brass at Little Easton in Essex, has a series of leaves, no less than thirteen in number, that rise to a uniform slight elevation above the front of an ample coronet; and about the same time, 1487, the coronets of another earl and countess of Arundel have their circlets heightened with an uninterrupted series of architectural conventional leaves, and once more, at Hever, in Kent, the brass to Sir T. Boleyn, K.G., earl of Wiltshire and Ormonde, represents the maternal grandfather of Queen Elizabeth, with the insignia of the Garter, and wearing a rich coronet, the circlet of which is set with small pearls in contact, not raised, and so numerous that upwards of twenty are displayed.

Parliament, the 11th of Henry VI. 1433), by the fact of his hereditary possession of Arundel Castle only. As hereditary Earl-Marshal, his Grace of Norfolk is the head of the College of Arms. (C. B.)

EARLE, JOHN (1601?-1665), bishop of Worcester and afterwards of Salisbury, was born at York about 1601. He completed his education at Oxford, first entering Christ Church, and taking his degree of B.A. in 1619. He afterwards passed to Merton College, and graduated M.A. in 1624. He was appointed in 1631 proctor of the university, and the same year became chaplain to Philip, earl of Pembroke, then chancellor of the university. He was soon after presented by this nobleman to the rectory of Bishopstone, in Wiltshire, and, having been introduced to the king, Charles I., was appointed chaplain and tutor to Prince Charles. In 1642 Earle took his degree of D.D., and in the following year was elected one of the famous Assembly of Divines at Westminster. But his sympathies with the king and with the Church of England were so strong that he declined to sit. Early in 1643 he was chosen chancellor of the cathedral of Salisbury; but of this preferment he was soon after deprived. After Cromwell's great victory at Worcester, Earle went abroad, and was named clerk of the closet and chaplain to Charles II. He spent a year at Antwerp in the house of Izaak Walton's friend Dr Morley, who became afterwards bishop of Winchester. He next joined the duke of York (James II.) at Paris, returning to England at the Restoration. He was at once appointed dean of Westminster, and in 1661 was one of the commissioners for revising the liturgy. At the end of November 1662 he was consecrated bishop of Worcester, and was translated, ten months later, to the see of Salisbury. During the plague of London Bishop Earle attended the king and queen at Oxford, and there he died, November 17, 1665. Earle's chief title to remembrance is his witty and humorous work entitled *Microcosmography, or a Piece of the World discovered, in Essays and Characters*, which throws light on the manners of the time. First printed in 1628, it became very popular, and ran through eight editions in the lifetime of the author. A new edition with notes and appendix, containing much interesting matter, by Philip Bliss, was published in 1811. The style is quaint and epigrammatic; and the reader is frequently reminded of Thomas Fuller by such passages as this: "A university dunner is a gentlemen follower cheaply purchased, for his own money has hyr'd him." Several reprints of the book have been issued since the author's death; and in 1671 a French translation by J. Dymock appeared with the title of *Le vice ridiculé*. Earle was employed by Charles II. to make the Latin translation of the *Eikon Basilike*, published in 1649.

"Dr Earle," says Lord Clarendon in his *Life*, "was a man of great piety and devotion, a most eloquent and powerful preacher, and of a conversation so pleasant and delightful, so very innocent, and so very facetious, that no man's company was more desired and loved. No man was more negligent in his dress and habit and mien, no man more wary and cultivated in his behaviour and discourse. He was very dear to the Lord Falkland, with whom he spent as much time as he could make his own."

See preface to Bliss's edition of the *Microcosmographie*, and Arber's Reprint, London, 1868.

EARLOM, RICHARD (1742-1822), English mezzotint engraver, was born in London in 1742. His natural faculty for art appears to have been first called into exercise by some paintings for the lord mayor's state coach, just decorated by Cipriani. He tried to copy the paintings, and was sent to study under Cipriani. He displayed great skill as a draughtsman, and at the same time acquired without assistance the art of engraving in mezzotint. In 1765 he was employed by Alderman Boydell, then one of the most liberal promoters of the fine arts, to make a series of drawings from the pictures at Houghton Hall; and these he afterwards engraved in mezzotint. His most perfect works as engraver are perhaps the fruit and flower pieces after the Dutch artists Van Os and Van Huysum. Amongst his historical and figure subjects are—Agrippina, after West; Love in Bondage, after Guido Reni; the Royal Academy, the Embassy of Hyderbeck to meet Lord Cornwallis, and a Tiger Hunt, the last three after Zoffany; and Lord Heathfield, after Sir Joshua Reynolds. Earlom also executed a series of 200 facsimiles of the drawings and sketches of Claude Lorraine, which was published in 3 vols. folio, under the title of *Liber Veritatis* (1777-1819). Earlom died in London, October 9, 1822.

EAR-RING, an ornament worn pendent from the ear, and generally suspended by means of a ring or hook passing through the pendulous lobe of the ear. The general usage appears to have been to have ear-rings worn in pairs, the two ornaments in all respects resembling each other; in ancient times, or sometimes more recently among Oriental races, a single ear-ring has sometimes been worn. The use of this kind of ornament, which constantly was of great value and sometimes was made of large size, dates from the remotest historical antiquity, the earliest mention of ear-rings occurring in the book of Genesis. It appears probable that the ear-rings of Jacob's family, which he buried with his strange idols at Bethel, were regarded as amulets or talismans, such unquestionably being the estimation in which some ornaments of this class have been held from a very early period, as they still are held in the East. Among all the Oriental races of whom we have any accurate knowledge, the Hebrews and Egyptians excepted, ear-rings always have been in general use by both sexes; while in the West, as well as by the Hebrews and Egyptians, as a general rule they have been considered exclusively female ornaments. By the Greeks and Romans also ear-rings were worn only by women; and the prevalence of this fashion among the races of classic antiquity is illustrated in a singular manner by the ears of the famous statue of the Venus de' Medici being bored, evidently for the reception of pendent jewels. Ear-rings invariably occupy important positions among the various remains of ancient and mediæval goldsmiths' work that from time to time have rewarded the researches of archæological inquirers. And these early relics, with rare exceptions objects of great beauty and delicacy, never fail to exemplify the artistic styles of their periods, as they were prevalent among the races by whom each individual jewel was produced. Ear-rings of costly materials and elaborate workmanship have been brought to light in considerable numbers in the Troad and in Peloponnesus by Dr Schliemann; jewels of the same class, of exquisite beauty, and of workmanship that is truly wonderful, have been rescued from the sepulchres of ancient Etruria and Greece by Signor Castellani; other ear-rings of gold of characteristic forms have come down to our own times from the ancient Egyptians; we know well what styles of ear-rings were worn by the Romans of the empire and by the early Scandinavians; and recent researches among the burial places of our Anglo-Saxon predecessors in the occupancy of this island have led to the discovery of jewels in considerable numbers, which among their varieties include ear-rings executed in a style that proves the Anglo-Saxons to have made no inconsiderable advance in the arts of civilization. These same ornaments, which never have fallen into disuse, enjoy at the present day a very high degree of favour; like all other modern jewels, however, the ear-rings of our own times as works of arts can claim no historical attributes, because they consist as well of reproductions from all past ages and of every race as of fanciful productions that certainly can be assigned to no style of art whatever.

EARTH, FIGURE OF THE. The determination of the figure of the earth is a problem of the highest importance in astronomy, inasmuch as the diameter of the earth is the unit to which all celestial distances must be referred. Reasoning, doubtless, from the uniform level appearance of the horizon in any situation in which a spectator can be placed—the variations in altitude of the circumpolar stars as one travels towards the north or south, the disappearance of a ship standing out to sea, and perhaps other phenomena—the earliest astronomers universally regarded this earth as a sphere, and they endeavoured to ascertain its dimensions. Aristotle relates that the mathematicians had found the circumference to be 400,000 stadia. But Eratosthenes appears to have been the first who entertained an accurate idea of the principles on which the determination of the figure of the earth really depends, and attempted to reduce them to practice. His results were very inaccurate, but his method is the same as that which is followed at the present day—depending, in fact, on the comparison of a line measured on the earth's surface with the corresponding arc of the heavens. He observed that at Syene in Upper Egypt, on the day of the summer solstice, the sun was exactly vertical, whilst at Alexandria at the same season of the year its zenith distance was 7° 12′, or one-fiftieth of the circumference of a circle. He assumed that these places were on the same meridian; and, reckoning their distance apart as 5000 stadia, he inferred that the circumference of the earth was 250,000 stadia. A similar attempt was made by Posidonius, who adopted a method which differed from that of Eratosthenes only in using a star instead of the sun. He obtained 240,000 stadia for the circumference. But it is impossible to form any correct opinions as to the degree of accuracy attained in these measures, as the length of the stadium is unknown. Ptolemy in his *Geography* assigns the length of the degree as 500 stadia.

The Arabs, who were not inattentive to astronomy, did not overlook the question of the earth's magnitude. The caliph Almamoum, 814 A.D., having fixed on a spot in the plains of Mesopotamia, despatched one company of astronomers northwards and another southwards, measuring the journey by rods, until each found the altitude of the pole to have changed one degree. But the result of this measurement does not appear to have been very satisfactory. From this time the subject seems to have attracted no attention until about 1500, when Fernel, a Frenchman, measured a distance in the direction of the meridian near Paris by counting the number of revolutions of the wheel of his carriage as he travelled. His astronomical observations were made with a triangle used as a quadrant, and his resulting length of a degree was by a happy chance very near the truth.

The next geodesist, Willebrord Snell, took an immense step in the right direction by substituting a chain of triangles for actual linear measurement. The account of this operation was published at Leyden in 1617. He measured his base line on the frozen surface of the meadows near Leyden, and measured the angles of his triangles, which lay between Alkmaar and Bergen-op-Zoom, with a quadrant and semicircles. He took the precaution of comparing his standard with that of the French, so that his result was expressed in toises (the length of the toise is about 6·39 English feet). The work was recomputed and reobserved by Muschenbroek in 1729.

In 1637 an Englishman, Richard Norwood, published his own determination of the figure of the earth in a volume entitled *The Seaman's Practice, contayning a Fundamentall Probleme in Navigation experimentally verified, namely, touching the Compasse of the Earth and Sea and the quantity of a Degree in our English Measures.* It appears that he observed on the 11th June 1633 the sun's meridian altitude in London as 62° 1′, and on June 6, 1635, his meridian altitude in York as 59° 33′. He measured the distance between these places along the public road partly with a chain and partly by pacing. By this means, through compensation of errors, he arrived at 367,176 feet for the degree—a very fair result.

The application of the telescope to circular instruments was the next important step in the science of measurement. Picard was the first who in 1669, with the telescope, using such precautions as the nature of the operation requires, measured an arc of meridian. He measured with wooden rods a base line of 5663 toises, and a second or base of verification of 3902 toises; his triangulation extended from Malvoisine, near Paris, to Sourdon, near Amiens. The angles of the triangles were measured with a quadrant furnished with a telescope having cross-wires in its focus. The difference of latitude of the terminal stations was determined by observations made with a sector on a star in Cassiopeia, giving 1° 22′ 55″ for the amplitude. The terrestrial measurement gave 78,850 toises, whence he inferred for the length of the degree 57,060 toises.

Hitherto geodetic observations had been confined to the determination of the magnitude of the earth considered as a sphere, but a discovery made by Richer turned the attention of mathematicians to its deviation from a spherical form. This astronomer, having been sent by the Academy of Sciences of Paris to the island of Cayenne, in South America, for the purpose of determining the amount of terrestrial refraction and other astronomical objects, observed that his clock, which had been regulated at Paris to beat seconds, lost about two minutes and a half daily at Cayenne, and that in order to bring it to measure mean solar time it was necessary to shorten the pendulum by more than a line. This fact, which appeared exceedingly curious, and was scarcely credited till it had been confirmed by the subsequent observations of Varin and Deshayes on the coasts of Africa and America, was first explained in the third book of Newton's *Principia*, who showed that it could only be referred to a diminution of gravity arising either from a protuberance of the equatorial parts of the earth and consequent increase of the distance from the centre or from the counteracting effect of the centrifugal force. About the same time, 1673, appeared the work of Huyghens entitled *De Horologio Oscillatorio*, in which for the first time were found correct notions on the subject of centrifugal force. It does not, however, appear that they were applied to the theoretical investigation of the figure of the earth before the publication of Newton's *Principia*. In 1690 Huyghens, following up the subject, published his treatise entitled *De Causa Gravitatis*, which contains an investigation of the figure of the earth on the supposition that the attraction of every particle is towards the centre.

Between 1684 and 1718 J. and D. Cassini, starting from Picard's base, carried a triangulation northwards from Paris to Dunkirk and southwards from Paris to Collioure. They measured a base of 7246 toises near Perpignan, and a somewhat shorter base near Dunkirk; and from the northern portion of the arc, which had an amplitude of 2° 12′ 9″, obtained for the length of a degree 56,960 toises; while from the southern portion, of which the amplitude was 6° 18′ 57″, they obtained 57,097 toises. The immediate inference from this was that, the degree diminishing with increasing latitude, the earth must be a prolate spheroid. This conclusion was totally opposed to the theoretical investigations of Newton and Huyghens, and created a great sensation among the scientific men of the day. The question was far too important to be allowed to remain unsettled, and accordingly the Academy of Sciences of Paris determined to apply a decisive test by the measurement of arcs at a great distance from each other. For this purpose some of the most distinguished members of their body undertook the measurement of two meridian arcs—one in the neighbourhood of the equator, the other in a high latitude; and so arose the celebrated expeditions of the French Academicians. In May 1735, MM. Godin, Bouguer, and De la Condamine, under the auspices of Louis XV., proceeded to Peru, where, assisted by two Spanish officers, after ten years of laborious exertion they measured an arc of 3° 7′ intersected by the equator. The second party consisted of Maupertuis, Clairaut, Camus, Lemonnier, and Outhier, who reached the Gulf of Bothnia in July 1736; they were in some respects more fortunate than the first party, inasmuch as they completed the measurement of an arc near the polar circle of 57′ amplitude and returned to Europe within sixteen months from the date of their departure.

The measurement of Bouguer and De la Condamine was executed with great care, and on account of the locality, as well as the manner in which all the details were conducted, it has always been regarded as a most valuable determination. The southern limit was at a place called Tarqui, the northern at Cotchesqui. A base of 6272 toises was measured in the vicinity of Quito, near the northern extremity of the arc, and a second base of 5260 toises near the southern extremity. The mountainous nature of the country made the work very laborious, in some instances the difference of heights of two neighbouring stations exceeding a mile. The difficulties with which the observers had to contend were increased by the opposition of the more ignorant of the inhabitants, and they were at times in danger of losing their lives. They had also much trouble with their instruments, those with which they were to determine the latitudes proving untrustworthy. But their energy and ingenuity were equal to the occasion, and they succeeded by simultaneous observations of the same star at the two extremities of the arc in obtaining very fair results. The whole length of the arc amounted to 176,945 toises, while the difference of latitudes was 3° 7′ 3″. In consequence of a misunderstanding that arose between De la Condamine and Bouguer, their operations were conducted separately, and each wrote a full and interesting account of the operation. Bouguer's book was published in 1749; that of De la Condamine in 1751. The toise used in this measure was ever after regarded as *the* standard toise, and is always referred to as the *Toise of Peru.*

The party of Maupertuis, though their work was quickly despatched, had also to contend with great difficulties. They were disappointed in not being able to make use of the small islands in the Gulf of Bothnia for the trigonometrical stations, and were forced to penetrate into the forests of Lapland. They commenced operations at Tornea, a city situated on the mainland near the extremity of the gulf. From this, the southern extremity of their arc, they carried a chain of triangles northward to the mountain Kittis, which they selected as the northern terminus. In the prosecution of this work they suffered greatly from cold and the bites of flies and gnats. The latitudes were determined by observations with a sector (made by Graham) of the zenith distance of α and δ Draconis. The base line was measured on the frozen surface of the river Tornea about the middle of the arc; two parties measured it separately, and they differed by about 4 inches. The result of the whole was that the difference of latitudes of the terminal stations was 57′ 29″·6, and the length of the arc 55,023 toises. In this expedition, as well as in that to Peru, observations were made with a pendulum to determine the force of gravity; and these observations coincided with the geodetical results in proving that the earth was an oblate and not prolate spheroid.

In 1740 was published in the Paris *Mémoires* an account, by Cassini de Thury, of a remeasurement by himself and Lacaille of the meridian of Paris. With a view to determine more accurately the variation of the degree along the meridian, they divided the distance from Dunkirk to Collioure into four partial arcs of about two degrees each, by observing the latitude at five stations. The anomalous results previously obtained by J. and D. Cassini were not confirmed, but on the contrary the length of the degree derived from these partial arcs showed on the whole an increase with increasing latitude. In continuation of their labours, Cassini and Lacaille further measured an arc of parallel across the mouth of the Rhone. The difference of time of the extremities was determined by the observers at either end noting the instant of a signal given by flashing gunpowder at a point near the middle of the arc.

While at the Cape of Good Hope in 1752, engaged in various astronomical observations, Lacaille measured an arc of meridian of 1° 13′ 17″, which gave him for the length of the degree 57,037 toises—an unexpected result, which has led to the modern remeasurement of the arc by Sir Thomas Maclear.

Passing over the measurements made between Rome and Rimini and on the plains of Piedmont by the Jesuits Boscovich and Beccaria, and also the arc measured with deal rods in North America by Messrs Mason and Dixon, we come to the commencement of the English triangulation. In 1783, in consequence of a representation from Cassini de Thury on the advantages that would accrue to science from the geodetic connection of Paris and Greenwich, General Roy was with the king's approval appointed by the Royal Society to conduct the operations on the part of this country,—Count Cassini, Mechain, and Delambre being appointed on the French side. And now a precision previously unknown was brought into geodesy by the use of Ramsden's splendid theodolite, which was the first to make the spherical excess of triangles measurable. The wooden rods with which the first base was measured were speedily replaced by glass rods, which again were rejected for the steel chain of Ramsden. The details of this operation are fully given in the *Account of the Trigonometrical Survey of England and Wales.* Shortly after this, the National Convention of France, having agreed to remodel their system of weights and measures, chose, as applicable to all countries, for their unit of length the ten-millionth part of the meridian quadrant. In order to obtain this length precisely, the remeasurement of the French meridian was resolved on, and deputed to Delambre and Mechain. The details of this great operation will be found in the *Base du Système Métrique Décimale.* The arc was subsequently extended by MM. Biot and Arago to the island of Iviza.

The appearance in 1838 of Bessel's classical work entitled *Gradmessung in Ostpreussen* marks an era in the science of geodesy. Here we find the method of least squares, a branch of the theory of probabilities, applied to the calculation of a network of triangles and the reduction of the observations generally. This work has been looked on as a model ever since, and probably it will not soon be superseded as such. The systematic manner in which all the observations were taken with the view of securing final results of extreme accuracy is admirable. The triangulation, which is a small one, extends about a degree and a half along the shores of the Baltic in a N.N.E. direction. The compound bars with which he measured his base line may be understood by the following brief description. On the surface of an iron bar two toises in length is laid a zinc bar, both being very perfectly planed and in free contact—the zinc bar being slightly shorter than the iron bar. They are united at one end only, and as the temperature varies the difference of length of the bars as seen at the other end varies; this difference of length is a thermometrical indica whereby a correction for temperature can be applied he bars so as to reduce their length to that at the lard temperature. The bars in measuring were not red to come into contact, but the intervals left were sured by the interposition of a glass wedge. The lts of all the comparisons of the four measuring rods one another, and with the standards, are elaborately ed out by least squares. The angles were observed theodolites of 12 and 15 inches diameter, and the ıdes determined by means of the transit instrument in orime vertical—a method much used in Germany. The ulæ employed in the reduction of the astronomical rvations are very elegant. The reduction of the gulation was carried out in the most thorough ıer,—the sum of the squares of all the actual theo- e observations being made a minimum. As it is l now to follow this method (sometimes only approxi- ly) in all triangulations where great precision is ired, we here give a brief description of the method. equations of condition of a triangulation are those h exist between the supernumerary observed quantities heir calculated values, for, after there are just sufficient vations to fix all the points, then any angle that may subsequently observed can be compared with its lated value. If a triangulation consist of $n+2$ points, of which are the ends of a base line, then to fix the n a $2n$ angles suffice; so that if m be the actual number ıgles really observed, the triangulation must afford $2n$ equations of condition. To show how these suppose that from a number m of fixed points C . . . a new point P is observed, which m points are observed from P, then there will be formed $m-1$ gles, in each of which the sum of the observed angles 180° + the spherical excess; this gives at once $m-1$ ions of condition. The $m-2$ distances will each l an equation of the form

$$\frac{\mathrm{PC}}{\mathrm{PB}}\cdot\frac{\mathrm{PB}}{\mathrm{PA}}\;\frac{\mathrm{PA}}{\mathrm{PC}}=1\,,$$

ıowever, limited to three factors. Should P observe m points and not be observed back, there will be equations of the above form (they are called side ions). In a similar manner other cases can be treated. actice the ratios of sides are replaced by the ratios of nes of the corresponding opposite angles. To each ved angle a symbolical correction is applied, so that if an observed angle and $a+x$ the true or most probable , $\sin(a+x)=\sin a(1+x\cot a)$, x being a small angle square is neglected. Thus the side equation takes orm $\beta+\beta_1x_1+\beta_2x_2+\ \ldots\ \beta_rx_r=0$. In the case of ions formed by adding together the three observed s of a triangle the co-efficients are of course unity. problem then is this: Given n equations

$$\begin{aligned}\beta+\beta_1x_1+\beta_2x_2+\ldots\beta_mx_m&=0\\ \beta'+\beta_1'x_1+\beta_2'x_2+\ldots\beta_m'x_m&=0\\ \beta''+\beta_1''x_1+\beta_2''x_2+\ldots\beta_m''x_m&=0\\ \cdots\cdots\cdots\cdots\cdots\cdots&\cdots\end{aligned}$$

en $m(m>n)$ unknown quantities $x_1\ldots x_m$, which are rrections (expressed in seconds of arc) to the observed , it is required to determine these quantities so as to r the function $w_1x_1^2+w_2x_2^2+w_3x_3^2+\ \ldots\ w_mx_m^2$ a num, where $w_1\ldots w_m$ are the *weights* of the deter- ions of the angles to which the corresponding correc- belong. The corrections $x_1\ldots x_m$ fulfilling this tion of minimum have, according to the theory of squares, a higher probability than any other system of tions that merely satisfy the equations of condition. ply the n equations by multipliers $\lambda_1,\lambda_2,\ \ldots\ \lambda_n$, and tain by the theory of maxima and minima m equa-

$$\begin{aligned}w_1x_1&=\beta_1\lambda_1+\beta_1'\lambda_2+\beta_1''\lambda_3+\ldots\\ w_2x_2&=\beta_2\lambda_1+\beta_2'\lambda_2+\beta_2''\lambda_3+\ldots,\\ &\vdots\\ w_mx_m&=\beta_m\lambda_1+\beta_m'\lambda_2+\beta_m''\lambda_3+\ldots\end{aligned}$$

The values of $x_1\ldots x_m$ obtained from these equations are to be substituted in the original equations of condition, and then there will be n equations between the n multipliers $\lambda_1\ldots\lambda_n$. These being solved, the numerical values of $\lambda_1\ldots\lambda_n$ will be obtained, and on substituting these in the last equations written down, the values of $x_1\ldots x_m$ will follow. The process is a long and tedious one; but it is inevitable if we wish very good results.

The great meridian arc in India was commenced by Colonel Lambton at Punnœ in latitude 8° 9′. Following generally the methods of the English survey, he carried his triangulation as far north as 20° 30′. The work then passed into the able hands of Sir George (then Captain) Everest, who continued it to the latitude of 29° 30′. Two admirably written volumes by Sir George Everest, published in 1830 and in 1847, give all the details of the vast undertaking. The great trigonometrical survey of India is now being prosecuted with great scientific skill by Colonel Walker, R.E., and it may be expected that we shall soon have some valuable contributions to the great problem of geodesy. The working out of the Indian chains of triangles by the method of least squares presents peculiar difficulties, but enormous in extent as the work is, it is being thoroughly carried out. The ten base lines on which the survey depends were measured with Colby's compensation bars.

These compensation bars were also used by Sir Thomas Maclear in the measurement of the base line in his extension of Lacaille's arc at the Cape. The account of this operation will be found in a volume entitled *Verification and Extension of Lacaille's Arc of Meridian at the Cape of Good Hope*, by Sir Thomas Maclear, published in 1866. Lacaille's amplitude is verified, but not his terrestrial measurement.

The number of stations in the principal triangulation of Great Britain and Ireland is about 250. At 32 of these the latitudes were determined with Ramsden's and Airy's zenith sectors. The theodolites used for this work were, in addition to the two great theodolites of Ramsden which were used by General Roy and Captain Kater (and which are now in as good condition as when they came from the hands of the maker), a smaller theodolite of 18 inches diameter by the same mechanician, and another of 24 inches diameter by Messrs Troughton and Simms. Observations for determination of absolute azimuth were made with these instruments at a large number of stations; the stars α, δ, and λ Ursæ Minoris and 51 Cephei being those observed, always at the greatest azimuths. At six of these stations the probable error of the result is under 0″·4, at twelve under 0″·5, at thirty-four under 0″·7: so that the absolute azimuth of the whole network is determined with extreme accuracy. Of the seven base lines which have been measured, five were by means of steel chains and two with Colby's compensation bars. This is a system of six compound bars self-correcting for temperature. The compound bar may be thus described. Two bars, one of brass and the other of iron, are laid side by side, parallel, and firmly united at their centres, from which they are free to expand or contract; at the standard temperature they are of the same length. Let AB be one bar, A′B′ the other; draw a line through the corresponding extremities A, A′ to P, and a line through the other extremities B, B′ to Q, make A′P = B′Q, AA′ being = BB′. Now if A′P is to AP as the rate of expansion of the bar A′B′ to the rate of expansion of the bar AB, then clearly the distance PQ will be invariable, or very nearly so. In the actual instrument P and Q are finely engraved dots at the distance of 10 feet apart. In the measurement the bars when aligned do not come into contact; an interval of six inches is left between each bar and its neighbour. This small space is measured by an ingenious micrometrical arrangement constructed on exactly the same principle as the bars themselves. The triangulation was computed by least squares. The total number of equations of condition for the triangulation is 920; if therefore the whole had been reduced in one mass, as it should have been, the solution of an equation of 920 unknown quantities would have occurred as a part of the work. To avoid this an approximation was resorted to; the triangulation was divided into twenty-one parts or figures; four of these, not adjacent, were first adjusted by the method explained, and the corrections thus determined in these figures carried into the equations of condition of the adjacent figures. The average number of equations in a figure is 44; the largest equation is one of 77 unknown quantities.[1]

Airy's Zenith Sector is too well known to need description. The vertical limb is read by four microscopes; altogether, in the complete observation of a star there are 10 micrometer readings and 12 level readings. In some recent observations in Scotland for latitude the Zenith Telescope has been used with very great success; it is very portable; and a complete determination of latitude, affected with the mean of the declination errors of two stars, is effected by two micrometer readings and four level readings. The observation consists in measuring with the telescope micrometer the *difference* of zenith distances of two stars which cross the meridian, one to the north and the other to the south of the observer at zenith distances which differ by not much more than 10′ or 15′, the interval of the times of transit being not less than one nor more than twenty minutes. The advantages are that, with simplicity in the construction of the instrument and facility in the manipulation, refraction is eliminated (or nearly so, as the stars are generally selected within 25° of the zenith), and there is no large divided circle. The telescope, which is counterpoised on one side of the vertical axis, has a small circle for finding, and there is also a small horizontal circle. This instrument is universally used in American geodesy.

The United States Coast Survey has a principal triangulation extending for about 9° 30′ along the coast, but the final results are not yet published.

In 1860 was published F. G. Struve's *Arc du Méridien de* 25° 20′ *entre le Danube et la Mer Glaciale mesuré depuis* 1816 *jusqu'en* 1855. This work is the record of a vast amount of scientific labour and is the greatest contribution yet made to the question of the figure of the earth. The latitudes of the thirteen astronomical stations of this arc were determined partly with vertical circles and partly by means of the transit instrument in the prime vertical. The triangulation, a great part of which, however, is a simple chain of triangles, is reduced by the method of least squares, and the probable errors of the resulting distances of parallels is given; the probable error of the whole arc in length is ± 6·2 toises. Ten base lines were measured. The sum of the lengths of the ten measured bases is 29,863 toises, so that the average length of a base line is 19,100 feet. The azimuths were observed at fourteen stations. In high latitudes the determination of the meridian is a matter of great difficulty; nevertheless the azimuths at all the northern stations were successfully determined,—the probable error of the result at Fuglenaes being ± 0″·53.

Mechanical Theory.

Newton appears to have been the first to apply his own newly-discovered doctrine of gravitation, combined with the so-called centrifugal force, to the question of the figure of the earth. Assuming that an oblate ellipsoid of rotation is a form of equilibrium for a homogeneous fluid rotating with uniform angular velocity, he obtained the ratio of the axes 229 : 230, and the law of variation of gravity on the surface. A few years later Huyghens published an investigation of the figure of the earth, supposing the attraction of every particle to be towards the centre of the earth, obtaining as a result that the proportion of the axes should be 578 : 579. In 1740 Maclaurin wrote his celebrated essay on the tides, one of the most elegant geometrical investigations ever made. He demonstrated that the oblate ellipsoid of revolution is a figure which satisfies the conditions of equilibrium in the case of a revolving homogeneous fluid mass whose particles attract one another according to the law of the inverse square of the distance; he gave the equation connecting the ellipticity with the proportion of the centrifugal force at the equator to gravity, and he determined the attraction on a particle situated anywhere on the surface of such a body. Some few years afterwards Clairaut published (1743) his *Théorie de la Figure de la Terre*, which contains, among other results, demonstrated with singular elegance, a very remarkable theorem which establishes a relation between the ellipticity of the earth and the variations of gravity at different points of its surface. Assuming that the earth is composed of concentric ellipsoidal strata having a common axis of rotation, each stratum homogeneous in itself, but the ellipticities and densities of the successive strata varying according to any law, and that the superficial stratum has the same form as if it were fluid, he proves the very important theorem contained in the equation

$$\frac{g'-g}{g}+e=\frac{5}{2}m\,,$$

Where g, g' are the amounts of gravity at the equator and at the pole respectively, e the ellipticity of the meridian, and m the ratio of the centrifugal force at the equator to g. Clairaut also proved that the increase of gravity in proceeding from the equator to the poles is as the square of the sine of the latitude. This, taken with the former theorem, gives the means of determining the earth's ellipticity from observation of the comparative force of gravity at any two places. Clairaut would seem almost to have exhausted the subject, for although much has been written since by mathematicians of the greatest eminence, yet, practically, very little of importance has been added. Laplace, himself a prince of mathematicians, who had devoted much of his own time to the same subject, remarks on Clairaut's work that "the importance of all his results and the elegance with which they are presented place this work amongst the most beautiful of mathematical productions" (Todhunter's *History of the Mathematical Theories of Attraction and the Figure of the Earth*, vol. i. p. 229).

The problem of the figure of the earth treated as a question of mechanics or hydrostatics is one of great difficulty, and it would be quite impracticable but for the circumstance that the surface differs but little from a sphere. In order to express the forces at any point of the body arising from the attraction of its particles, the form of the surface is required, but this form is the very one which it is the object of the investigation to discover; hence the complexity of the subject, and even with all the present resources of mathematicians only a partial and imperfect solution can be obtained, and that not without some labour. We may, however, here briefly indicate the line of reasoning by which some of the most important of the results we to above may be obtained. The principles of show us that if X, Y, Z be the components ree rectangular axes of the forces acting on a fluid mass at the point x, y, z, then, p being there, and ρ the density,

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[1] See the volume of the Ordnance Survey, entitled *Account of the Principal Triangulation of Great Britain and Ireland*, by Captain A. R. Clarke, R.E., F.R.S., 1858.

$$dp=\rho(Xdx+Ydy+Zdz)\,;$$

ilibrium the necessary conditions are, that y + Zdx) be a complete differential, and at face $Xdx + Ydy + Zdz = 0$. This equation the resultant of the forces is normal to the ery point, and in a homogeneous fluid it is differential equation of all surfaces of equal the fluid be heterogeneous then it is to be at for forces of attraction according to the of gravitation, if X, Y, Z be the components ion of a mass whose potential is V, then

$$dx+Ydy+Zdz=\frac{dV}{dx}dx+\frac{dV}{dy}dy+\frac{dV}{dz}dz\,,$$

mplete differential. And in the case of a fluid h uniform velocity, in which the so-called orce enters as a force acting on each particle to its distance from the axis of rotation, the g part of $Xdx+Ydy+Zdz$ is obviously a erential. Therefore for the forces with which concerned $Xdx+Ydy+Zdz=dU$, where U is n of x, y, z, and it is necessary for equilibrium U be a complete differential; that is, ρ must n of U or a function of p, and so also p a . So that $dU=0$ is the differential equation equal pressure and density.

now show that a homogeneous fluid mass in an oblate ellipsoid of revolution having a ocity of rotation can be in equilibrium. It ved that the attraction of the ellipsoid $+\epsilon^2) = c^2(1+\epsilon^2)$ upon a particle P of its z has for components

$$X = Ax,\ \ Y = Ay,\ \ Z = Cz,$$

$$A = 2\pi\rho\left(\frac{1+\epsilon^2}{\epsilon^3}\tan^{-1}\epsilon - \frac{1}{\epsilon^2}\right)$$

$$C = 4\pi\rho\left(\frac{1+\epsilon^2}{\epsilon^2}-\frac{1+\epsilon^2}{\epsilon^3}\tan^{-1}\epsilon\right)$$

attraction of the mass of the ellipsoid, the orce at P has for components $-x\omega^2, -y\omega^2, 0$; lition of fluid equilibrium is

$$A-\omega^2)xdx + (A-\omega^2)ydy + Czdz = 0,$$

egrating gives

$$(A-\omega^2)(x^2+y^2) + Cz^2 = \text{constant}.$$

uation of an ellipsoid of rotation, and there- ilibrium is possible. The equation coincides the surface of the fluid mass if we make

$$A-\omega^2=\frac{C}{1+\epsilon^2}\,,$$

$$\frac{\omega^2}{2\pi\rho}=\frac{3+\epsilon^2}{\epsilon^4}\tan^{-1}\epsilon-\frac{3}{\epsilon^3}\,.$$

ld determine the maximum value of ω from , we find that it corresponds to the value of ϵ y the condition

$$\tan^{-1}\epsilon=\frac{9\epsilon+7\epsilon^3}{(1+\epsilon^2)(9+\epsilon^2)}\,;$$

be shown that if the angular velocity exceed d from $\frac{\omega^2}{2\pi\rho}=0\cdot2247$, equilibrium is impos- form of an ellipsoid of revolution. If ω fall limit, there are two ellipsoids which satisfy the quilibrium; in one of these the eccentricity is greater and in the other less than 0·93. In the case of the earth, which is nearly spherical, we get by expanding the expression for ω^2 in powers of ϵ^2, rejecting the higher powers, and remarking that the ellipticity $e=\frac{1}{2}\epsilon^2$,

$$\frac{\omega^2}{2\pi\rho}=\frac{4}{15}\epsilon^2=\frac{8}{15}e.$$

Now, if m be the ratio of the centrifugal force at the equator to gravity there,

$$m=\frac{c\omega^2}{\frac{4}{3}\pi\rho c-c\omega^2}\,,\quad\therefore\ \frac{\omega^2}{2\pi\rho}=\frac{2}{3}\,\frac{m}{1+m}\,.$$

In the case of the earth it is a matter of observation that $m=\frac{1}{289}$, hence the ellipticity

$$e=\frac{5}{4}m=\frac{1}{231}\,,$$

so that the ratio of the axes on the supposition of a homogeneous fluid earth is 230 : 231, as announced by Newton.

Now, to come to the case of a heterogeneous fluid, we shall assume that its surfaces of equal density are spheroids, concentric and having a common axis of rotation, and that the ellipticity of these surfaces varies from the centre to the outer surface, the density also varying. In other words, the body is composed of homogeneous spheroidal shells of variable density and ellipticity. On this supposition we shall express the attraction of the mass upon a particle in its interior, and then, taking into account the centrifugal force, form the equation expressing the condition of fluid equilibrium. The attraction of the homogeneous spheroid $x^2+y^2+z^2(1+2e)=c^2(1+2e)$, where e is the ellipticity, of which the square is neglected, on an internal particle, whose co-ordinates are $x=f$, $y=0$, $z=h$, has for its x and z components

$$X'=\frac{4}{3}\pi\rho f\left(1-\frac{2}{5}e\right),\quad Z'=\frac{4}{3}\pi\rho h\left(1+\frac{4}{5}e\right),$$

the Y component being of course zero. Hence we infer that the attraction of a shell whose inner surface has an ellipticity e, and its outer surface an ellipticity $e+de$, the density being ρ, is expressed by

$$dX'=-\frac{4}{3}\cdot\frac{2}{5}\pi\rho f de,\quad dZ'=\frac{4}{3}\cdot\frac{4}{5}\pi\rho h de.$$

To apply this to our heterogeneous spheroid; if we put c_1 for the semiaxis of that surface of equal density on which is situated the attracted point P, and c_0 for the semiaxis of the outer surface, the attraction of that portion of the body which is exterior to P, namely, of all the shells which inclose P, has for components

$$X_0=-\frac{8}{15}\pi f\int^{c_0}\frac{de}{dc}dc\,,\quad Z_0=\frac{16}{15}\pi h\int_{c_1}^{c_0}\rho\frac{de}{dc}dc\,,$$

both e and ρ being functions of c. Again the attraction of a homogeneous spheroid of density ρ on an *external* point f, h has the components

$$X''=\frac{4}{3}\pi\rho\frac{f}{r^3}\left\{c^3(1+2e)-\lambda ec^5\right\}$$

$$Z''=\frac{4}{3}\pi\rho\frac{h}{r^3}\left\{c^3(1+2e)-\lambda' ec^5\right\}$$

where $\lambda=\frac{3}{5}\cdot\frac{4h^2-f^2}{r^4}$, $\lambda'=\frac{3}{5}\cdot\frac{2h^2-3f^2}{r^4}$, and $r^2=f^2+h^2$.

Now e being considered a function of c, we can at once express the attraction of a shell (density ρ) contained between the surface defined by $c+dc$, $e+de$ and that defined by c, e upon an external point; the differentials with respect to c, viz. dX'' dZ'', must then be integrated with ρ under the integral sign as being a function of c. The integration will extend from $c=0$ to $c=c_1$. Thus the components of the attraction of the heterogeneous spheroid upon a particle within its mass, whose co-ordinates are f, 0, h, are

$$X = \frac{4}{3}\pi\rho f\left\{\frac{1}{r^3}\int_0^{c_1}\rho\,d.c^3(1+2e) - \frac{\lambda}{r^5}\int_0^{c_1}\rho\,d(ec^5) - \frac{2}{5}\int_{c_1}^{c_0}\rho\,de\right\}$$

$$Z = \frac{4}{3}\pi\rho h\left\{\frac{1}{r^3}\int_0^{c_1}\rho\,d.c^3(1+2e) - \frac{\lambda'}{r^5}\int_0^{c_1}\rho\,d(ec^5) + \frac{4}{5}\int_{c_1}^{c_0}\rho\,de\right\}$$

We take into account the rotation of the earth by subtracting the centrifugal force $f\omega^2 = F$ from X. Now, the surface of constant density upon which the point f, 0, h is situated gives $(1-2e)fdf + hdh = 0$; and the condition of equilibrium is that $(X-F)df + Zdh = 0$. Therefore,

$$(X-F)h = Zf(1-2e),$$

which, neglecting small quantities of the order e^2 and putting $\omega^2t^2 = 4\pi^2$, gives

$$\frac{2e}{r^3}\int_0^{c_1}\rho\,d.c^3(1+2e) - \frac{6}{5r^5}\int_0^{c_1}\rho\,d(ec^5) - \frac{6}{5}\int_{c_1}^{c_0}\rho\,de = \frac{3\pi}{t^2}$$

Here we must put now c for c_1, c for r, and $1+2e$ under the first integral sign may be replaced by unity. Two integrations lead us to the following very important differential equation:—

$$\frac{d^2e}{dc^2} + \frac{2\rho c^2}{\int\rho c^2dc}\cdot\frac{de}{dc} + \left(\frac{2\rho c}{\int\rho c^2dc} - \frac{6}{c^2}\right)e = 0.$$

When ρ is expressed in terms of c, this equation can be integrated. We infer then that a rotating spheroid of very small ellipticity, composed of fluid homogeneous strata such as we have specified, will be in equilibrium; and when the law of the density is expressed, the law of the corresponding ellipticities will follow. If we put M for the mass of the spheroid, then

$$M = \frac{4\pi}{3}\int_0^{c_0}\rho\,d.c^3(1-2e)\,;\quad\text{and}\quad m = \frac{c^3}{M}\cdot\frac{4\pi^2}{t^2},$$

and putting $c = c_0$ in the equation expressing the condition of equilibrium, we find

$$M(2e-m) = \frac{4}{3}\pi\cdot\frac{6}{5c^2}\int_0\rho\,d(ec^5),$$

Making these substitutions in the expressions for the forces at the surface, and putting $r = 1 + e - e\frac{h^2}{c^2}$, we get

$$G\cos\phi = \frac{M}{c^2}\left\{1 - e - \frac{3}{2}m + \left(\frac{5}{2}m - 2e\right)\frac{h^2}{c^2}\right\}\frac{f}{c}$$

$$G\sin\phi = \frac{M}{c^2}\left\{1 - e - \frac{3}{2}m + \left(\frac{5}{2}m - 2e\right)\frac{h^2}{c^2}\right\}\frac{h}{c}.$$

Here G is gravity in the latitude ϕ, and r the radius of the spheroid. Since $\sin\phi = \frac{h}{c}\left(1 + e - e\frac{h^2}{c^2}\right)$,

$$G = \frac{M}{c^2}\left\{1 - [illegible] m + \left(\frac{5}{2}m - e\right)\sin^2\phi\right\},$$

which [illegible] the theorems we have referred [illegible]

[illegible] the figure of the earth as a [illegible] subject [illegible] In England [illegible]

[illegible]

that if the external form of the sea—imagined the land by canals—be a spheroid with smal then the law of gravity will be that found ab

An important theorem by Jacobi must not b He proved that for a homogeneous fluid i spheroid is not the only form of equilibrium; rotating round its least axis may with certain of the axes and a certain time of revolution l equilibrium.[2]

Local Attraction.

In speaking of the figure of the earth, v surface of the sea imagined to percolate th by canals. That this surface should turn out, measurements, to be exactly an ellipsoid of *a priori* improbable. Although it may be hi that originally the earth was a fluid mass, cooling whereby the present crust has resulte solid surface has been left in form the m It is clear that these irregularities of the vi must be accompanied by irregularities in the figure of the earth, and when we consider th face of our globe, its irregular distribution masses, continents, with oceans and islands, we to admit that the earth may not be precisely a revolution. Nevertheless, there must exist s which agrees very closely with the mathemat the earth, and has the same axis of rotatio conceive this figure as exhibiting slight de the spheroid, the two surfaces cutting on various lines; thus a point of the surface i its latitude, longitude, and its height above of reference. Call this height for a mom of the actual magnitude of this quantity we have no information, it only obtrudes itself by its variations. In the vicinity of moun change sign in the space of a few mil regarded as a function of the latitude an if its differential coefficient with respect to zero at a certain point, the normals to the then will lie in the prime vertical; if th coefficient of u with respect to the longitude two normals will lie in the meridian; if bo are zero, the normals will coincide. The c terrestrial measurements with the correspondi cal observations have ever been accom discrepancies. Suppose A and B to be two tr stations, and that at A there is a disturbing the vertical through an angle δ, then it is ev apparent zenith of A will be really that of so A, whose distance from A is $r\delta$, when r is the and similarly if there be a disturbance at B δ', the apparent zenith of B will be really other place B, whose distance from B is $r\delta'$ have the discrepancy that, while the geodet ments deal with the points A and B, the observations belong to the points A, B. [illegible] the displacements AA, BB [illegible] will appear [illegible] early history of geodesy. [illegible] latitude [illegible]

[illegible]

[2] [illegible]

n latitudes, and near each other, say about five .titude apart, the probable error of the resulting ie ellipticity will be approximately $\pm\frac{1}{500}\epsilon$, ϵ ssed in seconds, so that if ϵ be so great as 2″ error of the resulting ellipticity will be greater ipticity itself. It is not only interesting, but times, to calculate the attraction of a mountain, sequent disturbance of the astronomical zenith, t within its influence. The deflection of the caused by a local attraction whose amount is ured by the ratio of $A\delta$ to the force of gravity n. Expressed in seconds, the deflection Δ is

$$\Delta = 12''.447.\frac{\delta}{\rho}A\,,$$

the mean density of the earth, δ that cting mass,—the linear unit in expressing A . Suppose, for instance, a table-land whose ctangle of twelve miles by eight miles, having 00 feet and density half that of the earth; let be two miles distant from the middle point of side. The deflection then is 1″·472; but it increases to 2″·20. At sixteen astronomical he English Survey the disturbance of latitude orm of the ground has been computed, and the ll give an idea of the results. At six stations n is under 2″, at six others it is between 2″ at four stations it exceeds 4″. There is one onal station on the north coast of Banffshire, age of Portsoy, at which the deflection amounts at if that village were placed on a map in a correspond with its astronomical latitude, 1000 feet out of position! There is the sea to d an undulating country to the south, which, a spectator at the station does not suggest any ance of gravity. A somewhat rough estimate ttraction from external causes gives a maximum herefore we have 5″ unaccounted for, or rather arise from unequal density in the underlying surrounding country. In order to throw light rkable phenomenon, the latitudes of a number etween Nairn on the west, Fraserburgh on the Grampians on the south, were observed, and lections determined. It is somewhat singular flections diminish in all directions, not *very* tainly, and most slowly in a south-west direc- disappearing, and leaving the maximum at the ion at Portsoy.

od employed by Dr Hutton for computing the masses of ground is so simple and effectual ardly be improved on. Let a horizontal plane the given station; let r, θ be the polar co- any point in this plane, and r, θ, z, the co- a particle of the attracting mass; and let it be find the attraction of a portion of the mass etween the horizontal planes $z=0$, $z=h$, the surfaces $r=r_1$, $r=r_2$, and the vertical planes $_2$. The component of the attraction at the igin along the line $\theta=0$ is

$$\delta\int_{r_1}^{r_2}\int_{\theta_1}^{\theta_2}\int_0^h \frac{r^2\cos\theta\,dr\,d\theta\,dz}{(r^2+z^2)^{\frac{3}{2}}}$$

$$=\delta h(\sin\theta_2-\sin\theta_1)\log\frac{r_2+(r_2^2+h^2)^{\frac{1}{2}}}{r_1+(r_1^2+h^2)^{\frac{1}{2}}}\,.$$

$_2 - r_1$ sufficiently small, and supposing h also usually is, compared with r_1+r_2, the attraction

$$=\delta(r_2-r_1)(\sin\theta_2-\sin\theta_1)\frac{h}{r}\,,$$

r_1+r_2). This form suggests the following procedure. Draw on the contoured map a series of equidistant circles, concentric with the station, intersected by radial lines so disposed that the sines of their azimuths are in arithmetical progression. Then, having estimated from the map the mean heights of the various compartments, the calculation is obvious.

In mountainous countries, as near the Alps and in the Caucasus, deflections have been observed to the amount of as much as 29″. On the other hand, deflections have been observed in flat countries, such as that noted by Professor Schweitzer, who has shown that, at certain stations in the vicinity of Moscow, within a distance of 16 miles the plumb-line varies 16″ in such a manner as to indicate a vast deficiency of matter in the underlying strata. But these are exceptional cases.[1] Since the attraction of a mountain mass is expressed as a numerical multiple of $\delta:\rho$, the ratio of the density of the mountain to that of the earth, if we have any independent means of ascertaining the amount of the deflection, we have at once the ratio $\rho:\delta$, and thus we obtain the mean density of the earth, as, for instance, at Schiehallion, and more recently at Arthur's Seat. A compact mass of great density at a small distance under the surface of the earth will produce an elevation of the mathematical surface which is expressed by the formula

$$y = a\mu\left\{\frac{1}{(1+k^2-2k\cos\theta)^{\frac{1}{2}}}-1\right\},$$

where a is the radius of the (spherical) earth, $a(1-k)$ the distance of the disturbing mass below the surface, μ the ratio of the disturbing mass to the mass of the earth, and $a\theta$ the distance of any point on the surface from that point, say Q, which is vertically over the disturbing mass. The maximum value of y is at Q, where it is

$$y = a\mu\frac{k}{1-k}\,.$$

The deflection at the distance $a\theta$ is

$$\Delta = \frac{\mu k\sin\theta}{(1+k^2-2k\cos\theta)^{\frac{3}{2}}}$$

or since θ is small, putting $h+k=1$,

$$\Delta = \frac{\mu\theta}{(h^2+\theta^2)^{\frac{3}{2}}}\,.$$

The maximum deflection takes place at a point whose distance from Q is to the depth of the mass as $1:\sqrt{2}$, and its amount is

$$\frac{2}{3\sqrt{3}}\frac{\mu}{h^2}\,.$$

If, for instance, the disturbing mass were a sphere a mile in diameter, the excess of its density above that of the surrounding country being equal to half the density of the earth, and the depth of its centre half a mile, the greatest deflection would be 5″, and the greatest value of y only two inches. Thus a large disturbance of gravity may arise from an irregularity in the mathematical surface whose actual magnitude, as regards height at least, is extremely small.

The effect of the disturbing mass μ on the vibrations of a pendulum would be a maximum at Q; if ν be the number of seconds of time gained per diem by the pendulum at Q, and σ the number of seconds of angle in the maximum deflection, then it may be shown that

$$\frac{\nu}{\sigma} = \frac{\pi\sqrt{3}}{10}\,;$$

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[1] In the *Philosophical Transactions* for 1855 and 1859 will be found Archdeacon Pratt's calculations of the attractions of the Himalayas and the mountain region beyond them, and the consequent deflection of the plumb-line at various stations in India; the subject, which presents many anomalies and difficulties, is very fully gone into in his treatise on the figure of the earth. His computed deflections are vastly greater than anything brought to light by observation.

[illegible]

then on expressing z, z', ζ, ζ' in terms of u and u',

$$U = 1 - \cos u \cos u' \cos \omega - \sin u \sin u' ;$$

also, if σ be the third side of a spherical triangle, of which two sides are $\frac{1}{2}\pi - u$ and $\frac{1}{2}\pi - u'$ and the included angle ω, taking a subsidiary angle ψ such that

$$\sin \psi \sin \frac{\sigma}{2} = e \sin \frac{u' - u}{2} \cos \frac{u' + u}{2} ,$$

we obtain finally the following equations:—

$$k = 2a \cos \psi \sin \frac{\sigma}{2}$$

$$\cos \mu = \Delta \sec \psi \sin \frac{\sigma}{2}$$

$$\cos \mu' = \Delta' \sec \psi \sin \frac{\sigma}{2}$$

$$\sin \mu \sin z = \frac{a}{k} \cos u' \sin \omega$$

$$\sin \mu' \sin z' = \frac{a}{k} \cos u \sin \omega .$$

These determine rigorously the distance, and the mutual zenith distances and azimuths, of any two points on a spheroid whose latitudes and difference of longitude are given.

By a series of reductions from the equations containing ζ, ζ' it may be shown that

$$\alpha + \alpha' = \zeta + \zeta' + \frac{e^4}{4} \omega (\phi' - \phi)^2 \cos^4 \phi_0 \sin \phi_0 + \ldots ,$$

where ϕ_0 is the mean of ϕ and ϕ', and the higher powers of e are neglected. A short computation will show that the small quantity on the right-hand side of this equation can never amount even to the ten thousandth part of a second, which is, practically speaking, zero; consequently the sum of the azimuths $\alpha + \alpha'$ on the spheroid is equal to the sum of the spherical azimuths, whence follows this very important theorem (known as Dalby's theorem). If ϕ, ϕ' be the latitudes of two points on the surface of a spheroid, ω their difference of longitude, α, α' their reciprocal azimuths,

$$\tan \frac{\omega}{2} = \frac{\cos \frac{\phi' - \phi}{2}}{\sin \frac{\phi' + \phi}{2}} \cot \frac{\alpha + \alpha'}{2} .$$

The vertical plane at P passing through Q and the vertical plane at Q passing through P cut the surface of the spheroid in two distinct curves. The greatest distance apart of these curves is, if α_0 = the mean azimuth of PQ,

$$\frac{e^2}{16} \frac{s^3}{a^2} \cos^2 \phi_0 \sin 2\alpha_0 .$$

This is a very small quantity; for even in the case of a line of 100 miles in length having a mean azimuth $\alpha = 45°$ in the latitude of Great Britain, it will only amount to half an inch, whilst for a line of fifty miles it cannot exceed the sixteenth part of an inch. The geodesic line joining P and Q lies wholly between these two curves.[1] If we designate by P′, Q′ the two curves (the former being that in the vertical plane through P), then, neglecting quantities of the order $e^4\theta^4$, where θ is the angular distance of P and Q at the centre of the earth, the geodesic curve makes with P′ at P an angle equal to the angle it makes with Q′ at Q, each of these angles being one third of the angle of intersection of P′ and Q′. The difference of length of the geodesic line and either of the curves P′, Q′ is, s being the length of either,

$$\frac{s}{360} e^4 \theta^4 \cos^4 \phi_0 \sin^2 2\alpha_0 .$$

At least this is an approximate expression. Supposing the angle PQ to be as much as 10°, this quantity would be less than one hundredth of an inch.

An idea of the course of a geodesic line may be gathered from the following example. Let the line be that joining Cadiz and St Petersburg, whose approximate positions are

	Cadiz.	St Petersburg.
Lat.	36° 32′ N.	59° 56′ N.
Long.	6° 18′ W.	30° 17′ E.

If G be the point on the geodesic corresponding to F on that one of the plane curves which contains the normal at Cadiz (by "corresponding" we mean that F and G are on a meridian) then G is to the north of F; at a quarter of the whole distance from Cadiz GF is 458 feet, at half the dis-

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[1] See a paper "On the course of Geodesic Lines on the Earth's Surface" in the *Philosophical Magazine* for 1870.

7 feet, and at three quarters it is 473 feet. of the geodesic at Cadiz differs 20″ from that l plane, which is the astronomical azimuth. of a geodesic line cannot be observed, so that not enter of necessity into practical geodesy, y formulæ connected with its use are of great l elegance. The geodesic line has always held tant place in the science of geodesy among the ns of France, Germany, and Russia than has l to it in the operations of the English and ulations. Although the observed angles of a are not geodesic angles, yet in the calculation e and reciprocal bearings of two points which and are connected by a long chain of triangles, pon the geodesic line in this manner:—

e points, then to start the calculation from A, we preliminary calculation the approximate azimuth gle made by the direction of Z with the side AB or triangle. Let P_1 be the point where this line inter-, to find P_2, where the line cuts the next triangle ke the angle BP_1P_2 such that $BP_1P_2+BP_1A=180°$. and P_3 is fixed by a repetition of the same process; . . Now it is clear that the points P_1, P_2, P_3 so com- which would be actually fixed by an observer with oceeding in the following manner. Having set the t A, and turned the telescope in the direction of earing, an assistant places a mark P_1 on the line t till bisected by the cross-hairs of the telescope at lite is then placed over P_1, and the telescope turned izontal circle is then moved through 180°. The laces a mark P_2 on the line CD, so as to be bisected e, which is then moved to P_2, and in the same fixed. Now it is clear that the series of points oaches to the geodesic line, for the plane of any two uents $P_{n-1}P_n$, P_nP_{n+1} contains the normal at P_n.

rmulæ which we have given above, expressing lations of two points P, Q on a spheroid, we e following solution of the problem: Given ϕ of P, with the azimuth α and distance s mine the latitude and longitude of Q and the α'.

$$\theta=\frac{s}{a}\Delta$$

$$\zeta=\frac{e^2\theta^2}{4(1-e^2)}\cos^2\phi\sin 2\alpha$$

$$\zeta'=\frac{e^2\theta^3}{6(1-e^2)}\cos^3\phi\cos^2\alpha\,;$$

ery minute quantities even for the longest distances; $=90°-\phi$,

$$\tan\frac{\alpha'+\zeta-\omega}{2}=\frac{\sin\frac{1}{2}(\kappa-\theta-\zeta')}{\sin\frac{1}{2}(\kappa+\theta+\zeta')}\cot\frac{\alpha}{2}$$

$$\tan\frac{\alpha'+\zeta+\omega}{2}=\frac{\cos\frac{1}{2}(\kappa-\theta-\zeta')}{\cos\frac{1}{2}(\kappa+\theta+\zeta')}\cot\frac{\alpha}{2}$$

$$=\frac{s}{\rho}\,\frac{\sin\frac{1}{2}(\alpha'+\zeta-\alpha)}{\sin\frac{1}{2}(\alpha'+\zeta+\alpha)}\left(1+\frac{\theta^2}{12}\cos^2\frac{\alpha'-\alpha}{2}\right);$$

adius of curvature of the meridian for the mean). These formulæ are approximate only, but they precise even for very long distances.

Meridian Arcs.

the arc of meridian between the latitudes ϕ_1 and ϕ_2

$$=\int_{\phi_1}^{\phi_2}\rho d\phi=a\int_{\phi_1}^{\phi_2}\frac{(1-e^2)d\phi}{(1-e^2\sin^2\phi)^{\frac{3}{2}}}\,;$$

g the excentricity, put the ratio of the axes = en

$$s=\int_{\phi_1}^{\phi_2}\frac{b(1+n)(1-n^2)}{(1+2n\cos 2\phi+n^2)^{\frac{3}{2}}}\,.$$

ration, gives

$$+\frac{5}{4}n^3\Big)a_0-\Big(3n+3n^2+\frac{21}{8}n^3\Big)a_1+\Big(\frac{15}{8}n^2+\frac{15}{8}n^3\Big)a_2-\Big(\frac{35}{24}n^3\Big)a_3\,,$$

where

$$\begin{aligned}a_0&=\phi_2-\phi_1\\a_1&=\sin(\phi_2-\phi_1)\cos(\phi_2+\phi_1)\\a_2&=\sin 2(\phi_2-\phi_1)\cos 2(\phi_2+\phi_1)\\a_3&=\sin 3(\phi_2-\phi_1)\cos 3(\phi_2+\phi_1)\end{aligned}$$

The part of s which depends on n^3 is very small; in fact, if we calculate it for the longest arc measured, the Russian arc, it amounts to only an inch and a half, therefore we omit this term, and put for $\frac{s}{b}$ the value

$$\Big(1+n+\frac{5}{4}n^2\Big)a_0-\Big(3n+3n^2\Big)a_1+\Big(\frac{15}{8}n^2\Big)a_2$$

Now, if we suppose the observed latitudes to be affected with errors, and that the true latitudes are ϕ_1+x_1, ϕ_2+x_2; and if further we suppose that n_1+dn is the true value of $a-b:a+b$, and that n_1 itself is merely a very approximate numerical value, we get, on making these substitutions and neglecting the influence of the corrections x on the *position* of the arc in latitude, *i.e.*, on $\phi_1+\phi_2$,

$$\frac{s}{b}-\Big(1+n_1+\frac{5}{4}n_1^2\Big)a_0-\Big(3n_1+3n_1^2\Big)a_1+\Big(\frac{15}{8}n_1^2\Big)a_2$$

$$+\Big\{\Big(1+\frac{5}{2}n_1\Big)a_0-\Big(3+6n_1\Big)a_1+\Big(\frac{15}{4}n_1\Big)a_2\Big\}dn$$

$$+\Big\{1+n_1-3n_1\frac{da_1}{da_0}\Big\}da_0\,;$$

here $da_0=x_2-x_1$; and as b is only known approximately, put $b_1=b(1+u)$; then we get, after dividing through by the coefficient of da_0, which is $=1+n_1-3n_1\cos(\phi_2-\phi_1)\cos(\phi_2-\phi_1)$, an equation of the form $x_2=x_1+h+fu+gv$, where for convenience we put v for dn.

Now in every measured arc there are not only the extreme stations determined in latitude, but also a number of intermediate stations, so that if there be $i+1$ stations there will be i equations

$$\begin{aligned}x_2&=x_1+f_1u+g_1v+h_1\\x_3&=x_1+f_2u+g_2v+h_2\\&\;\vdots\\x_i&=x_1+f_iu+g_iv+h_i\,.\end{aligned}$$

In combining a number of different arcs of meridian, with the view of determining the figure of the earth, each arc will supply a number of equations in u and v and the corrections to its observed latitudes. Then, according to the method of least squares, those values of u and v are the most probable which render the sum of the squares of *all* the errors x a minimum. The corrections x which are here applied arise not from errors of observation only. The mere uncertainty of a latitude, as determined with modern instruments, does not exceed a very small fraction of a second as far as errors of observation go, but no accuracy in observing will remove the error that may arise from local attraction. This, as we have seen, may amount to some seconds, so that the corrections x to the observed latitudes are attributable to local attraction. Archdeacon Pratt, in his treatise on the figure of the earth, objects to this mode of applying least squares first used by Bessel; but certainly Bessel was right, and the objection is groundless.

Comparisons of Standards.

In determining the figure of the earth from the arcs of meridian measured in different countries, one source of uncertainty was, until the last few years, the want of comparisons between the standards of length in which the arcs were expressed. This has been removed by the very extensive series of comparisons recently made at Southampton (see *Comparisons of Standard of Length of England, France, Belgium, Prussia, Russia, India, and Australia, made at the Ordnance Survey Office, Southampton*, 1866, and a paper in the *Philosophical Transactions* for 1873, by Lieut.-Col. A. R. Clarke, C.B., R.E., on the further comparisons of the standards of Austria, Spain, the United States, Cape of Good Hope, and Russia). These direct comparisons, which were carried out with the highest attainable precision, are of very great value. The length of the toise has three independent determinations, viz., through the Russian standard double toise, the Prussian toise, and the Belgium toise,—giving for the length of the toise, expressed in terms of the standard yard of England

through the Russian standard	....	6·39453216 ft.
,, ,, Prussian ,,	....	6·39453703 ft.
,, ,, Belgian ,,	....	6·39453215 ft.

By combining all the different comparisons made in England and on the Continent on these bars, by the method of least squares, the final value of the toise is

6·39453348 ft. (log = 0·8058088656),

from which the greatest divergence of the three separate results specified above is only half a millionth of a toise, corresponding to ten feet in the earth's radius. From the known ratio of the toise and the metre, 864000 : 443296, we get for the metre

3·28086933 ft. (log = 0·5159889356).

That the close agreement between the determinations of the toise is not due to chance will be seen from the fact that the comparisons of the Prussian toise with the English standard involved 2340 micrometer readings and 520 thermometer readings, extending over twenty-five days, the probable error of the resulting length of the toise being ± 0·00000015 yard. The probable error of the determination of the Belgian toise is ± 0·00000027; that of the Russian double toise ± 0·00000031. With regard to the metre, there is an independent determination resulting from the comparison of the platinum metre of the Royal Society,—a large number of observations giving for the length of the metre 3·28087206 feet, which differs from the former result by about one millionth part. But this determination, involving the expansion of the bar for 30° of temperature, and being dependent on some old observations of Arago, cannot be allowed any weight in modifying the result obtained through the toises. The Russian standard, compared at Southampton, was that on which the length of their base lines and therefore their whole arc depends.

Calculation of the Semiaxes.

We now bring together the results of the various meridian arcs, omitting many short arcs which have been used in previous determinations, but which on account of their smallness have little influence in the result aimed at.

The data of the French arc from Formentera to Dunkirk are—

Stations.	Astronomical Latitudes. °	′	″	Distance of Parallels. Feet.
Formentera	38	39	53·17	...
Mountjouy	41	21	44·96	982671·04
Barcelona	41	22	47·90	988701·92
Carcassonne	43	12	54·30	1657287·93
Pantheon	48	50	47·98	3710827·13
Dunkirk	51	2	8·41	4509790·84

The latitude of Formentera as here given is taken from the observations of M. Biot, recorded and computed in the third volume of his *Traité Élémentaire d'Astronomie physique.*

The latitude of the Pantheon, given in the *Base du Système Métrique Décimal* (ii. 413), is 48° 50′ 48″·86. In the *Annales de l'Observatoire Impérial de Paris*, vol. viii. page 317, we find the latitude of south face of the observatory determined as 48° 50′ 11″·71. The Pantheon being 35″·35 north of this, we thus get a second determination of its latitude. The mean is that given above.

The distance of the parallels of Dunkirk and Greenwich, deduced from the recent extension of the triangulation of England into France, in 1862, is 161407·3 feet, which is 3·9 feet greater than that obtained from Captain Kater's triangulation, and 3·2 feet less than the distance calculated by Delambre from General Roy's triangulation. The following table shows the data of the English arc with the distances in standard feet from Formentera.

	°	′	″	Feet.
Formentera		...		
[illegible]	51	28	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	14	[illegible]	[illegible]
[illegible]	[illegible]	27	[illegible]	[illegible]
Saxavord	[illegible]	49	[illegible]	[illegible]

The latitude assigned in this table to Saxavord is not the directly observed latitude, which is 60° 49′ 38″·58, for there are here a cluster of three points, whose latitudes are astronomically determined; and if we transfer, by means of the geodesic connection, the latitude of *Gerth of Scaw* to Saxavord, we get 60° 49′ 36″·59; and if we similarly transfer the latitude of *Balta*, we get 60° 49′ 36″·46. The mean of these three is that entered in the above table.

For the Indian arc in long. 77° 40′ we have the following data:—

	°	′	″	Feet.
Punnae	8	9	31·132	...
Putchapolliam	10	59	42·276	1029174·9
Dodagoontah	12	59	52·165	1756562·0
Namthabad	15	5	53·562	2518376·3
Daumergida	18	3	15·292	3591788·4
Takalkhera	21	5	51·532	4697329·5
Kalianpur	24	7	11·262	5794695·7
Kaliana	29	30	48·322	7755835·9

The data of the Russian arc (long. 26° 40′) taken from M. Struve's work are as below:—

	°	′	″	Feet.
Staro Nekrassowka	45	20	2·94	...
Wodolui	47	1	24·98	616529·81
Ssuprunkowzi	48	45	3·04	1246762·17
Kremenetz	50	5	49·95	1737551·45
Belin	52	2	42·16	2445745·17
Nemesch	54	39	4·16	3400312·63
Jacobstadt	56	30	4·97	4076412·28
Dorpat	58	22	47·56	4762421·43
Hogland	60	5	9·84	5386135·39
Kilpi-maki	62	38	5·25	6317905·67
Tornea	65	49	44·57	7486789·97
Stuor-oivi	68	40	58·40	8530517·90
Fuglenaes	70	40	11·23	9257921·06

From the arc measured by Sir Thomas Maclear in long. 18° 30′, we have

	°	′	″	Feet.
North End	29	44	17·66	...
Heerenlogement Berg.	31	58	9·11	811507·7
Royal Observatory	33	56	3·20	1526386·8
Zwart Kop	34	13	32·13	1632583·3
Cape Point	34	21	6·26	1678375·7

And, finally, for the Peruvian arc, in long. 281° 0′,

	°	′	″	Feet.
Tarqui	−3	4	32·068	...
Cotchesqui	0	2	31·387	1131036·3

Having now stated the data of the problem, we may either seek that ellipsoid which best represents the observations, or we may restrict the figure to one of revolution. It will be convenient to commence with the supposition of an ellipsoidal figure, as on so doing we can, by a slight alteration in the equations of minimum, obtain also the required figure of revolution. It may be remarked that, whatever the real figure may be, it is certain that if we presuppose it an ellipsoid, the arithmetical process will bring out an ellipsoid, which ellipsoid will agree better with all the observed latitudes than any spheroid would, therefore we do not *prove* that it is an ellipsoid; to prove this, arcs of longitude would be required. There is no doubt such arcs will be shortly forthcoming, but as yet they are not available.

The first thing that occurs to one in considering an ellipsoidal earth is the question, What is a meridian curve? It may be defined in different ways: a point moving on the surface in the direction astronomically determined as "north" might be said to trace a meridian; or we may define it as the locus of those points which have a constant longitude, whose zeniths lie in a great circle of the heavens having its poles in the equator; we adopt this definition. Let a, b, c be the semiaxes, c being the polar semiaxis. The equation of the ellipsoid being

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1\,,$$

if P be any point on the surface, the direction cosines of the normal at P are proportional to

$$\frac{du}{dx},\ \frac{du}{dy},\ \frac{du}{dz},\ \text{or}\ \frac{x}{a^2},\ \frac{y}{b^2},\ \frac{z}{c^2};$$

ɜ the angle between this normal and the
ɪt ϕ is the latitude of P, we have

$$\sin\phi = \frac{\frac{z}{c^2}}{\left(\frac{x^2}{a^4}+\frac{y^2}{b^4}+\frac{z^2}{c^4}\right)^{\frac{1}{2}}}.$$

ion to a "parallel" in which the latitude

$$\frac{x^2}{a^4}+\frac{y^2}{b^4}-\frac{z^2}{c^4}\cot^2\phi=0.$$

ipsoidal earth the parallel is no longer a
t longitude be reckoned from the plane of
two species of latitude, astronomical and
re are in the ellipsoidal earth two species
entric (called u) and astronomical (called
line passing through the origin in the
or and directed to a point whose longitude
lirection cosines of that line are—sin ω,
hose points of the surface whose normals
s to this line are in the meridian whose
the condition of perpendicularity is

$$\frac{x\sin\omega}{a^2}+\frac{y\cos\omega}{b^2}=0;$$

is the equation of the meridian, which is
ɔsoidal hypothesis a plane curve. The
ronomical longitudes are connected by the

$$a^2\tan u = b^2\tan\omega.$$

ve is an ellipse whose minor semi-axis is c, and
-axis major is some quantity r intermediate
ch that

$$\frac{1}{r^2}=\frac{\cos^2 u}{a^2}+\frac{\sin^2 u}{b^2}.$$

s i, k, such that $a^2(1-i)=b^2(1+i)=k^2$, then
and take n such that

$$n=\frac{r-c}{r+c},$$

alue of r, neglecting the square of i; this gives

$$n=\frac{k-c}{k+c}+\frac{i}{4}\cos 2u.$$

ermine not only the three semi-axes a, b, c, but
Let u_1 be the longitude of one of the measured
e longitude of a, then, for that arc,

$$\frac{k-c}{k+c}+\frac{i}{4}\cos 2(u_1-u_0)$$

$$\frac{k-c}{k+c}+p\cos 2u_1+q\sin 2u_1,$$

, $4q=i\sin 2u_0$.
does not pass through the axis of rotation, so
latitudes on an ellipsoid are not exactly the
ould be used in the ordinary method of ex-
of a meridian arc in terms of the latitudes.
ı that this consideration may be neglected.

ve collected form 35 equations between the
to the observed latitudes, and the four
ies determining the elements of the
ɜ n_1 to be an approximate value of the ratio
ɪt

$$\frac{k-c}{k+c}=n_1+r,$$

correction to n_1 and suppose c_1 to be an
ɜ of c so that $c=c_1(1+t)$, then the four
es are p, q, r, t. The result of making
uares of the 40 corrections a minimum is

Feet.	Metres.
·20926350 =	6378294·0
·20919972 =	6376350·4
·20853429 =	6356068·1

$$\frac{a-c}{c}=\frac{1}{285{\cdot}97};\quad \frac{b-c}{c}=\frac{1}{313{\cdot}38}$$

$$\frac{a-b}{c}=\frac{1}{3260{\cdot}5}$$

Longitude of a..............15° 34′ East.

The meridian of the greater axis passes, in the Eastern Hemisphere, through Spitzbergen, the Straits of Messina, Lake Chad in North Africa, and along the west coast of South Africa,—nearly corresponding to the meridian which passes over the greatest quantity of land in that hemisphere. In the Western Hemisphere it passes through Behring's Straits and through the centre of the Pacific Ocean. The meridian (105° 34′ E.) of the minor axis of the equator passes near North-east Cape on the Arctic Sea, through Tong-king and the Straits of Sunda, and corresponds nearly to the meridian which passes over the greatest amount of land in Asia; and in the Western Hemisphere it passes through Smith Sound, the west of Labrador, Montreal, between Cuba and Hayti, and along the west coast of South America, nearly coinciding with the meridian that passes over the greatest amount of land in that hemisphere.

The length of the meridian quadrant passing through Paris, in the ellipsoidal figure given above, is 10001472·5 metres, showing that the length of the ideal French standard is considerably in error as representing the ten-millionth part of the quadrant. The minimum quadrant, in longitude 105° 34′, has a length of 10000024·5 metres. The probable error of the longitude of the major axis of the equator given above is of course large, as much perhaps as ± 15°.

It has been objected to this figure of three unequal axes that it does not satisfy, in the proportions of the axes, the conditions brought out in Jacobi's theorem. Admitting this, it has to be noted, on the other hand, that Jacobi's theorem contemplates a homogeneous fluid, and this is certainly far from the actual condition of our globe, indeed the irregular distribution of continents and oceans suggests as possible a sensible divergence from a perfect surface of revolution.

If we limit the figure to being an ellipsoid of revolution, we get rid in our equations of two unknown quantities, and the result may be expressed thus:—

	Feet.	Metres.
a =	20926062 =	6378206·4
c =	20855121 =	6356503·8

$c:a = 293{\cdot}98 : 294{\cdot}98$.

As might be expected, the sum of the squares of the 40 latitude corrections, viz., 153·99, is greater in this figure than in that of three axes, where it amounts to 138·30. In the Indian arc the largest corrections are at Dodagoontah, + 3″·87, and at Kalianpur, − 3″·68. In the Russian arc the largest corrections are + 3″·76, at Tornea, and − 3″·31, at Staro Nekrassowka. Of the whole 40 corrections, 16 are under 1″·0, 10 between 1″·0 and 2″·0, 10 between 2″·0 and 3″·0, and 4 over 3″·0. For the ellipsoidal figure the probable error of an observed latitude is ± 1″·42; for the spheroidal it would be very slightly larger. This quantity may be taken therefore as approximately the probable amount of local deflection.

In 1860, the Russian Government, at the instance of M. Otto Struve, imperial astronomer at St Petersburg, invited the co-operation of the Governments of Prussia, Belgium, France, and England, to the important end of connecting their respective triangulations so as to form a continuous chain under the parallel of 52° from the island of Valentia on the south-west coast of Ireland, in longitude 10° 20′ 40″ W., to Orsk on the river Ural in Russia. This grand undertaking was at once set in action, but up to the present time there are portions of the work still incomplete. Off the part of England the triangulation was, in 1862, carried through France into Belgium; and the difference of longitude of Greenwich and Valentia was determined by the Astronomer Royal by means of electric telegraph signals.

Although in theory the determination of differences of longitude by electric telegraph signals may appear extremely simple, yet practically there are very many sources of error which have to be sought out and eliminated by a proper arrangement of the observations. The system has now been brought to such perfection that the astronomical amplitude of arcs of longitude can be determined with nearly as much accuracy as those of latitude, and in a few years the data of the problem of the figure of the earth will thus receive many additions. As an example of the precision arrived at, the difference of longitude of Greenwich Observatory and Harvard Observatory, U.S.A., has been three times determined with the following results :—

	h.	m.	s.
1866 by Anglo-American Cable	4	44	31·00
1870 by French Cable to Duxbury	4	44	30 99
1872 by French Cable to St Pierre	4	44	30·96

But the different determinations of the velocity of transmission of signals present great anomalies.

Pendulum Observations.

In Clairaut's theorem we have seen that if g' be gravity in the latitude of ϕ, g its value at the equator, then $g'=g(1+q\sin^2\phi)$. If the same pendulum be swung in different latitudes then the square of the number of vibrations will be proportional to gravity. Hence, if N be the number of vibrations of an invariable pendulum per diem at the equator, N′ the number in latitude ϕ, then $N'^2=N^2(1+q\sin^2\phi)$. Thus q can be obtained by observations on the same pendulum in different latitudes, and since $q=\frac{5}{2}m-e$ and m is known, e will at once follow. The pendulum which makes 86400 oscillations per diem in London is observed to lose 136 vibrations at the equator and gain 79 at Spitzbergen.

The limits of space at our disposal here prevent our going into the subject of pendulum experiments, and it seems unnecessary to repeat the investigations that have already been based upon the older pendulum observations. See Airy's *Figure of the Earth*, Baily's paper in the *Memoirs of the Royal Astronomical Society*, General Sabine's *Account of Experiments to determine the Figure of the Earth by means of the Pendulum vibrating seconds in Different Latitudes*, 1825, and a valuable paper in the *Cambridge Philosophical Transactions*, 1849, by Professor Stokes. The pendulum gives an ellipticity certainly somewhat greater than that resulting from arcs of meridian, viz., $\frac{1}{292\cdot2}$. An immense number of pendulum observations are now being made at the astronomical stations of geodesical surveys in Germany, Russia, and India, which, when fully published, will throw light more perhaps upon the local variations of gravity than on the figure of the earth. The observations made at the various stations of the Indian meridian are bringing to light a physical fact of the very highest importance and interest, namely, that the density of the strata of the earth's crust under and in the vicinity of the Himalayan Mountains is less than that under the plains to the south, the deficiency increasing as the stations of observation approach the Himalayas, and being a maximum when they are situated on the range itself. This accounts for the non-appearance of the large deflections which the Himalayas, according to Archdeacon Pratt's calculations, ought to produce. The Indian pendulum observations further throw some light on the relative variations of gravity at continental, coast, and island stations, showing that, without a single exception, gravity at the coast stations is greater than at the corresponding continental stations, and greater at island stations than at coast stations. The ellipticity of the earth has also been deduced from the motion of the moon, the quantity $e-\frac{1}{2}m$ entering as a coefficient in the expression for the moon's latitude. The resulting value of the ellipticity is $\frac{1}{307}$th (Airy's *Tracts*, p. 188). A value of the ellipticity may also be derived from the precession of the equinoxes, but as this depends on the assumed law of density in the interior of the earth it is not of much importance.

Elements of the Figure as a Solid of Revolution.

$$a=20926062 : b=20855121\,.$$

If ρ be the radius of curvature of the meridian in latitude ϕ, ρ' that perpendicular to the meridian, D the length of a degree of the meridian, D′ the length of a degree of longitude, r the radius drawn from the centre of the earth, V the angle of the vertical, then

$$\begin{array}{llllll}
 & \text{Feet.} & & & & \\
\rho & =20890606\cdot6 & -106411\cdot5 & \cos 2\phi & +225\cdot8 & \cos 4\phi \\
\rho' & =20961607\cdot3 & -\ \ 35590\cdot9 & \cos 2\phi & +\ \ 45\cdot2 & \cos 4\phi \\
D & =\ \ \ 364609\cdot87 & -\ \ \ \ 1857\cdot14 & \cos 2\phi & +\ \ \ 3\cdot94 & \cos 4\phi \\
D' & =\ \ \ 365538\cdot43\cos\phi & -\ \ \ \ \ 310\cdot17 & \cos 3\phi & +\ \ \ 0\cdot39 & \cos 5\phi \\
\text{Log}\,\frac{r}{a} & =9\cdot9992645 & +\ \cdot0007374 & \cos 2\phi & -\ \cdot0000019 & \cos 4\phi
\end{array}$$

$$V=700''\cdot44\sin 2\phi-1''\cdot19\sin 4\phi.$$

(A. R. C.)

EARTHQUAKE. Although the terrible effects which are often produced by earthquakes have in all ages forced themselves upon the attention of man, it is nevertheless only within the last thirty years that the phenomena have been subjected to exact investigation. A new science has been thus established under the name of *seismology* (σεισμός, an earthquake). This branch of knowledge, however, has hitherto attracted but few students, and its development in England has been almost exclusively due to the researches of Mr Robert Mallet. References to his principal works will be given at the end of this article.

Accounts of earthquakes are to be found scattered through the writings of many ancient authors, but they are, for the most part, of little value to the seismologist. There is a natural tendency to exaggeration in describing such phenomena, sometimes indeed to the extent of importing a supernatural element into the description. It is true that attempts were made by some ancient writers on natural philosophy to offer a rational explanation of earthquake phenomena, but the hypotheses which their explanations involved are, as a rule, too fanciful to be worth reproducing at the present day. It is therefore unnecessary to dwell upon the references to seismic phenomena which have come down to us in the writings of such historians and philosophers as Thucydides, Aristotle, and Strabo, Seneca, Livy, and Pliny. Nor is much to be gleaned from the pages of mediæval and later writers on earthquakes, of whom the most notable are Fromondi (1527), Maggio (1571), and Travagini (1679). In this country, the earliest work worthy of mention is Dr Robert Hooke's *Discourse on Earthquakes*, written in 1668, and read at a later date before the Royal Society. This discourse, though containing many passages of considerable merit, tended but little to a correct interpretation of the phenomena in question. Equally unsatisfactory were the attempts of Priestley and some other scientific writers of the last century to connect the cause of earthquakes with electrical phenomena. The great earthquake of Lisbon in 1755 led the Rev. John Michell, professor of mineralogy at Cambridge, to turn his attention to the subject; and in 1760 he published in the *Philosophical Transactions* a remarkable essay on the Cause and Phenomena of Earthquakes. Regarding the earth as having a liquid interior covered by a comparatively thin crust, he conceived that waves might be generated in this subterranean liquid, and that such waves by shaking the flexible crust would produce the shocks of an earthquake.

tion of the movement of the ground is that of a
t thrown into undulations by being shaken at

Although Michell's hypothesis is still accepted,
fied form, by some geologists, it should be
l that many arguments of considerable weight
urged by modern physicists against the doctrine
nucleus and a thin crust. Whatever the merits
theory, he failed to understand the true nature
tion, and the way in which it is transmitted
arthquake shock. Modern seismologists believe
rthquake is a vibratory motion propagated
solid materials of the earth, much in the same
ound is propagated by vibrations in the atmo-
appears that this view was first suggested by
Young in his *Lectures on Natural Philosophy*,
in 1807. The development of this view,
n its quantitative results, lies at the very base
gy. In 1846 Mr Mallet communicated to the
Academy his first paper "On the Dynamics
akes;" and in the following year the late Mr
f Cambridge, presented to the British Association
report in which earthquake-phenomena are dis-
ome detail. Since that date the great advances
ntry have been made by Mr Mallet, assisted
by the Rev. Professor Haughton and other
ians.

the present day, after all that has been written
ect, but little is really known as to the origin of
s. Probably several distinct causes should be
for it is hardly to be supposed that all sub-
listurbances, differing as they do so widely in
nd in duration, should be referable to one
chanism. Any great concussion, even upon the
competent to produce tremors which may be
diminutive earthquakes; thus the great landslip
berg in Switzerland in 1806 was accompanied
quaking of the ground. Volger and Mohr have
that some of the small earthquakes which have
Germany may be referred to the falling-in of
enormous subterranean cavities formed by the
ued solvent action of water on deposits of rock-
one, and gypsum. Such causes, however, can
rise to only very petty shocks, and must be
rdinate to subterranean disturbances of a more
racter. The late Mr Poulett Scrope was led to
earthquakes to "the snap and jar occasioned by
and violent rupture of solid rock-masses, and
instantaneous injection into them of intumescent
tter from beneath." He believed that the
the rocks was due to expansion of deeply seated
ineral matter, consequent upon either increased
e or diminished temperature. It is argued,
Mr Mallet, on mechanical principles, that such
uld produce only very weak impulses; but he
t some earthquakes, especially those marked by
ued tremors, may be due to the movement and
rock masses by tangential pressures produced
cooling of the earth. Steam has always been a
gent with seismologists, since it is clearly com-
oduce great effects by its sudden generation or by
condensation. It has been suggested that water,
way through fissures in the earth's crust, might
ly-heated rocks and remain quietly, in the
condition, until a local reduction of temperature
aused it to flash into steam. After all, the
rthquakes is probably to be regarded as part
much wider question. Whatever causes are
to produce volcanic action are, in all likelihood,
petent to produce the ordinary manifestations
nergy. A relation is clearly traceable between the geographical distribution of volcanoes and the chief earthquake-areas; and although it is not for a moment to be supposed that the volcano and the earthquake stand to each other in the relation of cause and effect, it is nevertheless highly probable that they represent merely different expressions of the same subterranean forces.

Whatever may be the real origin of the earthquake shock, it is convenient to regard its effects as proceeding from a concussion or sudden blow delivered underground at some definite centre. This centre of impulse is called the *seismic focus*. It must be borne in mind, however, that such a centre, so far from being anything like a mathematical point, is in nature a subterranean region, which in many cases is no doubt of very large dimensions, measuring perhaps some miles in diameter.

From the seismic centre waves are propagated in all directions through the solid materials of the earth's crust; and if the focus be situated beneath the sea, the vibrations of the ground will be accompanied by undulations of the water. Those waves which pass through the elastic materials of the earth consist, for the most part, of *longitudinal* vibrations, like those of atmospheric sound-waves, and consequently not like ordinary water-waves. In the sound-wave the air is alternately condensed and rarefied, the molecules advancing and retreating in the line of direction in which the wave is travelling. In a water-wave, on the contrary, the molecules of liquid rise and fall, or rather describe closed curves in planes which are transverse to the direction in which the undulation or wave-form advances. According to Mr Hopkins, both orders of vibration—longitudinal and transversal—coexist in the earth quake-wave, and call for investigation. When, for example, the molecules of an iron bar are disturbed by a blow delivered at one end, both kinds of vibration are generally excited, and hence two waves are sent through the bar,—the longitudinal, however, having a much greater velocity than the transversal wave. But it may be doubted whether the seismologist need concern himself with any but longitudinal vibrations. For, admitting that small transversal vibrations are generated at the seismic focus, it is probable that they would be cut off to a great extent during transmission from stratum to stratum. Indeed, the planes of junction between the several beds in stratified deposits would hinder the transmission of transversal vibrations travelling in a direction normal to the strata. Hence Mr Mallet maintains, that in studying the effects of an earthquake, attention may be restricted, without danger of error, to the longitudinal or normal vibrations, the transversal or tangential vibrations being neglected.

Around the seismic centre, or mean focal point, the molecules of the rock will first be squeezed together by the concussion, and then separated by virtue of the elasticity of the solid medium; the onward motion is then rapidly taken up by the next set of molecules, which in like manner are pushed against each other, and then spring apart. In this way the pulse, or form of the wave, may be propagated to an enormous distance, whilst the excursions of the individual particles are confined within very narrow limits. It is therefore of great importance to distinguish between the transit of the wave and the movement of the material particles. Each molecule may move only through a few inches, but the undulation may travel for hundreds of miles. The distance through which the individual particles oscillate is called the *amplitude* of the wave. After the Neapolitan earthquake of 1857 Mr Mallet found from actual observation at a place called Polla, situated nearly above the seismic centre, that the amplitude of a wave which caused certain fractures in masonry could not have been more than 2½ inches. He is thus led to believe, contrary to the opinion of most geologists, that earthquakes are not great agents of permanent elevation. That elevation has been frequently observed after an earthquake is a fact beyond question; thus, Captain Fitzroy found, after the South American earthquake of 1835, that a part of the isle of Santa Maria, in the Bay of Concepcion, had been raised upwards of 10 feet, and, although this elevation was followed by a slow subsidence, it is believed that the land was permanently left considerably higher than its level before the occurrence of the catastrophe. Mr Mallet, however, would refer such alteration of level to the action of elevatory forces accompanying the earthquake, but not to the direct transit of the earth-wave.

From the density and the modulus of elasticity of a given rock, it is possible to calculate the velocity with which a vibration would travel through such a medium. But the rate deduced by calculation usually exceeds very greatly that actually observed in an earthquake. To determine the rate of transit through various rocks, Mr Mallet and his son Dr J. W. Mallet conducted many years ago a series of experiments, at the instance of the British Association. A mile was carefully levelled and measured on sand in Killiney Bay, near Dublin, and by explosion of gunpowder the velocity of transmission through this damp sand was observed. This sand was selected as a medium likely to give a minimum velocity, whilst an assumed maximum velocity was observed by experiments on the granite of Killiney Hill. The velocity in sand was about 825 feet, and in solid granite 1665 feet per second. These figures are much lower than those obtained from theoretical considerations, and it is believed that the difference is due to loss of speed occasioned by the discontinuity of the rock, even the solid granite being always more or less affected by joints. The velocity deduced from these experiments accords tolerably well, however, with that observed during earthquake shocks. Thus the velocity of shock during the Lisbon earthquake of 1755 is computed to have been about 20 miles per minute, or 1760 feet per second. This velocity of the vibration, or wave of shock, is of course to be carefully distinguished from the velocity of the oscillating particles. The mischief of the shock depends in fact on the rate at which the earth-molecules are moving, and this is vastly inferior to that of the wave. Thus Mr Mallet calculated from his observations in Naples that the shock of the great earthquake of 1857 had a mean velocity at the surface of 788 feet per second, whilst the greatest velocity of the wave-particles was never more than 15 feet per second, and in many places was very much less. Yet this low velocity is quite sufficient to produce effects of the most disastrous kind upon solid objects exposed to the shock.

If the earth were a homogeneous solid, perfectly isotropic—that is to say, possessing equal elasticity in all directions—the waves of alternate compression and expansion would take the form of a series of concentric spherical shells around the seismic focus as a common centre. As a matter of fact, however, the crust of the earth is made up of rocks varying greatly in physical properties, each having its own density and elasticity, whilst the rocks themselves are fissured in all directions. Symmetry of wave-surface is therefore hardly to be expected, for the waves will necessarily have greater velocity in one direction than in another, whilst the continuity of the wave may be interrupted by breach of continuity in the [illegible]. The points at which the wave-front reaches the surface form a curve which [illegible] It is clearly the line along which the shock will be simultaneously felt, [illegible] will emerge at the same angle. Since the wave-fronts are not concentric spheres, the coseismals cannot be represented by concentric circles.

It may readily be supposed that the greatest effect of an earthquake, at least in shaking a building up and down, will be felt at that point of the surface which is situated vertically over the centre of impulse. A line joining this point with the earthquake-focus is termed the *seismic vertical*, and the wave travelling to the surface along this vertical has a shorter path than that of a wave emerging at any other point. Just as the seismic focus is, in nature, not a single point, but a considerable space, so the seismic vertical is not a single line, but rather a succession of parallel lines drawn vertically from every point of the focal area to the surface. The mean of these lines may be taken as the seismic vertical. In the neighbourhood of this line the waves emerge at very steep angles, and indeed for a considerable area may be regarded as practically vertical in direction. As the distance from the seismic vertical increases, the angle of emergence becomes less and less; but it is evident that since the focus is seated beneath the surface, the path of an emergent wave can never be perfectly horizontal, unless indeed it be that of a reflected wave.

Almost any object which has been overthrown or projected by an earthquake-shock may afford direct information as to the path of the wave along the surface. For when the vibration is transmitted to such a solid body as an upright column, the particles are pushed together and then pulled apart in the line of wave-transit. It is clear too that half the excursion of each particle is executed in the same direction as that in which the wave is travelling, and half in the opposite direction. Each particle of the object when first disturbed moves with the wave, and its velocity increases from zero to the maximum, this maximum being reached at one quarter of the total vibration; then the velocity diminishes from the maximum to zero, which it attains at the end of half the oscillation. During this first semi-phase, therefore, the vibration has been in the direction in which the wave moves. After the first half oscillation has been executed, movement begins afresh, but this time in the contrary direction, attaining its maximum at the end of the third quarter, and then falling again to zero when the vibration is completed. Hence during the first semi-phase, the motion of the particles is in the same sense or direction as that of the wave, and during the second semi-phase in the opposite direction. But in consequence of the inertia of the body its apparent movement if free, will be in a direction contrary to that of the wave during the first semi-phase. Whatever the direction of overthrow, however, it will always be in the *line* of wave-transit. Hence the azimuthal direction of the wave is easily found.

Whenever any two wave-paths, not in the same right line, can be thus traced on the surface, the position of the seismic vertical may be immediately determined. For this line must pass through the point of their intersection. If, for example, it is found by observation on bodies displaced by the shock that one wave moved in the direction AB (fig. 1), whilst another had a path along CD, it is only necessary to mark on the surface the point O, at which these azimuths meet, and the seismic focus will be vertically beneath such a point. The point indicates, in fact, the centre on the surface from which the waves radiated. Practically it is found that the several wave-paths of an earthquake do not diverge from a single point, for reasons already indicated; but intersections of the paths are crowded together in the neighbourhood of the mean vertical.

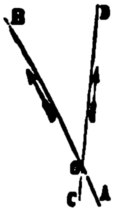

Fig. 1.

It is easy to understand that the greatest amount of mechanical damage is not to be expected immediately above the focus, although this is the point nearest to the origin of impulse. It is true, the shock passing directly upwards along the seismic vertical may destroy the roof or floor of a building, but it would not tend directly to overturn the walls or produce lateral disturbance. In fact, the side thrust will be greatest in waves which reach the surface at small angles, and are therefore necessarily at great distances from the seismic vertical. But the energy of the wave diminishes as the square of the distance along the normal increases. Hence there must be some definite position upon the surface beyond which the advantage of direction is counterbalanced by loss of energy. It is therefore generally possible after an earthquake to trace a line of maximum disturbance, where the damage to the shaken country has been greatest. The line indicating this maximum is termed the *meizoseismic curve*, whilst lines along which the overthrow of objects may be regarded as practically the same are known as *isoseismic curves*. After what has been already said, it is hardly necessary to remark that these lines are not true circles, nor indeed are they in all cases regular closed curves.

ıres and fissures in walls which have been rent by an earth-
are of great value to the seismologist, since they often
the direction in which the waves emerge at the surface.
rpretation of such phenomena, in some cases very compli-
ıas been ably discussed by Mr Mallet, who applied the
vith excellent effect to his observations on the Neapolitan
ıke. If it is possible to find, from such indications, the
ı in which any two waves emerged at the surface, the depth
eismic focus is easily determined. For since the waves
from this focus, any two wave-paths when produced back-
ill meet at the seismic centre. It has already been shown
ly the vertical is found, and when this is known the deter-
n of the focus is simplified, for as the vertical itself repre-
e-wave path it is necessary to find only one other. Let O
be the seismic focus, and OA the seismic vertical; if a

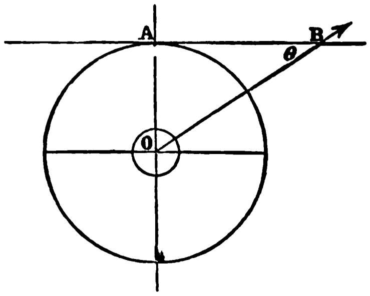

Fig. 2.

)B, emerge at the surface B, at an angle θ, it is evident

$$AO = AB \cdot \tan\theta.$$

ıd the depth of the focus, it is consequently only necessary
r the angle of emergence of a wave at a given station, and
tance of this station from the seismic vertical. As the
A and B are comparatively near each other, the earth's
ty may be neglected, and the surface between the two
l as practically a horizontal plane.

e several wave-paths are known, several values of AO will
ned, and as the seismic centre is not a point, like O, but a
of determinate magnitude, the average of these different
must be taken to represent the *mean focal depth*. After the
leapolitan earthquake of 1857, Mr Mallet, aided by the
Society, spent some months in carefully examining the
which had been visited by the shock; and in 1862 he
ed an elaborate report in which his observations were
iscussed. By determining the wave-paths at twenty-six
in every azimuth around the seismic vertical, he was
to deduce the important fact that the mean focal depth of
hquake was about 5¾ geographical miles. Similar principles
ıce been applied by Dr Oldham to an examination of the
of an earthquake which occurred in Cachar in India, on
r 10, 1869; and he has found that the seismic focus there
ave had a depth of about 30 miles. This coincides very
with the depth which Mr Mallet believes to be the maximum
h any earthquake is likely to originate in our planet.

ı the centre of disturbance is seated beneath the sea, as
to have been the case with that which produced the great
ake of Lisbon in 1755, a water-wave is generated; but
ıis has less velocity than the earth-wave, it does not roll in
ıe shore until after the shock has been felt on land. The
of the sea-wave depends on the depth of the water. During
bon earthquake the wave at Cadiz was as much as sixty
height. It is this great sea-wave which, breaking upon the
fter the earthquake-shock, generally completes the work of
tion. At first the water retires from the land, but in a few
ts the gigantic wave rolls in, and sweeps all before it.
rthquakes which are so frequently felt on the western
f South America are generally terminated in this manner;
great tidal wave which accompanied the earthquake of
377, wrought dreadful havoc at Arica, Iquique, and other
n the coast.

ldition to the waves propagated through earth and sea, it
nly happens that waves are transmitted through the air and
oduce sound. These sound-waves, travelling at the rate of
100 feet per second, may reach the observer either simul-
ly with the shock or before it or even after it. They pro-
sult from sudden fracture and dislocation of rock-masses, or
bterranean explosions.

ıost every object disturbed by an earthquake may be
to yield, when properly questioned, more or less information with respect to the direction and intensity of shock. Special instruments termed *seismometers* have, however, been constructed for this purpose, and have assumed considerable variety of form. Perhaps the simplest seismometer is that suggested by Mr Babbage, consisting merely of a bowl of some viscid liquid like treacle. On the passage of a shock the liquid rises up one side of the vessel, leaving its mark to indicate rudely the direction and extent of motion. As a modification of this simple instrument Mr Mallet proposed the use of a common wooden tub having its inside rubbed with chalk, and half filled with coloured water. An apparatus devised by Professor Cacciatore, of Palermo, and much used in Italy, is constructed with a shallow dish having eight notches in the side, and containing mercury up to the level of the lips. When any oscillation occurs, the liquid is spilt into a series of cups placed under the notches; and the quantity ejected, which may be readily weighed, gives some notion of the intensity of the shock. Since the notches face the four cardinal points and bisecting rhumbs, the direction in azimuth is approximately obtained. Mr Mallet suggested a convenient form of seismometer in the shape of a system of four L-shaped glass tubes having the upper ends closed and the horizontal limbs directed to the cardinal points. The tubes are partially filled with mercury, and the horizontal component of any shock causes the mercury to move in the lower limbs; whilst the vertical component is determined by the motion of quicksilver in a U-shaped tube. In both cases, the movement of the liquid column is registered by means of indexes.

All these instruments depend for their indications on the displacement of liquids by the shock of the earthquake. But it is obvious that the oscillations of solid bodies may be equally well employed in seismometry. Thus a pendulum free to move in all directions will be set vibrating by a shock, and may be made to record the direction and extent of its vibration by means of a stile below the bob, which moves over a bed of fine sand in a properly-shaped dish. Two pendulums are sometimes used, as proposed by Santi. One pendulum vibrates in a vertical plane directed north and south, and the other in one striking east and west,—the arcs traversed in these planes being registered by means of a tracing-stile affixed to the bob. Professor J. Forbes employed an inverted pendulum, or rod fixed at its base and weighted above, carrying at its free end a pencil or tracer by which any oscillation could be recorded. A modification of the inverted pendulum was proposed by Mr Budge of Valparaiso, in which the pendulum when moved by the first shock was kept in position at the end of a semioscillation, by means of a pawl working in a ratchet on the base of the vibrating body.

Such seismometers as those previously noticed require to have their indications observed after each shock. Several ingenious instruments have, however, been constructed on self-registering principles, so that however often they are disturbed, each movement leaves a permanent record. The first of these self-registering seismometers was devised by Mr Mallet, and described in 1846. Both the horizontal and the vertical element of a shock are recorded by the movement of mercury in a system of glass tubes, the tubes being placed in a galvanic circuit so arranged that contact is broken by displacement of the liquid. As long as the circuit remains complete, a pencil traces a line on ruled paper wound round a cylinder rotated by clock-work, but the motion of the mercury intercepts the current and thus breaks the line. Two forms of "ball seismometer" are also due to the ingenuity of the same investigator. In one of these instruments, two heavy metal balls are placed on slightly inclined planes supported by a cast-iron table, the axis of which passes through a vertical spiral spring. During the passage of an earthquake wave the spring is compressed and the balls displaced,—their displacement breaking contact in an electric circuit which had previously been completed through the balls. That ball which first moves gives the time at which the shock commences, whilst the other gives the elements of the shock. Two such instruments are necessary to form one seismometer, the two being placed at right angles to each other.

An elaborate electro-magnetic seismograph has been constructed by Professor Palmieri, and has done good service in the observatory on Mount Vesuvius. The vertical movements are recorded by a helix of copper wire, the lower end of which is caused by even the slightest shock to dip into a basin of mercury, and thus complete a galvanic circuit. An electro-magnet, brought into action when the connections are completed, strikes an alarm bell which calls an attendant, and also stops a clock, so that the instant at which the shock occurs is permanently marked. At the same time a second electro-magnet releases the pendulum of another clock, which being thus set in motion unrolls a band of paper, while a pencil continues to mark upon the paper as long as the shock lasts. To record the vertical element a system of four U-shaped tubes is employed, the tubes being placed in different azimuths. Each limb is partly filled with mercury, and any oscillation in the level of the liquid is indicated by movement of a little float connected with an index. The oscillation of the quicksilver also completes a galvanic circuit, and brings into action the electro-magnets already described.

Although the limits of this article forbid reference to some other seismometers, such as that of Kreil of Vienna, mention should certainly be made of one instrument which is marked by its extreme simplicity. Its construction, which is due to Mr Mallet, will be understood by reference to fig. 3. Two sets of right cylinders are turned in some hard material, such as boxwood. The cylinders are all of the same height, but vary in diameter. Two planks of wood are fixed to a level floor, one having its length in a north-and-south, and the other in an east-and-west direction. The cylinders stand upright on the planks in the order of their size, with a space between each pair greater than their height, so that when one pillar falls it does not strike its neighbour. The surrounding floor is covered up to the level of the planks with dry sand. When a shock passes, some of the cylinders are overturned, the number depending on the velocity of the wave. Suppose the shock knocks over the narrow-based cylinders 4, 5, 6, leaving Nos. 1, 2, 3 standing; then the velocity of the horizontal component must have been greater than that needed to overturn No. 4, but not great enough to overturn No. 3. Hence the velocity (V) can be approximately obtained by using a formula due to Professor Haughton, viz.:

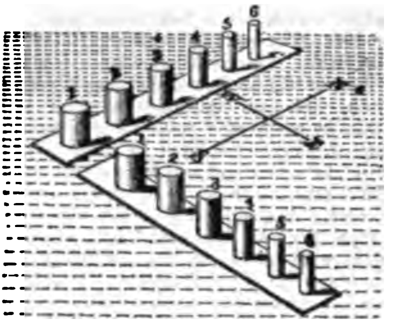

Fig. 3.

$$V^2 = \frac{10b^2+16a^2}{12a^2}\cdot g\sqrt{a^2+b^2}(1-\cos\theta);$$

where a is the altitude of the column, b the diameter of its base, and θ the angle formed by the side and a line drawn through the centre of gravity to the extremity of the base. The direction in azimuth is indicated by the position in which the overturned pillars are found, since the bed of sand prevents rolling. It is possible to obtain the exact time at which the shock commences by connecting the narrowest-based pillar with the pendulum of a clock so as to stop it at the instant of overthrow. Where the angle of wave-emergence is very steep, this instrument is not to be recommended, since it ignores the vertical element of the shock.

Catalogues of earthquakes, showing their distribution in time and space, have been constructed by Mallet, Perrey, Von Hoff, Cotte, and other seismologists. The most complete of these statistical works is the *catalogue raisonné* compiled by Mr R. Mallet and his son, Dr J. W. Mallet, and published by the British Association between the years 1854 and 1858. This includes notices of all recorded earthquakes from 1606 B.C. to 1842 A.D., and is thence carried on to 1850 from Perrey's annual catalogues. Between 6000 and 7000 separate earthquakes are recorded as having occurred in almost every part of the world, both on land and at sea. But though seismic energy may thus become sensible at any point of the earth's surface, there are, as everyone knows, certain regions peculiarly subject to earthquakes: and it is, in fact, possible to trace seismic bands of variable width following the great lines of elevation which divide the oceanic basins.

It is now several years since Professor Alexis Perrey, of Dijon, sought to trace a relation between the occurrence of earthquakes and the age of the moon. By careful analysis of his catalogue he believed that he had established the facts—that earthquakes occur more frequently at the syzygies than at the quadratures, that their frequency increases at the perigee and diminishes at the apogee of the moon, and that shocks are more frequent when the moon is on the meridian than when 90° from it. Such a connection between seismic phenomena and the phases of the moon would accord with Zantedeschi's views on the existence of a terrestrial or terrene tide, views which were based, however, on the old hypothesis of a liquid nucleus in the earth, covered by a thin crust.

From Mallet's discussion of his catalogue for three centuries, he was led to detect definite periods of maximum energy. Thus it is found that the greatest number of earthquakes are recorded about the middle of each century; whilst a second epoch, less powerful than the first, occurs towards the close of the century. According to Perrey there is a preponderance of earthquake-shocks at particular seasons, the equinoxes and solstices, which he terms "critical epochs." Mallet's analysis of a large catalogue showed a decided maximum about the winter solstice, but Perrey's other epochs were less marked. In the present state of our knowledge it would be rash to regard seismic force, whatever it may be, as a distinctly periodic force, or to insist upon any of those relations between earthquakes and meteorological phenomena which have sometimes been discussed.

Annual reports on earthquakes have been published for many years by Professor Fuchs. During the year 1876 he recorded 104 earthquakes, which were distributed among the months as follows:—In January 10, February 10, March 14, April 8, May 7, June 7, July 8, August 5, September 7, October 14, November 5, December 9. In the preceding year 97 earthquakes were noticed, occurring as follows:—In January 15, February 7, March 12, April 7, May 8, June 10, July 6, August 5, September 8, October 2, November 5, December 12.

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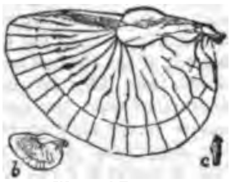
EARWIG, a name, sanctioned by common error, applied under various modifications in different languages (*e.g.* Auricularia, Perce-oreille, Ohr-wurm, Oorblaser, Oorwurm, Oerentvist, Gusano del oido, &c.) to the somewhat curious insects comprised in the old Linnean genus *Forficula*,—a error arising in the first instance probably from their invariable habit of secreting themselves in any cavity, of which they always endeavour to reach the innermost recess (instances being known of the common species hiding itself in the ear of a person sleeping in the open air), and strengthened by the popular exaggerated idea of the strength and attributes of the anal forceps peculiar to these insects.

Earwigs have been for some time of uncertain position in classification, having been even considered as worthy of the rank of a special separate order (*Labidoures*, Duméril; *Dermaptera*, corrected to *Dermatoptera*, Leach; and *Euplexoptera*, corrected to *Euplectoptera*, Westwood), but they are now generally recognized as forming a family, *Forficulidæ* or *Forficulariæ*, of the *Orthoptera* (the Locusts, Grasshoppers, Crickets, Cockroaches, Mantis, &c.) They have much the facies of the *Brachelytra* or *Staphylinidæ* in the *Coleoptera* (Beetles), from which order they differ in their pupa being active, resembling the perfect insect except in possessing only rudimentary wings, &c.; also in the method of folding and neuration of the hinder wings, the possession of an anal forceps, and, as in the other *Orthoptera*, in the additional external lobe to their maxillæ. From all the other *Orthoptera*, apart from the anal forceps, they differ in having horizontal elytra covering the wings in repose as in beetles, and in the female not possessing a corneous ovipositor, and from most of them in the hind legs being not formed for jumping.

Of distinct species 250 are recognized, comprised in 34 genera (of which some are apparently needless); but it is highly probable that this represents a mere outline of the group, as scarcely any naturalists make them an object of study, and their geographical distribution is very extended. There are about 200 species in the collection of the British Museum alone, mostly unnamed, and not specially collected. They are found in the whole of Europe, in Syria and Asia Minor, Central Asia, Hindustan, Ceylon, Indo-China, China and Formosa, the Malay Archipelago, the Philippines, North, West, and South Africa to the Cape itself, Egypt, Zanzibar, Mauritius, Kamtchatka, Newfoundland, the North American States from New York to California (but comparatively rare, according to Packard), Mexico, Florida, Central America and the West Indies, South America from Columbia to Chili, New Guinea, North Australia, Tasmania, and New Zealand; and species occur in such isolated localities as Madeira, the Canaries, St. Helena, Woodlark Island, the Solomon and Sandwich Isles, and Kerguelen's Island. As regards pre-historic times, a few fossil species have been found in the territories of Solenhofen, Œningen, and Italy in the Old World, and of the Rocky Mountains (Colorado) in the New. Seven species have been recorded from Great Britain, of which two are universally common, viz., *Forficula auricularia*, the typical earwig, and the smaller *Labia minor*. The former of these is found all over Europe, in Armenia, the Caucasus, and other parts of Asia, and in the eastern United States, being also recorded from Japan; and the latter occurs in Europe, Western Asia, and North America. Another species, *Labidura riparia*, extends over the entire Old World.

All are of comparatively small size, and nearly all of obscure colours, mostly various shades of brown or dull yellows and reds: one South American species is white; another, from the Amazon, has blue metallic elytra, which are metallic also in another from Penang; a fourth exotic species is yellow, with black stripe; and several have opaline or iridescent wings. Eccentricity of development is shown chiefly in the forceps, which in a Nicaraguan species are as long as the rest of the body; in another South American form the abdomen is laterally toothed; a third has very long legs, being almost tipuliform; *Apachys* has the body as thin as cardboard.

Sexual differences are shown in the male by the greater development and armature of the forceps, or the tuberculated abdomen, which is composed of nine distinct segments, whereas only seven are evident in the female. The forceps have been observed to be used in arranging the wings, and are also supposed to be used as weapons of offence and defence, though it is difficult to understand how they could be of any practical assistance for either purpose. The lower wings have long attracted attention from their unexpectedly large size and fan like structure; in the accompanying figure, *a* is the magnified open wing of the common earwig, *b* the same of the natural size, and *c* the wing closed, also of natural size. Although possessed of such ample organs of flight, *Forficula auricularia* has seldom, if ever, been observed to make use of them, though there is evidence that it does fly; but the other common British species, *Labia minor*, is frequently seen on the wing, being often mistaken for a brachelytrous beetle. It may be observed, that the possession of wings is apparently sexual in some cases, and that some species are entirely apterous.



Wing of Earwig.

Some few instances have been recorded of earwigs being carnivorous, devouring the larvæ and pupæ of wild bees and even their own species; but the majority are in a normal state certainly eaters of vegetable matter, congregating under bark, and destroying flowers, fruit, &c., often to a considerable extent. An instance of their adaptability to circumstances is afforded by Mr H. W. Bates's discovery of a large *white* species (above referred to) very common on white sandy beaches of the Brazilian river Pará, at Caripí, with a white *Tetracha* and a white mole cricket; this whiteness was permanent, and must not be confused with the light colour of recently disclosed individuals.

The female of the common earwig has long been noted for an exhibition of remarkable maternal instinct in defending her progeny, not only brooding over her eggs, but caring for her newly hatched young.

The chief writers on *Forficulidæ* are Dohrn, in the *Stettiner entomologische Zeitung* for 1862 and following years, and quite recently, S. H. Scudder, in the *Proceedings of the Boston Natural History Society*, vol. xviii., the latter being the first to discuss these insects in a collective form. (E. C. R.)

EASEMENT, in English law, is a species of servitude or limited right of use over land belonging to another. It is distinguished from a *profit*, which is a right to take the soil of another, while an easement is a right to use the soil or the produce of the soil in a way tending to the more convenient enjoyment of another piece of land. Thus a right of way is an easement, a right of common is a profit. Besides rights of way the most important easements are *water-courses* (as where a person has a right to divert a flow of water), the right to discharge water, &c., upon a neighbour's land, and the right to restrain such a use of land as would obstruct the access of light and air to an ancient window.

EASTBOURNE, a watering-place on the Sussex coast, 66 miles from London by railway. It is situated about three miles to the east of Beachy Head, the loftiest headland on the English Channel. It once consisted of three parts:—the old village of East Bourne, a mile inland; South Bourne, lying back from the shore; and Seahouses, facing the beach; but these distinctions are now almost obliterated, and numerous handsome terraces and detached houses have more or less united the three old hamlets into one town. Besides the parish church of St Mary's, a building of some antiquity, there are four chapels of ease in Eastbourne. A pier was erected in 1868. The population, which is rapidly increasing, was 10,361 in 1871.

EASTER, the annual festival observed throughout Christendom in commemoration of the Resurrection of our Lord Jesus Christ. The word *Easter*—Anglo-Saxon, *Eastre*, *Eoster*; German, *Ostern*—like the names of the days of the week, is a survival from the old Teutonic mythology. According to Bede (*De Temp. Rat.*, c. xv.) it is derived from *Eostre*, or *Ostâra*, the Anglo-Saxon goddess of spring, to whom the fourth month, answering to our April—thence called *Eostur-monath*—was dedicated. This month, Bede informs us, was the same as the "Mensis Paschalis," when "the old festival was observed with the gladness of a new solemnity."

[illegible] of the Cru[illegible] [illegible] the first [illegible] day of the [illegible] day of the [illegible] was the [illegible] day of the [illegible] Nisan. [illegible] keep the 14th day were [illegible] and were [illegible] of any [illegible] observed and the proper [illegible] was [illegible] the festival before the week, [illegible] at the beginning [illegible] at the [illegible] thus creating a wonderful and [illegible]

[illegible] gradually brought to an end [illegible] The Roman Chris[illegible] Sunday usage, which, within [illegible] the Crucifixion [illegible] that of the Resurrection on the following [illegible] Pius I, c. 147—the genuine[illegible] established—pre[illegible] on the Lord's [illegible] Anicetus was equally firm [illegible] Polycarp, the venerable and sainted bishop [illegible] Irenaeus (ap. Euseb., *H. E.*, [illegible] with this object, failed to [illegible] conform to the Quartodeciman usage, [illegible] had received from his master, the Apostle [illegible] Anicetus declined to permit the Jewish custom in [illegible] his jurisdiction, but made no scruple of [illegible] and allowed Poly[illegible] the Eucharist at Rome. Between thirty [illegible] years after this visit (197) the same question [illegible] in a very different spirit between Victor, [illegible] of Rome, and Polycrates, bishop of Ephesus, the [illegible] Proconsular Asia. This province was [illegible] of Christendom that still maintained the [illegible] usage, which had been dropt even by the [illegible] and Alexandria. Victor's despotic [illegible] that the Asiatic churches should adopt the [illegible] system having been met by Polycrates with [illegible] but firm refusal, Victor proceeded to ex[illegible] him and all who held with him. So sweep[illegible] the Christian world. Irenaeus [illegible] with the bishop of Rome, and ultimately [illegible] churches were allowed to retain their usage [illegible] *H. E.*, v. 23-25.) We still find [illegible] springing up from time to time [illegible] never took permanent root, and at the [illegible] of Nicaea (325) the Syrians and the [illegible] champions of the Jewish [illegible] the controversy was one [illegible] the emperor Constantine to summon [illegible] of the assembled prelates was [illegible] that Easter should be kept on one [illegible] the world, and that none [illegible] the blindness of the Jews. [illegible] however, was said as to the deter[illegible] This was practically left to be [illegible] the home of astronomical science [illegible] was to announce it annually to [illegible] jurisdiction and to the bishop of [illegible] by whom it was to be communicated to the Western churches.

The name by which Easter is known among the Romance nations— French *pâques ;* Italian, *pasqua ;* Spanish, *pascua*—is derived through the Latin *pascha*, and the Greek πάσχα, from the Chaldee or Aramæan form, פַּסְחָא *pascha'*, of the Hebrew name of the Passover festival, פֶּסַח, *pesach*, from פָּסַח, "he passed over," in memory of the great deliverance when the destroying angel "passed over the houses of the children of Israel in Egypt when he smote the Egyptians," Exod. xii. 27. An erroneous derivation of *pascha* is given by some of the early fathers of the church, *e.g.*, Irenæus, Tertullian, &c., to whom Hebrew was an unknown tongue, from the Greek πάσχειν, "to suffer," as being the period of our Lord's sufferings. St Augustine (*in Joann. Tract.* 55) notices this false etymology, and shows how similarity of sound had led to the error, and gives the true derivation.

There is no trace of the celebration of Easter as a Christian festival in the New Testament or in the writings of the apostolic fathers. The sanctity of special times or places was an idea quite alien from the early Christian mind, too profoundly absorbed in the events themselves to think of their external accidents. "The whole of time is a festival unto Christians because of the excellency of the good things which have been given," writes Chrysostom, commenting on the passage 1 Cor. v. 7, which has been erroneously supposed to refer to an apostolic observance of Easter. Origen also in the same spirit (*Contr. Celsum*, viii. 22) urges that the Christian who dwells on the truths of Christ as our Passover and the gift of the Holy Ghost, is every day keeping an Easter and Pentecostal feast. The ecclesiastical historian Socrates (*Hist. Eccl.*, v. 22) states with perfect truth that neither Christ nor his apostles enjoined the keeping of this or any other festival. "The apostles," he writes, "had no thought of appointing festival days, but of promoting a life of blamelessness and piety;" and he attributes the introduction of the festival of Easter into the church to the perpetuation of an old usage, "just as many other customs have been established." This is doubtless the true statement of the case. The first Christians, being derived from, or intimately connected with, the Jewish Church, naturally continued to observe the Jewish festivals, though in a new spirit, as commemorations of events of which these had been the shadows. The Passover, ennobled by the thought of Christ the true Paschal Lamb, the first-fruits from the dead, continued to be celebrated, and became the Christian Easter. Thus the human instinct which everywhere craves for the commemoration of marked epochs in the personal, social, ecclesiastical, or national life, found its legitimate gratification in the public celebration of the events which are the foundation of the Christian faith.

But though the observance of the Paschal festival at a very early period became the rule in the Christian church, a difference as to the time of its observance speedily sprang up between Christians of Jewish and Gentile descent, which led to a long-continued and bitter controversy, and an unhappy severance of Christian union. No rule as to the date of the Easter festivals having been laid down by authority, Christians were left to follow their own instincts. These were naturally different in the Jewish and Gentile churches. The point at issue really was the date of the termination of the Paschal fast. With the Jewish Christians, whose leading thought would be the death of Christ as the true Paschal Lamb, this fast would end at the same time as that of the Jews, on the 14th day of the moon, at evening, and the Easter festival would immediately follow, entirely *irrespective of the day of the week.* With the Gentile Christians, on the other hand, unfettered by Jewish traditions, the first day of the week would be identified with the Resurrection festival, and the preceding Friday would be kept as the commemoration of the Crucifixion, *irrespective of the day of the month*, the fast continuing with increasing strictness till the midnight of Saturday. With the one, therefore, the observance of the day of the month, with the other the observance of the day of the week, was the ruling principle. The chief point was the "keeping" or "not keeping" the 14th day of the moon corresponding to that of the month Nisan. Those who, adopting the Jewish rule, did so keep the 14th day were called Τετραδεκάτιται, Τετράδιται, *Quartodecimani*, and were stigmatized as heretics. In the absence of any authoritative decision as to the day to be observed and the proper mode of calculating it, other discrepancies arose, which led to controversies and dissensions which, in the words of Epiphanius (*Panar.*, Hær. lxx.), distracted the church, and became a source of mockery and ridicule to the unbelievers. "Some," he writes, "began the festival before the week, some after the week, some at the beginning, some at the middle, some at the end, thus creating a wonderful and laborious confusion."

This diversity of usage was gradually brought to an end by the verdict of the Church of Rome. The Roman Christians adopted the ordinary Gentile usage, which, within certain limits, placed the observance of the Crucifixion on a Friday, and that of the Resurrection on the following Sunday. A decretal of Pope Pius I., c. 147—the genuineness of which, however, is by no means established—pronounces that "the Pasch should be celebrated on the Lord's Day by all." His successor Anicetus was equally firm upon the point. Polycarp, the venerable and sainted bishop of Smyrna, who, according to Irenæus (*apud* Euseb., *H. E.*, v. 24), visited Rome in 159 with this object, failed to induce Anicetus to conform to the Quartodeciman usage, which Polycarp had inherited from his master, the Apostle John. Anicetus declined to permit the Jewish custom in the churches under his jurisdiction, but made no scruple of communicating with those who adopted it, and allowed Polycarp to celebrate the Eucharist at Rome. Between thirty and forty years after this visit (197) the same question was controverted in a very different spirit between Victor, bishop of Rome, and Polycrates, bishop of Ephesus, the aged metropolitan of proconsular Asia. This province was the only portion of Christendom that still maintained the Quartodeciman usage, which had been dropt even by the churches of Palestine and Alexandria. Victor's despotic demand that the Asiatic churches should adopt the Roman system having been met by Polycrates with a courteous but firm refusal, Victor proceeded to excommunicate him and all who held with him. So sweeping a measure shocked the Christian world. Irenæus remonstrated with the bishop of Rome, and ultimately the Asiatic churches were allowed to retain their usage unmolested. (Euseb., *H. E.*, v. 23–25.) We still find the Quartodeciman usage springing up from time to time in various places, but it never took permanent root, and at the time of the Council of Nicæa (325) the Syrians and the Antiochenes were the solitary champions of the Jewish rule. The settlement of this controversy was one among the causes which led the emperor Constantine to summon that council. The consent of the assembled prelates was unanimous. All agreed that Easter should be kept on one and the same day throughout the world, and that none should hereafter follow the blindness of the Jews (Socr., *H. E.*, i. 9). Nothing, however, was said as to the determination of the day. This was practically left to be calculated at Alexandria, the home of astronomical science, and the bishop of that see was to announce it annually to the churches under his jurisdiction and to the bishop of Rome, by whom it was to be communicated to the Western churches.

But although measures had thus been apparently taken o secure uniformity of observance, some centuries elapsed efore all discrepancy ceased. A more intricate question emained to be solved, viz., how the full moon on which aster depended was to be predicted. The Nicene decrees ad effectually crushed the feeble remnants of the uartodeciman usage. It was established as a rule that aster must be kept on a Sunday, but there was no general greement as to the cycle by which the festival was to be lculated,—some churches adopting one rule, some another. 'e learn from St Ambrose (*Epist.* 23) that in 387 the urches of Gaul kept Easter on March 21, while the urches of Italy postponed it to April 18, and those of gypt a week later still, to April 25; and it appears from epistle of Leo the Great (*Epist.* 64 *ad Marcian.*) that 455 there was eight days' difference between the oman and Alexandrine Easter. Similar discrepancies are entioned by Gregory of Tours in the year 577, nor did ey disappear from the Gallican Church till the 8th ntury, although by a canon of the fourth Council of rleans (541) it had been ordained that the Easter festival ould be kept at the same time by all, according to the bles of Victorius. The ancient British Church observed e 84 years' cycle which they had originally received from ome, and their stubborn refusal to give it up caused much tter controversy between the fathers of Iona and the atin missionaries. These latter unfairly attempted to fix e stigma of the Quartodeciman heresy on their opponents, d they are sometimes even now spoken of as adopting the siatic mode of calculation, and false inferences are thence rawn as to the Eastern origin of the British Church. his, however, is quite erroneous. The early British and ish Church always commemorated the Crucifixion on a iday and the Resurrection on a Sunday. The only ifference between them and the Romish Church was in e cycle adopted for the computation of the festival,—the ritish Church really adhering to the cycle originally lopted by the Romish Church itself, which had been perseded by the more accurate calculations of Victorius f Aquitaine (457), and of Dionysius Exiguus (525). his led to a double Easter being observed by the dherents of the two churches. Thus, as we learn from ede (*Eccl. Hist.*, iii. 25), in 651 Queen Eanfleda, dopting the Roman rule, was fasting and keeping Palm unday while her husband Oswy, king of Northumbria, was elebrating the Easter festival. This diversity of usage as put an end to in the kingdom of Northumbria in he council of Streaneshalch, or Whitby (654); and the oman rule was finally established in England by Archishop Theodore in 669. This rule may be thus briefly tated. Easter day is the first Sunday after the 14th day not the full moon) of the calendar moon which happens n or next after March 21. This calendar moon, however, not the moon of the heavens, nor the mean moon of the stronomers, but an imaginary moon created for ecclesiasical convenience in advance of the real moon (see Prof. e Morgan's article in *Companion to the Almanac*, 1845). fter nine centuries a fresh discrepancy in the observance f Easter between the Roman and the English Church was aused by the refusal in England to adopt the Gregorian eformation of the calendar, 1582, apparently for no other eason than that the alteration had originated at Rome. his difference was happily put an end to in 1752, when he "New Style" was adopted in the United Kingdom. The hurches of Russia and Greece, and the Oriental churches enerally, still observe the unreformed calendar, their Easter alling sometimes before sometimes after that of the Westrn church; very rarely, as in 1865, the two coincide.

The rules on which the calculation of Easter is based are iven in the article Calendar (vol. iv. p. 675).

Easter day, as commemorating the central fact of our religion, has always been regarded as the chief festival of the Christian year, and has been from the earliest times observed with a stately and elaborate ceremonial. It is not, however, the purpose of this article to enter on the ritual observances of Easter, nor on the many curious and interesting popular customs—of which the sending of Pasch eggs, or Easter eggs, is one of the most wide-spread—with which it is connected in all Christian nations. For these last the reader may consult Brand's *Popular Antiquities*, Hone's *Every Day Book*, and Chambers's *Book of Days*. (E. V.)

EASTLAKE, Sir Charles Lock (1793–1865), an eminent painter who became president of the Royal Academy in London, was born on 17th November 1793 in Plymouth, where his father, a man of uncommon gifts but of indolent temperament, was solicitor to the Admiralty and judge advocate of the Admiralty Court. Charles was educated (like Sir Joshua Reynolds) at the Plympton grammar-school, and in London at the Charterhouse. Towards 1809, partly through the influence of his fellow-Devonian Haydon, of whom he became a pupil, he determined to be a painter; he also studied in the Royal Academy school. In 1813 he exhibited in the British Institution his first picture, a work of considerable size, Christ restoring life to the Daughter of Jairus. In 1814 he was commissioned to copy some of the paintings collected by Napoleon in the Louvre; he returned to England in 1815, and practised portrait-painting at Plymouth. Here he saw Napoleon a captive on the "Bellerophon;" from a boat he made some sketches of the emperor, and he afterwards painted, from these sketches and from memory, a life-sized full-length portrait of him, which was pronounced a good likeness; it belongs to the marquis of Lansdowne. In 1817 Eastlake went to Italy; in 1819 to Greece; in 1820 back to Italy, where he remained altogether fourteen years, sojourning chiefly in Rome and in Ferrara. Subjects of banditti and peasant-life engaged his pencil mostly from 1820 onwards. In 1827 he exhibited at the Royal Academy his picture of the Spartan Isidas—who (as narrated by Plutarch in the life of Agesilaus), rushing naked out of his bath, performed prodigies of valour against the Theban host. This was the first work that attracted much notice to the name of Eastlake, who in consequence obtained his election as A.R.A.; in 1830, when he returned to England, as R.A. In 1850 he succeeded Shee as P.R.A. (his only worthy competitor being Landseer, with the elder Pickersgill and George Jones besides, to mark the poor estate of British art, or of its official representatives), and, as usual, he was knighted. Prior to this, in 1841, he had been appointed secretary to the Royal Commission for decorating the Houses of Parliament, and he retained this post until the commission was dissolved in 1862. In 1843 he was made keeper of the National Gallery, a post which he resigned in 1847 in consequence of an unfortunate purchase that roused much animadversion; in 1855, director of the same institution, with more extended powers. During his directorship he purchased for the gallery 155 pictures, mostly of the Italian schools. He became also a D.C.L. of Oxford, F.R.S., Chevalier of the Legion of Honour, and member of various foreign academies. In 1849 he married Miss Elizabeth Rigby, a lady of some literary distinction. In 1865 he fell ill at Milan; he died at Pisa on 24th December in the same year, and lies buried at Kensal Green.

As a painter, Eastlake was gentle, harmonious, diligent, and correct; lacking fire of invention or of execution; eclectic, without being exactly imitative; influenced rather by a love of ideal grace and beauty than by any marked bent of individual power or vigorous originality. Among his principal works (which were not numerous, 51 being the total exhibited in the Academy) are:—1828, Pilgrims arriving in sight of Rome (repeated in 1835 and 1836, and perhaps on the whole his *chef d'œuvre*); 1829, Byron's Dream (in the National Gallery); 1834, the Escape of Francesco di Carrara (a duplicate in the National Gallery); 1841, Christ Lamenting over Jerusalem (ditto); 1843, Hagar and Ishmael; 1845, Comus; 1849, Helena; 1851, Ippolita Torelli; 1853, Violante; 1855, Beatrice. These female heads, of a refined semi-ideal quality, with something of Venetian glow of tint, are the most satisfactory specimens of Eastlake's work to an artist's eye. He was an accomplished and judicious scholar in matters of art, and published, in 1840, a translation of Goethe's *Theory of Colours;* in 1847 (his chief literary work) *Materials for a History of Oil-Painting*, especially valuable as regards the Flemish school; in 1848, *Contributions to the Literature of the Fine Arts;* in 1851 and 1855, translated editions of Kugler's *History of the Italian School of Painting*, and *Handbook of Painting*.

Sir Charles Eastlake was a man of middle height, spare form, reddish complexion, bright hair (scanty in advanced life); of unassuming and rather courtier-like bearing; reluctant to oppose or offend, but with a strong sense of official duty. He was a neat and appropriate speaker, and filled his presidential and other offices with great credit in the eyes of all who appreciate moderation and cultured finish in the speech and bearing of a public man.

EASTON, a borough of the United States, and capital of Northampton county, Pennsylvania, is situated on the right bank of the Delaware immediately above the confluence of the Lehigh, 54 miles north of Philadelphia. The town is very systematically arranged in spite of the irregularity of the ground on which it is built; the water supply from the Lehigh river is abundant, and a strong pressure is obtained by the elevated position of the reservoirs. As the centre of a rich agricultural and mineral district, with free communication both by land and water, Easton has considerable activity at once in trade and manufacture. Among its establishments the borough contains breweries, tanneries, carriage factories, iron foundries, a rope-walk, and an oil-factory; and South Easton, on the other side of the Lehigh, has a cotton-factory, a rolling-mill, and railway engineering works. The principal buildings are the farmers' and mechanics' institute, the free reading room, and the Presbyterian or Lafayette college, which was founded in 1831, and in 1872 had 25 teachers and 259 students. The borough, laid out in 1758, was incorporated in 1789. Population in 1870, 10,987; or, if South Easton be included, 14,154.

EAST SAGINAW, a city of Saginaw county, Michigan, United States, is situated on the Saginaw river, about 90 miles N.N.W. of Detroit. It extends about three miles along the river, with a breadth of nearly a mile. It is the principal depôt of the salt and lumber trade of the Saginaw valley, and possesses foundries, boiler-shops, saw-mills, and planing mills. It is the terminus of the Saginaw Valley and St Louis Railway, while a branch of the Flint and Pere Marquette Railway extends here to Bay city and another to Caro, Tuscola county. On the opposite bank of the river is the Jackson, Lansing, and Saginaw line. East Saginaw was incorporated as a village in 1855, and obtained a city charter in 1859. Population in 1870, 11,350.

EAU DE COLOGNE, a perfume, so named from the city of Cologne, where its manufacture was first established by an Italian, Giovanni Maria Farina, born in 1685, and by other members of his family, some of whom made it according to a method due to one Paul Feminis. In 1874 there were in Cologne 35 establishments for the preparation of the perfume, 28 of which were in the hands of persons bearing the name of Farina. Eau de Cologne consists of a solution of various essential oils in strong alcohol. The purity and thorough blending of the ingredients are of the greatest importance in the process of manufacture. It was originally prepared by making a spirituous infusion of certain flowers, pot-herbs, drugs, and spices, and adding thereto, after distillation, definite quantities of several vegetable essences. See Laboulaye, *Dictionnaire des Arts et Manufactures*, vol. ii., *s.v.* "Parfumerie."

EBEL, HERMANN WILHELM (1820–1875), a distinguished philologist, was born at Berlin, May 10, 1820. He displayed in his early years a remarkable capacity for the study of languages, and at the same time a passionate fondness for music and poetry. At the age of sixteen he became a student at the university of Berlin, applying himself especially to philology, and attending the lectures of Boeckh. Music continued to be the favourite occupation of his leisure hours, and he pursued the study of it under the direction of Marx. In the spring of 1838 he passed to the university of Halle, and there began to apply himself to comparative philology under Pott. Returning in the following year to his native city, he continued this study as a disciple of Bopp. He took his degree in 1842, and, after spending his year of probation at the French Gymnasium of Berlin, he resumed with great earnestness his language studies. About 1847 he began to study Old Persian. In 1852 he accepted a professorship at the Beheim-Schwarzbach Institution at Filehne, which post he held for six years. It was during this period that his studies in the Old Slavic and Celtic languages began. In 1858 he removed to Schneidemühl, and there he discharged the duties of first professor for ten years. He was afterwards called to the chair of comparative philology at the university of Berlin. The most important work of Dr Ebel in the field of Celtic philology is his revised edition of the *Grammatica Celtica* of Professor Zeuss, completed in 1871. This had been preceded by his treatises—*De verbi Britannici futuro ac conjunctivo* (1866), and *De Zeussii curis positis in Grammatica Celtica* (1869). He made many learned contributions to Kühn's *Zeitschrift für vergleichende Sprachforschung*, and to Schleicher's *Beiträge zur vergleichenden Sprachforschung;* and a selection of these contributions was translated into English by Sullivan, and published under the title of *Celtic Studies* (1863). Ebel contributed the Old Irish section to Schleicher's *Indogermanische Chrestomathie* (1869). Among his other works must be named *Die Lehnwörter der Deutschen Sprache* (1856). He died at Misdroy, August 19, 1875.

EBERHARD, surnamed IM BART (*Barbatus*), count and afterwards first duke of Würtemberg, was born December 2, 1445. He was the second son of Count Ludwig I., who died in 1450; and he succeeded his elder brother, Ludwig II., at the age of twelve (1457). The guardianship of the young count was assumed by his uncle, Count Ulrich, and he had for tutor the learned John Nauclerus. Coveting power and careless of learning, he profited little by the learning of his tutor; and at the age of fourteen he succeeded in throwing off the restraint of the guardianship, and assumed the government. But instead of discharging its duties he thought only of indulging his passions, and for a time led a wild, reckless life. By some means he was brought to serious reflections, and we find him, according to a custom which had not become wholly extinct, undertaking in 1468 the pilgrimage to Jerusalem. He also visited Italy, and made acquaintance with some of the most famous scholars of the age. His marriage with Barbara, daughter of Lodovico di Gonzaga, contributed to the amendment and elevation of his character. He began to study and to take a practical interest in the promotion of the new learning, and at the instigation of his wife he founded, in 1477, the university of Tübingen. Hither came, in 1481, the young advocate John Reuchlin, who lectured on Greek at the university and took his degree of doctor of laws. Count Eberhard conceived a great liking for him, appointed him his private secretary, and named him councillor. In the spring of 1482 Eberhard, accompanied by Reuchlin, visited Rome, had an audience of Pope Sixtus IV., and received from him the Golden Rose. On his return he visited Florence, and enjoyed the society of the group of scholars gathered around Lorenzo de' Medici. It was in the same year that Eberhard, by the treaty of Minzingen, put an end to the evils which had arisen from a division of the county made in 1437 between his father and his uncle Ulrich, as representatives of the two lines of Urach and Stuttgart, and secured the future indivisibility of Würtemberg, and the right of primogeniture in his own family. The treaty was made under the guarantee of the empire, and was sanctioned by an assembly of prelates, knights, and landed proprietors. By a limitation of the power of the prince agreed to at the same time, Count Eberhard became the founder of the constitution of Würtemberg. He made Stuttgart his place of residence, and retained Reuchlin in his service till his own death. Eberhard sympathized with the desire that was daily strengthening for a thorough reformation in the church; and in his own dominions he rendered great services by his regulation of convents. Some of these institutions he secularized. Though a lover of peace, he knew how to bear the sword when war was necessary; and by his courage, wisdom, and fidelity to his engagements he secured the esteem and friendship of the emperors Frederick III. and Maximilian I., as well as that of other princes of his time. He was one of the leading members of the Grand Swabian League formed in 1488, and took part in the liberation of Maximilian, then king of the Romans, from his imprisonment at Bruges. In recognition of his great services the emperor at his first diet, held at Worms in 1495, raised Eberhard, without any solicitation on his part, to the dignity of duke, confirming at the same time all the possessions and prerogatives of his house. Duke Eberhard did not live long to enjoy his new dignity. He died at Tübingen on the 25th of February 1496. He had two children by his marriage; but these died in their infancy, and with him the line of Urach became extinct.

EBERHARD, August Gottlob (1769-1845), a German poet and miscellaneous writer, was born at Belzig, near Wittenberg in 1769, and died at Dresden on the 13th May 1845. He studied theology at Leipsic; but some stories he contributed to periodicals having proved successful, he devoted himself to literature. Among his earlier works were *Ida's Blumenkörbchen* (1792); *List um List, oder was ein Kuss nicht vermag; Ferdinand Werner, der arme Flötenspieler* (1802); *Prinz Irel Elof* (1804); and *Ischariot Krall's Lehren und Thaten* (1807). For a time he was associated with Becker in the editorship of his *Taschenbuch* and his *Erholungen*, for both of which he wrote numerous tales and sketches. His claim to permanent literary fame, however, depends almost exclusively on his *Hannchen und die Küchlein* (1822), a charmingly graceful narrative poem in ten parts, which has passed through many editions, and been translated into most of the languages of Europe. An English translation by James Cochrane was published in 1854. In his *Der Erste Mensch und die Erde* (1828), a poem written in hexameters, the narrative of the creation is given with dignity and spirit. After the death of Vater in 1826, Eberhard succeeded to the editorship of the *Jahrbuch der häuslichen Andacht*, a well-known German educational annual. The miscellaneous poems (*Vermischte Gedichte*) of Eberhard appeared in two volumes in 1833, and his collected works (*Gesammelten Schriften*) in 20 volumes in 1830-1.

EBERHARD, Johann Augustus (1739-1809), an eminent German theologian and philosopher, was born at Halberstadt, in Lower Saxony, August 31, 1739. His father, a man of considerable literary attainments, was the singing-master at the church of St Martin's in that town, and also teacher of the school of the same name. Young Eberhard was educated partly at home and partly in his father's school. In the seventeenth year of his age he went to the university of Halle to study theology. Towards the end of 1759 he returned to his native town, and became tutor to the eldest son of the Baron Von der Horst, to whose family he attached himself for a number of years. In 1763 he was appointed con-rector of the school of St Martin's, and second preacher in the Hospital Church of the Holy Ghost; but he soon afterwards resigned these offices, and followed his patron to Berlin. The advantage he enjoyed of being introduced by the baron into the best company tended to polish his manners, and to form, even at an early period, a style of writing which served as a model to many of his contemporaries. His residence at Berlin gave him an opportunity of extending his knowledge, and of cultivating the acquaintance of some of the most eminent literary men in Germany. Amongst these were Nicolai and Moses Mendelssohn, with whom he associated upon terms of intimate friendship.

In 1768 he accepted the situation of preacher or chaplain to the workhouse at Berlin, along with that of preacher in the neighbouring fishing village of Stralow. The income from these livings was small; but his object was to continue at Berlin, and he had at the same time the promise of further preferment upon the first vacancy. He now applied with renewed ardour to the study of theology, philosophy, and history, the first fruits of which soon appeared in his *Neue Apologie des Socrates* (1772), a work occasioned by an attack which was made on the sentiments contained in the fifteenth chapter of Marmontel's *Belisarius* by Peter Hofstede, a clergyman of Rotterdam, who, with a misdirected industry, raked up the vices of the most celebrated characters in the pagan world, and maintained the patristic view that even their virtues were only *splendida peccata*. Eberhard stated the arguments for the broader view with great acuteness and learning, and is therefore entitled to rank as one of the founders of rationalistic theology in Germany. The *Apology* itself, which constitutes but a small part of the book, is esteemed a master-piece of clear, dignified, and persuasive eloquence. The whole work exhibits much reading and philosophical reflection; but the liberality of his reasoning gave great offence to many of the strictly orthodox divines of his time, and is believed to have obstructed his preferment in the church.

In 1774 he was appointed to the living of Charlottenburg; and he employed the leisure he had in this situation in preparing a second volume of his *Apology*, which appeared in 1778. In this he not only endeavours to obviate some objections which were taken to the former part, but continues his inquiries into the doctrines of the Christian religion, religious toleration, and the proper rules for interpreting the Scriptures. Perceiving that his further promotion in the church would be attended with difficulty, he resolved, although reluctantly, to accept the situation of professor of philosophy at the university of Halle, which became vacant in 1778 by the death of G. F. Meier. As an academical teacher, however, he was unsuccessful. His powers as an original thinker were not equal to his learning and his literary gifts, as was shown in his opposition to the philosophy of Kant.

On his arrival at Halle, the philosophical faculty presented him with a diploma as doctor in philosophy and master of arts. In 1786 he was admitted a member of the Berlin Academy of Sciences; and in 1805 the king of

Prussia conferred upon him the honorary title of a privy-councillor. In 1808 he obtained the degree of doctor in divinity, which was given him as a reward for his theological writings. He died January 6, 1809.

Eberhard's attainments in philosophy and literature were extensive and profound. He was master of the learned languages, spoke and wrote French with facility and correctness, and understood English, Italian, and Dutch. He had read a great deal, was thoroughly versed in the philosophical sciences, and possessed a just and discriminating taste for the fine arts. He was a great lover of music, and was himself a proficient in the art.

The following is a list of his works:—*Neue Apologie des Socrates*, &c., 2 vols. 8vo, 1772-8; *Allgemeine Theorie des Denkens und Empfindens*, &c., Berlin, 1776, 8vo, an essay which gained the prize assigned by the Royal Society of Berlin for that year; *Von dem Begriff der Philosophie und ihren Theilen*, Berlin, 1778, 8vo,—a short essay, in which he announced the plan of his lectures on being appointed to the professorship at Halle; *Lobschrift auf Herrn Johann Thunmann Prof. der Weltweisheit und Beredsamkeit auf der Universitat zu Halle*, Halle 1779, 8vo; *Amyntor, eine Geschichte in Briefen*, Berlin, 1782, 8vo,—written with the view of counteracting the influence of those sceptical and Epicurean principles in religion and morals then so prevalent in France, and rapidly spreading amongst the higher ranks in Germany; *Ueber die Zeichen der Aufklärung einer nation*, &c., Halle, 1783, 8vo; *Theorie der Schönen Kunste und Wissenschaften*, &c., Halle, 1783, 8vo, 3d ed. 1790; *Vermischte Schriften*, Halle, 1784; *Neue Vermischte Schriften*, Ib. 1786; *Allgemeine Geschichte der Philosophie*, &c., Halle, 1788, 8vo; 2d ed. with a continuation and chronological tables, 1796; *Versuch einer Allgemeinen-Deutschen Synonymik*, &c. Halle and Leipsic, 1795-1802, 6 vols. 8vo, long reckoned the best work on the synonyms of the German language (an abridgment of it was published by the author in one large volume 8vo, Halle, 1802); *Handbuch der Aesthetik*, &c., Halle, 1803-1805, 4 vols. 8vo. Besides the works above mentioned, Eberhard contributed a number of small tracts and essays to various periodical and scientific publications, and translated several foreign works. He was also the editor of the *Philosophical Magazine*, Halle, 1788-1792, and of the *Philosophical Archives*, Halle, 1793-1795. These two periodical works, which are now little read, were instituted for the purpose of controverting the metaphysical principles of Kant, and of vindicating the doctrines of Leibnitz and Wolf. Frederick Nicolai published a memoir on the life and character of Eberhard, Berlin and Stettin, 1810, 8vo. See also K. H. Jördens, *Lexicon Deutscher Dichter und Prosaisten*.

EBERT, Friedrich Adolf (1791-1834), a very eminent bibliographer, was born at Taucha, near Leipsic, July 9, 1791. He received his early education partly from his father, preacher to the Georgenhaus at Leipsic, and partly at the Nicholas School. At the age of fifteen he was appointed to a subordinate post in the town library of Leipsic, in which his literary tastes, early awakened, were fostered and strengthened. He studied theology for a short time, first at Leipsic and afterwards at Wittenberg, but, by the advice of a friend, renounced it in favour of history. After the close of his academical studies, he made his appearance as an author by the publication in 1811 of a work on public libraries, and in 1812 of another work entitled *Hierarchiae in religionem ac literas commoda*. In the following year he took part in the reorganization of the Leipsic University Library, and in 1814 was appointed secretary to the Royal Public Library of Dresden. The same year he published *F. Taubmann's Leben und Verdienste*, and in 1816 *Torquato Tasso*, a translation from Ginguené, with annotations. Anxious to turn to good account the rich resources open to him in the Dresden library, he undertook the work on which his reputation chiefly rests, the *Allgemeines bibliographisches Lexikon*, the first volume of which appeared in 1821, and the second in 1830. This work was the first of the kind produced in Germany; but [illegible] a higher aim and a more scientific character [illegible]. In 1823 Ebert was called to the post of chief librarian and professor at Breslau, and at the same time was offered that of librarian to the duke of Brunswick at Wolfenbüttel. He accepted the latter. But early in 1825 he returned to Dresden as public librarian; he was soon after named private librarian to the king, and in 1828 chief librarian and aulic councillor. Among his other works are—*Die Bildung des Bibliothekars* (1820), *Geschichte und Beschreibung der Königlichen öffentlichen Bibliothek in Dresden* (1822), *Zur Handschriftenkunde* (1825-27), and *Culturperioden des obersächsischen Mittelalters* (1825). Ebert was a contributor to various journals and encyclopædias, and took part in the editing of Ersch and Gruber's great work. He died at Dresden, November 13, 1834, in consequence of a fall from the ladder in his library a few days before.

EBINGEN, a town of Würtemberg, in the circle of the Schwarzwald, on the Schmicha, a left-hand tributary of the Danube, 22 miles south of Tübingen and 37 miles west of Ulm. It has rather more than 5000 inhabitants, who are engaged in woollen-weaving, stocking-weaving, hat-making, bleaching, and cattle-dealing.

EBIONITES, a Christian sect which was separated from the general Christian church about the end of the 2d century. The origin of the name has been much disputed, some deriving it from Ebion as the founder of the sect, and others from the Hebrew word (אֶבְיוֹן) meaning poor. For the former opinion the authority of Tertullian is quoted, who makes references to the existence of such a person as Ebion; but as counterbalancing these references there has to be considered—1st, that Tertullian being careless and inaccurate, and having no knowledge of Hebrew, may have merely fallen into the error of assuming that the sect took its name from that of a person; 2d, that no mention is made of the existence of such a person either by Irenæus or by Origen, and that any references to him by Epiphanius and later writers are probably borrowed from Tertullian, and 3d, that the name Ebionites had a very general signification, and represented a natural Judaizing tendency which must have had a more comprehensive beginning than that originating in an individual influence. Those who derive the name from the Hebrew word explain it in two ways—as applicable either to the poverty of the doctrines of the Ebionites, or to the poverty of their circumstances. Undoubtedly the name was applied to them with the former significance by their enemies, but it is more probable that they employed in a bad sense a name already existing, than that they coined it to suit their purpose. That the term was originally applied to the circumstances of the Ebionites seems the only probable supposition; and the argument in support of it may be stated thus:—That the early Christians, both Jewish and heathen, were designated the poor; that the poverty of the Jewish Christians continued longer than that of the heathen Christians, and Origen states that they in particular were named the poor (*Ἐβιωναῖοι χρηματίζουσιν οἱ ἀπὸ Ἰουδαίων τὸν Ἰησοῦν ὡς Χριστὸν παραδεξάμενοι*); and that, as the Judaizing Christians came gradually to be the only Jewish Christians who required to be distinguished from the heathen Christians, they retained the name. The fathers show a very imperfect knowledge of the origin, history, and doctrines of the Ebionites, but there cannot be any doubt that at first all Judaizing Christians went under that name. In the New Testament there is evidence of the existence of such a party, though it had not then developed into a recognized sect. This apparently did not happen till after the second destruction of Jerusalem and the founding of the heathen colony of Ælia Capitolina, when the emperor Hadrian banished from the neighbourhood all Jews who still retained their national peculiarities. As to the particular opinions of the Ebionites the statements of the fathers are somewhat contradictory, and this for the threefold reason—that by the isolation of the Ebionites from the general church the information obtainable regarding them could only be imperfect; that unde the general name Ebionites a good many varieties of opinion are included; and that their opinions varied at different periods of their history. The term Ebionites is used by some writers to include the Nazarenes, who, while recognizing the binding obligation of the Mosaic law on all Jews, did not regard it as binding on heathen Christians (see NAZARENES); but at an early period the stricter Ebionites must have separated themselves from the Nazarenes, who soon became merged in the general church. Of Ebionites proper Origen distinguishes two classes—those who affirm and those who deny the miraculous birth of Jesus: and in this he is followed by Eusebius. The extreme Ebionites, according to Origen, were only distinguishable from common Jews by the acceptance of the moral teaching of Christ; while those Ebionites who admitted the miraculous birth of Christ did not recognize His divinity proper, but believed that with His human nature the spirit of an angel or archangel, or even of Adam, was incorporated. Both classes of Ebionites seem to have had these points in common:—1st, They emphasized the unity of God; 2d, they affirmed the universal obligation of the Mosaic economy; 3d, of the books of the New Testament they received as genuine only the gospel of St Matthew; 4th, they denounced St Paul as a separatist; and 5th, they believed that Jerusalem was yet to be the city of God, and some of them at least believed in Christ's millennial reign. In the time of Eusebius the Ebionites inhabited chiefly the coasts of the Dead Sea, but they dwelt also in Rome and Cyprus. They vanished from history in the end of the 4th or beginning of the 5th century.

The ancient authorities on the Ebionites are Irenæus, Hyppolytus, Eusebius, Tertullian, Origen, and Theodoret. In modern literature there are—Gieseler, in *Stäudlin und Tzschirner's Archiv für ältere und neuere Kirchengeschichte*, vol. ii. Leipsic, 1820; Credner in *Winer's Zeitschrift für wissenschaftl. Theologie*, Sulzbach, 1829; Baur, *De Ebionitarum origine et doctrina ab Essæis repetenda* (*Tübinger Osterprogramm von* 1831); Hilgenfeld, *Die Clementinischen Recognitionen*, Jena, 1848; the article "Ebjoniten" in Herzog's *Real Encyclopädie*; and Mansel's *Gnostic Heresies of the First and Second Centuries*, London, 1875.

EBOLI, or EVOLI, a town of Italy, in the province of Principato Citeriore and district of Campagna, situated about thirteen miles from Salerno, on an elevated site commanding a fine prospect over land and sea. It has an ancient castle belonging to the princes of Angri, and its church of St Francis of Assisi contains a curious picture of the Crucifixion by Roberto di Oderisio. Between the town and the Silarus or Sele are the ruins of the ancient *Eburi*, a place of municipal rank; and the river is still spanned by a bridge of fine Roman construction. Population, 8947.

EBONY (ἔβενος), the wood of various species of trees of the genus *Diospyros* and natural order *Ebenaceæ*, found in the tropical parts of Asia and America. The best kinds are very heavy, are of a deep black, and consist of heart-wood only. On account of its colour, durability, hardness, and susceptibility of polish, ebony is much used for cabinet work and inlaying, and for the manufacture of pianoforte keys, knife-handles, and turned articles. Ceylon ebony is furnished by *D. Ebenum*, which grows in great abundance throughout the flat country west of Trincomalee. The tree is distinguished from others by the inferior width of its trunk, and its jet-black, charred-looking bark, beneath which the wood is perfectly white until the heart is reached (See Baker, *Eight Years' Wanderings in Ceylon*, p. 293, 1855). The wood is stated by Sir J. E. Tennent to excel that obtained from *D. recticulata* of the Mauritius and all other varieties of ebony in the fineness and intensity of its dark colour. Although the centre of the trees alone is employed, reduced logs 1 to 3 feet in diameter can readily be procured. Much of the East Indian ebony is yielded by the species *D. Melanoxylon*, a large tree 8 to 10 feet in circumference, with irregular rigid branches; oblong or oblong-lanceolate, entire leaves; white flowers, having a 5-cleft calyx; and a round, pulpy berry, containing 2–8 seeds. The bark of the tree is astringent, and mixed with pepper is used in dysentery by the natives of India. The wood of *D. Ebenaster*, the species called by the Singhalese *Cadooberia*, is black, with rich brown stripes; it is not so durable and heavy as the true ebonies. That of *D. tomentosa*, a native of North Bengal, is black, hard, and of great weight. *D. montana*, another Indian species, produces a dark wood, variegated with white-coloured veins. *D. quæsita* is the tree from which is obtained the wood known in Ceylon by the name *Calamander*, derived by Pridham from the Singhalee *kalu-mindrie*, black-flowing. Its closeness of grain, great hardness, and fine hazel-brown colour, mottled and striped with black, render it a valuable material for veneering and furniture-making. Cochin-China ebony is believed to be the wood of a species of *Maba*, a genus of *Ebenaceæ*. What is termed Jamaica or West Indian ebony and probably also the green ebony of commerce are produced by *Brya Ebenus*, a leguminous tree or shrub, having a trunk rarely more than 4 inches in diameter, flexible spiny branches, and orange-yellow, sweet-scented flowers. The wood is greenish-brown in colour, heavier than water, exceedingly hard, and capable of receiving a high polish.

From the book of Ezekiel (xxvii. 15) we learn that ebony was among the articles of merchandise brought to Tyre; and Herodotus states (iii. 97) that the Ethiopians every three years sent a tribute of 200 logs of it to Persia. Ebony was known to Virgil as a product of India (*Geor.*, ii. 116), and was displayed by Pompey the Great in his Mithridatic triumph at Rome. By the ancients it was esteemed of equal value for durability with the cypress and cedar (see Pliny, *Nat. Hist.*, xii. 9, xvi. 79). According to Solinus (*Polyhistor*, cap. lv. p. 353, Paris, 1621), it was employed by the kings of India for sceptres and images, also, on account of its supposed antagonism to poison, for drinking-cups. The hardness and black colour of the wood appear to have given rise to the tradition related by Pausanias, and alluded to by Southey in *Thalaba*, i. 22, that the ebony tree produced neither leaves nor fruit, and was never seen exposed to the sun.

EBRO (in Latin *Iberus*), the principal river of Spain, rises in the Cantabrian Mountains, near Reinosa, in the province of Santander, flows in a general south-east direction through Old Castile, Navarre, Aragon, and Catalonia, and falls into the Mediterranean about 80 miles south-west of Barcelona, in 40° 41′ N. lat. and 0° 50′ E. long., forming by its delta a very considerable excrescence on the otherwise regular outline of the coast. It has a total length of about 340 miles, and its drainage area is calculated at 31,445 square miles. Already a noble stream when it breaks through the pass of Horadada, it becomes navigable about Tudela; but its value as a means of communication is almost neutralized by the obstacles in its channel, and seafaring vessels cannot proceed further up than Tortosa. The great Imperial Canal, commenced by the emperor Charles V., proceeds along the right bank of the river from a point about three miles below Tudela, to the monastery of Monte Terero, five miles below Saragossa; and the San Carlos Canal affords direct communication between Amposta at the head of the delta and the harbour of Los Alfaques. The principal tributaries of the Ebro are—from the right hand the Jalon with its affluent the Jiloca, the Huerva, the Aguas, the Martin, and the Guadalope; from the left the Aragon, the Gallago, and the Segre with its elaborate system of confluent rivers.

ÉCARTÉ (French, *écarté*, separated, discarded), a game at cards, of modern origin, probably first played in the Paris *salons*, in the first quarter of the 19th century. It is a development of a very old card game called *la triomphe*, or French-ruff (*Académie des Jeux*, various editions; Cotton and Seymour, *Compleat Gamester*, various editions; and Paul Boiteau D'Ambly, *Les Cartes à jouer*, Paris, Hachette, 1854).

Écarté is generally played by two persons, but a pool of three may be formed, the player who is out taking the place of the loser, and the winner of two consecutive games winning the pool. At French écarté (but not at English) bystanders who are betting may advise the players, by pointing to the cards they desire them to play, and the loser of the game goes out and one of the *rentrants* takes his place, unless the loser is playing *la chouette* (*i.e.*, taking all the bets that are offered), when he does not have to resign his seat if he loses.

A pack of cards is used from which the small cards (from the two to the six both inclusive) are removed. The players cut for deal, the highest having the choice. The dealer gives five cards to his adversary and five to himself, by two at a time to each and by three at a time to each, or *vice versa*. The eleventh card is turned up for trumps. If it is a king, the dealer scores one.

The non-dealer then looks at his cards If satisfied with them he plays, and there is no *discarding;* if not satisfied he *proposes*. The dealer may either *accept* or *refuse*. If he accepts each player discards face downwards as many cards as he thinks fit, and fresh ones are given from the undealt cards or *stock*, first to complete the non-dealer's hand to five, then to complete the dealer's. Similarly, a second proposal may be made, and so on, until one player is satisfied with his hand. If the dealer refuses the hand is played without discarding.

If the non-dealer announces that he holds the king of trumps, he scores one; and similarly, if the dealer holds the king and announces it, he scores one.

The non-dealer, being satisfied with his hand, leads a card. The dealer plays a card to it, the two cards thus played forming a *trick*. The winner of the trick leads to the next, and so on. The highest card of the suit led wins, the cards ranking king (highest), queen, knave, ace, ten, nine, eight, seven. Trumps win other suits. The second to play to a trick must follow suit if able, and must win the trick if he can, whether by trumping or otherwise.

The scores are for the king (as already explained), and for the majority of tricks. The player who wins three tricks scores one for the *point;* if he wins all five tricks, he scores two for the *vole*. If the non-dealer plays without proposing, or the dealer refuses the first proposal, and fails to win three tricks, the adversary scores two, but no more even if he wins the vole. The game is five up.

HINTS TO PLAYERS.—The following hints, which merely touch on the elements of the play, may be of service to beginners:—

Shuffle thoroughly after every deal to prevent the cards packing in suits, otherwise the trump card is not unlikely to be of the same suit as those preceding it, which are in the dealer's hand. It is an act of courtesy to the adversary to shuffle your own pack well, to save him the trouble of making your cards.

Do not look at your hand when dealer, until after the non-dealer has decided whether he will propose or not. The countenance or manner often betrays the nature of the hand.

Do not announce the king until in the act of playing your first card.

Propose quickly, as hesitation exposes the nature of the hand. In order to be quick, the hands which should be played without proposing, called *jeux de règle*, ought to be thoroughly known. They are as follows:—

1. All hands with *three trumps*, whatever the other cards.

2 Hands with *two trumps* which contain also—

a. Any three cards of one plain suit;

b. Two cards of one plain suit, one being as high as a queen;

c. Two small cards of one suit, the fifth card being a king of another suit;

d. Hands intermediate between *b* and *c*, *i.e.*, with higher cards in one plain suit, and lower in another, *e.g.*, two trumps, knave, ace of one suit, and nine or eight of another; or ace, ten of one suit, and ten of another; or ten, nine of one suit, and knave of another;

e. Three cards of different suits, as high as king, knave, and a small card, or cards of equal value in different suits, as king, ace, nine; or king, and two tens; or two queens; or queen, knave, ace; or three knaves.

3. Hands with *one trump*, which contain also—

a. King, queen, knave of one suit, and a small card of another;

b. Four cards of one suit headed by king;

c. Three cards of one suit headed by queen, and queen of another suit.

4. Hands with *no trump*, which contain three queens or cards of equal value in different suits, *e.g.*, four court cards.

5. Hands from which only two cards can be discarded without throwing a king or a trump.

Holding cards which make the point certain, propose, as you have the chance of a refusal, and one good card taken in may give you the vole. If you hold a *jeu de règle*, and one of the trumps is the king, it is generally right to propose, as your adversary, if he accepts, cannot then take the king. But, except in the case of the king, the value of the trumps does not affect the proposal hands, as the game is not to lead trumps originally (without the king), unless you have three, but to keep them for trumping, and for this purpose high trumps are no better than low ones.

When discarding, throw out all cards except trumps and kings.

If your adversary proposes you should accept, unless you are guarded in three suits (a queen being a sufficient guard), or in two suits with a trump, or in one suit with two trumps. Hence the rule not to discard two cards, unless holding the king of trumps, applies to the dealer.

The hands with which to refuse are the same as those with which to play without proposing, except as follows:—

1. Two trumps and three cards of one plain suit should not be played unless the plain suit is headed by a court card.

2. One trump and a tierce major is too weak, unless the fifth card is a court card. With similar hands weaker in the tierce major suit, accept unless the fifth card is a queen.

3. One trump and four cards of a plain suit is too weak to play.

4. One trump and two queens is too weak, unless both queens are singly guarded.

5. One trump, queen of one suit, and knave guarded of another should not be played unless the queen is also guarded, or the card of the fourth suit is a court card.

6. One trump, a king and a queen, both unguarded, should not be played, unless the fourth suit contains a card as high as an ace.

7. Four court cards without a trump are too weak to play, unless they are of three different suits.

Refuse with three queens, if two are singly guarded; otherwise, accept.

Lead from your guarded suit, and lead the highest. An exception to this rule is with two small trumps, a guarded queen, and a small card of another suit, when the single card should be led.

When playing a weak hand after a refusal, with no hope of the point and fear of losing the vole, lead the strongest single card, unless you have a king.

If the strong suit led is not trumped, persevere with it, unless with king of trumps, or queen (king not having been announced), or knave, ace, when lead a trump before continuing your suit. Also, when playing for the vole with a weak trump and high cards, change the suit each time to avoid a ruff. Having made three tricks, then lead the trump.

You should not lead trumps at starting, even if your best suit, unless you hold king, or queen, knave, or knave, ace, with court cards out of trumps. Holding three trumps, the two best being in sequence, lead a trump.

If cards are refused, it is better to lead from two small cards in sequence, than from a high tenace.

If you have won two tricks, your opponent one, and you hold a trump and a plain card, lead the plain card; but if your adversary has won two tricks and you win the third, lead the trump.

If you make two tricks and have the queen and two small trumps (the king having been announced against you), by leading a small trump you must win the point.

The score has to be considered. If the dealer is at four, and the king is not in your hand nor turned up, play any cards without proposing which give an even chance of three tricks, *e.g.*, a queen, a guarded knave, and a guarded ten. The same rule applies to the dealer's refusal, but he ought to be protected in three suits, *e.g.*, three knaves, or a knave and two guarded tens. At the adverse score of four, and king not being in hand or turned up, any hand with one trump should be played, unless the plain cards are very small and of different suits. Further, the rule to ask for cards with the point certain does not hold at the adverse score of four, unless king is in hand or turned up.

If the non-dealer plays without proposing when he is four to three, and the dealer holds the king he ought not to mark it. The same rule applies to the non-dealer after a refusal, if the dealer is four to three.

At the score of non-dealer three, dealer four, the dealer should refuse on moderate cards, as the player proposing at this score must have a very bad hand.

At four a forward game should not be played in trumps, as there is no advantage in winning the vo'

Laws of Écarté.—The following laws are abridged from the revised code adopted by the Turf Club:—

Cutting.—1. A cut must consist of at least two cards. Card exposed in cutting, fresh cut. *Dealing.*—2. Order of distribution of cards, whether by three and two, or *vice versa*, once selected, dealer must not change it during game. If changed, or wrong number of cards dealt, non-dealer, before he looks at his hand, may claim fresh deal. 3. Dealer turning up more than one card, non-dealer, before looking at his hand, may select either for trump, or may claim fresh deal. If he has looked at his hand there must be a fresh deal. 4. Faced card discovered in pack before trump card is turned, fresh deal. 5. Dealer exposing own cards in dealing, no penalty; exposing non-dealer's cards, non-dealer, before looking at his hand, has option of fresh deal. 6. Deal out of turn, discovered before trump turned up, void; after, too late to rectify. 7. Misdeal discovered after trump card turned, and before proposing or playing, non-dealer has option of fresh deal. If deal stands, dealer cannot mark king turned up, and non-dealer having superfluous cards discards them; dealer having superfluous cards, non-dealer draws and looks at them; either having too few cards, hand is completed from stock. 8. Either player playing with wrong number of cards, adversary has option of fresh deal. *Marking king.*—9. King turned up may be marked any time before trump card of next deal is turned; king in hand must be announced before playing first card, or if king is card first led by non-dealer before being played to, or cannot be marked; if king is card first played by dealer, it must be announced before he plays again. 10. Player announcing king when he has not got it, and playing a card without declaring error, adversary may correct score and have hand played over again. If offender wins point or vole that hand, he scores one less than he wins. *Proposing.*—11. Proposal, acceptance, or refusal made cannot be retracted. *Discarding.*—12. Cards discarded must not be looked at. 13. Either player taking too many cards, and mixing any with his hand, adversary may claim fresh deal. If deal stands, adversary draws superfluous cards, and may look at them if offender has seen any of the cards given. Non-dealer asking for less cards than he discards, dealer counts as tricks all cards that cannot be played to. Same rule for dealer, but if he discovers error before playing a card, he may complete hand from stock. 14. Dealer giving more or less cards than asked for, non-dealer may claim fresh deal. If deal stands, non-dealer with too many cards discards superfluous ones; with too few, has hand completed from stock. 15. Faced card in stock after discarding, players may look at it; it is put aside and next card given. 16. Cards exposed in giving cards to non-dealer, he has option of taking them or of having next cards; dealer exposing his own cards, no penalty. 17. Dealer turning up top card after giving cards, cannot refuse second discard. 18. Dealer accepting when too few cards in stock to supply both, non-dealer may take cards, and dealer must play his hand. *Playing.*—19. Card led in turn cannot be taken up again. Card played to a lead can only be taken up prior to another lead, to save revoke or to correct error of not winning trick. Card led out of turn may be taken up prior to its being played to. 20. Player naming one suit and leading another, adversary has option of requiring suit named to be led. If offender has none, no penalty. 21. Player abandoning hand, adversary is deemed to win remaining tricks, and scores accordingly. *Revoking, and not winning trick.*—22. For either of these offences same penalty as in law 10. *Incorrect packs.*—23. Deal in which discovery made, void; preceding deals good. *Bystanders.*—24. If players declare to play English écarté, bystanders, betting or not, not allowed to make remarks or give advice, nor to play out game of player resigning. If bystander makes remark which affects score, player prejudiced may call on him to pay his stakes and bets. 25. At French écarté, those betting may correct score, give advice (by pointing only), or play game of player who resigns.

See *Académie des Jeux* (various editions after the first quarter of the 19th century); Hoyle's *Games* (various editions about same dates); Ch. Van-Tenac et Louis Delanoue, *Traité du Jeu de l'Écarté*, Paris, 1845 (translated in Bohn's *Handbook of Games*, London, 1850); "Cavendish,' *The Laws of Écarté, adopted by the Turf Club, with a Treatise on the Game*, London, 1878. (H. J.)

ECBATANA (Greek, 'Εκβάτανα), or, as it is found in Æschylus, 'Αγβάτανα, a name applied by the classical writers to several and possibly to no fewer than seven distinct sites,—the capital of Media Atropatene, the capital of Media Magna, the citadel of Persepolis, a Syrian city on Mount Carmel, the Assyrian castle of Amadiyah, the Arsacidan stronghold of Europus, and the city of Ispahan. This diversity of application doubtless arises from the fact that the word was a descriptive epithet; but its derivation has not been ascertained, and it is even possible that under the Greek disguise we may have two totally distinct originals. According to the usual hypothesis the meaning is treasury or place of assemblage, from the Old Persian *hagmatan*. The Median use of the name is the only one of special moment, involving, as it does, a difficult question of identification. It has long been admitted on all hands that the modern Hamadan, a town of Persia at the foot of the Elvend Mountains, occupies the site and preserves the name of the great city of Ecbatana, which was the summer residence of the Persian kings from the time of Darius Hystaspis to the Greek conquest, and afterwards became the capital of the Parthian empire. But the further identification of this Ecbatana with the Ecbatana of Herodotus, still maintained by some authorities, has been disputed by Sir Henry Rawlinson, who locates the latter city at Takht-i-Suleiman, a conical hill about half-way between Hamadan and Tabriz, which agrees in its main topographical features with the Herodotean description, and is still covered with extensive ruins of ancient date. There it was at least possible for the Median monarch Deioces to surround his palace with seven concentric walls of different colours, rising one behind the other; but, if the site of Hamadan be adopted, this part of the account, recently shown by the similar arrangement at Borsippa to be so probable in itself, must be relegated to the region of myths. One or other of the cities is possibly mentioned in the Old Testament as Achmatha or Amatha; in the Apocrypha the name frequently occurs in the form of Ekbatana.

See Sir Henry Rawlinson's "Memoir on the site of the Atropatenian Ecbatana," in *Journ. of the Roy. Geogr. Soc.*, 1841; Canon G. Rawlinson's *Herodotus*, vol. i. 1875, p. 226.

ECCARD, Johannes (1553–1611), a celebrated composer of church music, was born at Mühlhausen on the Unstrut, Prussia, in 1553. After having received his first musical instruction at home, he went, at the age of eighteen, to Munich, where he became the pupil of Orlando Lasso, one of the greatest masters of the Franco-Belgian school. In his company Eccard is said to have visited Paris, but in 1574 we find him again at Mühlhausen, where he resided for four years, and edited, together with Johann von Burgk, his first master, a collection of sacred songs, called *Crepundia sacra Helmboldi* (1577). Soon afterwards he obtained an artistic appointment in the house of Jacob Fugger, the great Augsburg banker, and in 1583 he became assistant conductor, and twelve years later first chapel-master, at Königsberg in Prussia. In 1608 he received a call to Berlin as chief conductor of the elector's chapel, but this post he held only for three years, owing to his premature death in 1611. Eccard's works consist exclusively of vocal compositions, such as songs, sacred cantatas, and chorales for four or five, and sometimes for seven, eight, or even nine voices. Their polyphonous structure is a marvel of art, and still excites the admiration of musicians. At the same time his works are instinct with a spirit of true religious feeling. They have indeed a religious and historic significance beyond their artistic value. The important position of music in the service of the Reformed churches is well known. It was derived from, and therefore appealed again to, the feelings of the people. Luther himself recognized the elevating influence of the art by cultivating it with zeal and success. His setting of the beautiful words "Ein' feste Burg ist unser Gott" is still regarded by the Germans as their representative national hymn. Eccard and his school are in the same way inseparably connected with the history of the Reformation. Of Eccard's songs a great many collections are extant; for an enumeration of the old and rare editions the reader is referred to the works by Winterfeldt, who has devoted great care to the study of Eccard, and by Döring (*Choralkunde*, p. 47).

ECCELINO, or EZZELINO DA ROMANO (1194-1259), fourth of the name, a famous Ghibelline chief, was born April 25, 1194. The family traced its origin to Eccelin, a knight who about 1036 followed the emperor Conrad II. into Italy, and received from him among other fiefs that of Romano, in the neighbourhood of Padua. Eccelino IV. was the elder of the two sons of Eccelino III., surnamed the Monk, who divided his little principality between them in 1223, and died in 1235. In his youth Eccelino displayed the dauntless courage and the power of dissimulation which characterized him through life. In 1226, at the head of a party of Ghibellines, he got possession of Verona, and was appointed podestat. He became one of the most faithful servants of the great emperor Frederick II., who by a charter granted in 1232 confirmed him in his possessions. Four years later (1236) he invited Frederick to enter Italy to his assistance, and in August met him at Trent. Eccelino was soon after besieged in Verona by the Guelfs, and the siege was raised by the emperor. Vicenza was next stormed, and the government was given to Eccelino. In 1237 the latter marched against Padua, became master of the city by capitulation, and crushed the spirit of the people by remorseless cruelty. The same year he took part in the siege of Mantua, and made himself master of Trevisa. On the return of Frederick to Italy he joined him with a large force, and contributed to the great victory over the Guelfs at Cortenuova (November). In the following year he strengthened his connection with the emperor by marriage with Selvaggia, his natural daughter. In 1239, after entering Padua with Frederick, he was excommunicated and declared deprived of his estates by the Pope. But he still went on fighting and augmenting his dominions and perpetrating such incredible cruelties that the emperor, it is said, would fain have been rid of him. Nevertheless Eccelino was among the auxiliaries of Frederick at the siege of Parma in 1247. At the time of Frederick's death, in 1250, Eccelino, who had been named vicar-imperial of all the districts between the Trentine Alps and the river Aglio, had extended his authority from the Adriatic to the environs of Milan. He had married a second wife in 1249. At length (1256) a crusade against this foe of the church was proclaimed by Pope Alexander IV., and a powerful league was formed, which the Venetians joined. Padua was soon lost to him; but in 1258 he defeated the army of the league and reduced Brescia. In 1259 he was called to Milan by the Ghibelline party and attempted to march on the city. He was, however, encountered by his enemies at Cassano, September 16, 1259, and was severely wounded and taken prisoner. His troops then disbanded. The great [illegible] was resolved not to survive his fall, nor would he make his peace with the church. He tore the bandages from his wounds, refused to take food, and died at Soncino, September 26, 1259. By the death of his brother Alberico about a year later the family became extinct, and their possessions were divided among the conquerors. The character of Eccelino is thus drawn by Mr Kington in his *History of Frederick the Second* (ii. p. 503): "He was bold, clear-sighted in politics, and staunch to the side he had chosen as his own. He had a most commanding intellect, and his counsels were sure not to be slighted. He was a first-rate soldier, and could overawe his enemies with a glance. He was, however, superstitious, as many found to their cost. Covetous of power, he was unscrupulous as to the means by which it was won or kept. His monstrous cruelty and his callousness to human suffering brand him as an enemy to mankind." In the *Divina Commedia* (Inferno, xii.) Eccelino is seen amongst those who expiate the sin of cruelty in the lake of blood in the seventh circle of hell.

ECCHELLENSIS, or ECHELLENSIS, ABRAHAM, a learned Maronite, whose surname is derived from Eckel in Syria, where he was born towards the close of the 16th century. He was educated at the Maronite college in Rome, and, after taking his doctor's degree in theology and philosophy, became professor of Arabic and Syriac in the college of the Propagandists. Called to Paris in 1630 to assist Le Jay in the preparation of his polyglot bible, he contributed to that work the Arabic and Latin versions of the book of Ruth and the Arabic version of the third book of Maccabees. A quarrel with Gabriel Sionita, one of his coadjutors, whose work he had revised, led to a sharp controversy in which De Flavigny took part. He returned to Rome in 1642, but resumed his residence in Paris in 1645. Being invited by the Congregation of the Propaganda to take part in the preparation of an Arabic version of the Scriptures, he went again in 1652 or 1653 to Rome, where he died in 1664. Ecchellensis published several Latin translations of Arabic works, of which the most important was the *Chronicon Orientale* of Ibn-ar Râhib (Paris, 1653). He was engaged in an interesting controversy with Selden as to the historical grounds of episcopacy, in the course of which he published his *Eutychius Vindicatus, sive Responsio ad Seldeni Origines* (Rome, 1661). Conjointly with Borelli he wrote a Latin translation of the 5th, 6th, and 7th books of the *Conics* of Apollonius of Perga (1661).

ECCLES, a populous village of England, in the county of Lancaster, four miles west of Manchester by railway, and practically an outlying suburb of that city. The parish church of St Mary, an ancient structure, was enlarged and extensively repaired in 1863-4; and several dissenting places of worship have been built in the present century. The cotton-manufacture is extensively carried on in the immediate neighbourhood. Previous to the Reformation the monks of Whalley Abbey had a grange at what is still called Monks' Hall; and in 1864 many thousands of silver pennies of Henry III. and John of England and William I. of Scotland were discovered near the spot. Ainsworth, the author of the Latin and English dictionary so long familiar to English students, was born at Eccles in 1660; and it was at the vicarage that the Right Hon. William Huskisson expired on 15th September 1830 from injuries received at the opening of the Liverpool and Manchester Railway.

ECCLESIA, in Grecian antiquity, the general assembly of Athenian citizens, who met from time to time to discuss public affairs. Ecclesiæ were of two kinds, ordinary and extraordinary. The first of these were held, according to the laws of Solon, four times in each prytany, or period of thirty-five days; while the others were only summoned in some pressing emergency. When any measure of unusual importance was to be publicly debated, the people were summoned from the country by special messengers. An assembly thus convened was called a *cataclėsia*. Much discussion has taken place as to the exact days of the month on which the ecclesiæ were held; but the result has only been to prove either that there were no days invariably fixed for them, or that we have no data by which to determine accurately what these days were. In Ulpian it is stated that when there were three assemblies a-month, the first fell on the eleventh, the second on the twentieth, and the third about the thirtieth of the month. The likelihood is that they were held at regular intervals though the days were not absolutely fixed. Ecclesiæ were originally held in the Agora or Forum. The place of meeting was subsequently removed to the Pnyx, and afterwards to such of the greater temples as might be most convenient. The Pnyx lay to the west of the Areopagus, and commanded an extensive view. It was partly within the city walls, and had an area of about 12,000 square yards. On its northern side, cut out of the solid rock, was the *bema* or hustings from which the speakers addressed the people. From this tribunal a splendid view of the principal buildings of the city might be had. The right of assembling the people lay with the prytanes, or presidents of the senate or Council of Five Hundred, who both advertised beforehand the business to be discussed, and on the day of meeting sent round a crier to remind the citizens that their presence was required. In times of war, however, or other national crises, the generals of the army sometimes assumed this privilege, though it was necessary for them in doing so to give notice of their intention by a public proclamation. They also sometimes claimed the right of preventing the ecclesia from assembling; but their claims to this privilege were not generally recognized. Such of the citizens as refused to attend were fined, and six magistrates called lexiarchs were appointed to collect the fines. To assure a full meeting, the custom was ultimately introduced of paying the poorer classes a small sum for their attendance. This sum was originally an obolus, but after the time of Pericles it was raised to three. According to the usual order the proceedings of an ecclesia were commenced by a lustration or ceremonial purification of the place of assembly. The victims sacrificed were usually sucking pigs, whose blood was sprinkled round the boundary of the assembly. The crier next offered up a prayer to the gods for guidance, after which the business for which the assembly had been convened was introduced. According to the laws of Solon, the crier first called upon citizens above fifty years of age to speak and then upon all others; but this distinction was afterwards abolished, and the discussion was open from the commencement to all citizens of whatever age. The vote was generally taken by show of hands. In certain special cases, however, such as those affecting individual rights, the ballot was used. The decision to which the assembly came was called a *psephisma*. The ecclesia was sometimes adjourned from one day to the next, and it generally broke up at once if any of those present declared that he had seen an unfavourable omen or if thunder and lightning occurred. The word *ecclesia* came to mean any assembly regularly convened, and in New Testament Greek it is used to denote the assembly of Christians in any particular place, or the Christian church.

ECCLESIASTES, The Book of, has been handed down by Hebrew tradition as one of the three canonical books of Solomon, son of David, the other two being Proverbs and the Song of Songs, or Canticles.

Two different practices have obtained from time immemorial as to the position of this book in the Bible. According to one, which is preserved in the MSS. and editions of the Septuagint, and is followed by the MSS. and editions of the Vulgate, Ecclesiastes is the second in the order of the five books which, according to the Alexandrian Jews and the Greek and Latin churches, was written by Solomon. The order of these five books in the Alexandrian and Sinaitic Codices and in the MS. Bible of Charles the Bold, *circa* 850 (British Museum) is Proverbs, Ecclesiastes, Canticles, Wisdom, and Ecclesiasticus. According to the other practice the book in question is separated from those which are supposed to belong to the same author, and is joined for liturgical purposes to the other four *Megilloth*. Thus in the oldest dated MS. of the entire Hebrew Bible yet known (1009), now in the imperial library of St Petersburg, it is the *third* of the five Megilloth, viz., Ruth, Canticles, Ecclesiastes, Lamentations, and Esther. Though this order is also to be found in the Spanish and Italian MSS., it is by no means universal. Additional MS. 15,250 of the British Museum not only puts Ecclesiastes before Canticles, but places Ruth before the Psalms. In the fourteen pre-Reformation German translations of the Bible (1462–1518), and in Wycliffe's English version, where the five Solomonic books are still kept together, the order of the Septuagint and Vulgate is followed, as is also the case in the English Catholic version (Douai, 1610). Luther, who was the first to remove Wisdom and Ecclesiasticus from this group, and place them with the other so-called Apocryphal books at the end of the Old Testament, has left Ecclesiastes as second in the order of the Solomonic writings. In our first English translation of the entire Bible (1535) Coverdale followed the example of the great Continental Reformer. Hence this narrower group and this position of Ecclesiastes in the succeeding English Bibles, and in the present Authorized Version.

There is hardly another book in the Bible which has called forth so many commentaries and suffered as much at the hands of expositors as Ecclesiastes. Nearly 350 years ago Luther remarked,—"Difficult as this book is, it is almost more difficult to clear the author of the visionary fancies palmed upon him by his numerous commentators than to develop his meaning." What would this sagacious Reformer have said if he could have seen the countless speculations of which it has been the subject since his days We are positively assured that the book contains the holy lamentations of Solomon, together with a prophetic vision of the splitting up of the royal house of David, the destruction of the Temple, and the Captivity; and we are equally assured that it is a discussion between a refined sensualist and a sober sage. Solomon publishes in it his repentance, to glorify God and to strengthen his brethren; he wrote it "when he was irreligious and sceptical during his amours and idolatry." "The Messiah, the true Solomon, who was known by the title of son of David, addresses this book to the saints;" a profligate who wanted to disseminate his infamous sentiments palmed it upon Solomon. It teaches us to despise the world with all its pleasures, and flee to monasteries; it shows that sensual gratifications are men's greatest blessing upon earth. It is a philosophic lecture delivered to a literary society upon topics of the greatest moment; it is a medley of heterogeneous fragments belonging to various authors and different ages. It describes the beautiful order of God's moral government, showing that all things work together for good to them that love the Lord; it proves that all is disorder and confusion, and that the world is the sport of chance. It is a treatise on the *summum bonum;* it is "a chronicle of the lives of the kings of the house of David from Solomon down to Zedekiah." Its object is to prove the immortality of the soul; its design is to deny a future existence. Its aim is to comfort the unhappy Jews in their misfortunes; and its sole purport is to pour forth the gloomy imaginations of a melancholy misanthrope. It is intended "to open Nathan's speech (1 Chron. xvii.) touching the eternal throne of David;" and it propounds by anticipation the modern discoveries of anatomy and the Harveian theory of the circulation of the blood. "It foretells what will become of man or angels to eternity;" and, according to one of the latest and greatest authorities, it is a keen satire on Herod, written 8 B.C., when the king cast his son Alexander into prison.[1]

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[1] For an historical account of the interpretation of Ecclesiastes, with detached specimens of these conflicting views, see Ginsburg, *Commentary on Ecclesiastes*, pp. 27-293, London, 1861.

One of the causes which have contributed to obscure the design of this book is the name *Ecclesiastes*. This title Preacher, which ascribes to Solomon an office foreign to the Old Testament, has been given to it by the Septuagint and Vulgate in accordance with a Jewish tradition, and has been adopted alike by the pre- and post-Reformation authorized versions of the Scriptures. The Jewish tradition in question is to be found in the *Midrash Rabba* on Eccl. i. 1, where we are told that "Solomon was called *Coheleth* = Ecclesiastes, because his discourses were delivered in the *Cahal* = Ecclesia." Hence the title in the Alexandrian version, which was followed by the Latin Authorized Version, and is reproduced in Wycliffe's Bible "the boc of Ecclesiastes, that is to sey, boc of talker to the people." Hence, too, Luther's title *Prediger*, which is followed in our first printed English Bible "the boke of the Preacher, otherwyse called Ecclesiastes" (Coverdale, 1535), and which is perpetuated in our Authorized Version. This title, however, is contrary to the grammatical form of the word *Coheleth*, as well as to the usage of the root from which it is derived. It has arisen from a desire on the part of the Jewish synagogue to exhibit Solomon in the garb of a penitent confessing his sins, and, by detailing his bitter experience, warning the people publicly to avoid the thorny path he has pursued and walk in the ways of righteousness. Laudable as this desire is, it perverts the historico-exegetical import of the book, and is contradicted by the signification of the name.

Coheleth is the participle feminine Kal of *kâhal*, which primarily means *to call, to call together, to collect, to assemble*. The verb occurs about forty times in the Hebrew Bible, and is invariably used for assembling or gathering people together, especially for religious worship. Hence the name means *a collectress*, or *an assembleress of people into the presence of God, a female gatherer of an assembly to God*. This meaning of the name is fully confirmed by another Jewish tradition, which is embodied in the *Midrash Yalkut* (Eccl. i. 1), and is exhibited in the ancient Greek versions of Aquila and Symmachus. Chapter i. 12 tells us that Solomon is meant by this designation, since he was the only son of David who was king over Israel in Jerusalem. The feminine and symbolic appellation arises from the fact that in chapter vii. 27 of this very book Solomon is depicted as *personified Wisdom*, who appears herself in Prov. i. 10, viii. 1, &c., as *Coheleth*, or *the female gatherer of the people*. This symbolic name is, moreover, intended to indicate the design of the book itself, and to connect Solomon's endeavours here with his work recorded in 1 Kings viii. Solomon, who in 1 Kings viii. is described as *gathering* (קהל) the people to hold communion with the Most High in the place which he erected for this purpose, is here again represented as *the gatherer* (קהלת) of the far off people of God. As he retains his individuality, he sometimes describes his own experience, and sometimes utters the words of Wisdom, whose organ he is.

The design of this book, as indicated in the symbolic title of its hero, is to gather God's people, who were led astray by the inexplicable difficulties in the moral government of the world, into the community of God. Coheleth shows them the utter insufficiency of all human efforts to obtain real happiness—that it cannot be secured by wisdom, pleasure, industry, wealth, and prudence, but that it consists in the calm enjoyment of our lot, in resignation to the dealings of Providence, in the service of the Most High, and in looking forward to a future state of retribution, when all the present mysteries shall be solved, and when the Righteous Judge shall render to every man according to his deeds, whether they be good or evil.

Instead of writing an elaborate metaphysical disquisition to refute the various systems of happiness which the different orders of mind and the different temperaments had constructed for themselves, Solomon is introduced as narrating his painful experience in all his attempts. He shows how he had vainly striven to divert the longings of his soul by various experiments, and the only solution which can pacify the perplexed mind when contemplating the unfathomable dealings in the moral government of the world.

The theme or problem of the book is given in chapter i. 2–11. On the assumption that there is *no hereafter*, and that the longing soul is to be satisfied with the things *here*, Coheleth declares all human efforts to satisfy the longings of the soul to be utterly vain (chap. i. 1, 2), since conscious man is more deplorable than unconscious nature, for he must speedily quit this life, whilst the earth abides for ever (4); the objects of nature depart and retrace their course again, but man disappears and is for ever gone (5–11).

In corroboration of the allegation in the prologue, and to show the utter failure to satisfy the cravings of the soul with mere temporal pleasures, Coheleth tells us that, with all the resources of a great monarch at his command (chap. i. 12), he applied himself assiduously to discover by the *aid of wisdom* the nature of earthly pursuits, and found that they were fruitless (13–14), since they could not alter destinies. Hence, when he reflected upon the large amount of wisdom which he had acquired, he came to the conclusion that it is utterly useless (16–17), for the accumulation of it only increased his sorrow and pain (18). Wisdom having failed, Coheleth resolved to try *pleasure*, to see whether it would yield the desired happiness, but he soon found that this too was vain (chap. ii. 1), and hence denounced it (2). After procuring every imaginable pleasure (3–10) he found that it was utterly insufficient to impart lasting good (11). He then compared wisdom with pleasure, the two experiments he had made (12); and though he saw that the former had a decided advantage over the latter (13, 14*a*), still he also saw that it does not except its possessor from death and oblivion, but that the wise man and the fool must both die alike and be forgotten (14*b*–16). This melancholy thought made him hate both life and the wealth which he had acquired by wisdom and industry, and which, to aggravate matters, he perchance might leave to a reckless fool (17–21). It convinced him that man has nothing from his toil but wearisome days and sleepless nights (22, 23), and that there is therefore nothing better for man than to enjoy himself (24*a*). Soon, however, he found that this too is not in the power of man (24*b*, 25). God gives this power to the righteous and withholds it from the wicked, and it is after all only transitory (2).

Having shown the failure of wisdom, knowledge, and enjoyment to calm the distracted mind which broods over the problem that, whilst the objects of nature depart and retrace their steps, again man vanishes and is for ever forgotten, Coheleth now shows the vain efforts of industry to satisfy the restless longings of the soul. All the events of life are immutably fixed (chap. iii. 1–8); labour is therefore fruitless (9). Even the regulations to human labour which God has prescribed in harmony with this fixed order of things man in his ignorance often mistakes (10, 11). Nothing is therefore left but the enjoyments as one finds them. But this, too, as has already been shown, is a gift of God (12, 13), who has fixed everything to make man feel his utter dependence on and fear the Lord (14, 15). The success of the wicked does not militate against this conclusion, for there is a day fixed for righteous retribution (16, 17). But even if all terminates *here*, and man and beast have the same destiny (17–21), this only shows all the more that the enjoyment of life is our only portion

Such a desperate conclusion, however, makes death rable to a toilsome life (iv. 1–3),—a life spent in ions to battle with the pre-ordained order of things, a xpended in labours which either arise from jealousies fail in their end (4–6), or are prompted by avarice and t themselves (9–16). But as God has thus ordained rder of things, we ought to serve him (17–v. 6), trust s protection under oppression (7, 8), and remember that ich oppressor has not even the comfort of the poor rer (9–11), and often brings misery upon his children himself (12–16). This again brings Coheleth to the nful conclusion that nothing is left but to enjoy the fleeting years of life, which is a gift of God (17–19).

heleth now shows that neither the much-coveted wealth the highly-praised prudence suffices to secure the ed happiness and solve the melancholy problem of life the same failure attends wealth (vi. 1–9), for the rich cannot over-rule the order of Providence, nor forecast will be for his happiness (10–12). The same is the with the prudential or common sense view of life. leth thought to secure happiness by acquiring and ng a good name (vi. 1–4), by listening to merited re- (5–9), not indulging in a repining spirit. He would submit to Divine Providence (10–14), be moderate in eligious practices (15–20), not meddle with the opinions hers (21, 22), seeing that higher wisdom is unattain- (23, 24), and submit to the oppressive powers that be, inced that the mightiest tyrant will ultimately be shed (viii. 1–9), for, though righteous retribution is entarily suspended which causes wickedness to triumph, will eventually administer justice (10–13). But e found that the fortunes of the righteous and the ed *are often reversed all their lifetime*, he had to quish this common-sense view of life as utterly fficient to calm the longings of the soul, and recurred is repeated conclusion that there is nothing left for but to enjoy the fleeting things of this life (14, 15).

efore propounding his final conclusion, Coheleth gives *sumé* of his investigations. Since it is impossible to om the work of God by wisdom, seeing that even the teous and wise are subject to this inscrutable Provi- e just as are the wicked (viii. 16–ix. 2);—for all must like and be forgotten, and have no more participation hat takes place here (3–6), and we are therefore to lge in pleasures here, since there is no hereafter (7–10); ess does not always attend the strong and the skilful 12); wisdom, though advantageous in many respects, ten despised and defeated by folly (13–x. 3); we are to atient under sufferings from rulers who by virtue of power often pervert the order of things (4–7), since sition may only increase our sufferings (8–11); the cise of prudence will in the long run be more ad- ageous than folly (12–20); we are to be charitable, gh the recipients of our charity often appear ungrate- since some of them may after all requite us (xi. 1, 2); re always to be at work, not allowing ourselves to be rred by imaginary failures, since we know not which of efforts may prove successful (3–6), and thus make life greeable as we can, since this is the only scene of enjoy- t, and the future is all vanity (7, 8);—yet, seeing even all this does not satisfy the higher craving of soul, and still leaves conscious man in a more deplor- state than unconscious nature, for the objects of nature rt, retrace their course again, while man disappears is for ever forgotten—Coheleth at last comes to the lusion that the enjoyment of this life, combined with a f in a future judgment, does secure real happiness for (9, 10). We are therefore to live from our early years e fear of God and of a final judgment, when the Right- Judge will rectify all present inequalities (xii. 1–7).

The wisest and most painstaking Coheleth found by experience that all human efforts to obtain real happiness are vanity of vanities (xii. 8–10), that the sacred writings alone contain the clue to it (11, 12), that there is a Righteous Judge who takes cognizance of all we do, that He will in the great Day of Judgment try the conduct of us all, and that we are therefore to fear Him and keep His commandments (13, 14).

From this analysis of its contents it will be seen that the book consists of four parts, with a prologue and epilogue. The prologue and epilogue are distinguished by respectively beginning with the same phrase (i. 1, xii. 8) and ending with two marked sentences (i. 11, xii. 14). The prologue, which consists of chapter i. 1–11, propounds the grand problem of the book; whilst the epilogue, which consists of chapter xii. 8–12, gives the solution proposed by Coheleth. The four sections, which are respectively indicated by the recurrence of the same formula or refrain, viz., ii. 26, v. 19, and viii. 15, give the result of each experiment or group of efforts to satisfy the cravings of the longing soul, apart from the conclusion at which Coheleth arrived.

Coheleth fills up a gap in the Old Testament lessons. Throughout the Hebrew Scriptures virtue and vice are spoken of as being visibly rewarded on earth. God declares at the very giving of the law that He will show mercy to thousands of those who love Him and keep His commandments, and visit the iniquity of those who hate Him to the third and fourth generation (Exod. xx. 5, 6). The whole of Lev. xxvi. and of Deut. xxviii. are replete with promises of earthly blessings to those who will walk in the way of the Lord, and threatenings of temporal afflictions upon those who shall transgress His law. The faithful fulfilment of these promises and threatenings in the early stages of the Jewish history convinced every Israelite that "God judgeth the righteous, and God is angry with the wicked *every day*," and afforded a source of consolation to which the righteous resorted when the power of the wicked threatened destruction (1 Sam. xxiv. 13–16, xxvi. 23; Pss. vii., ix., lii.). Like a net of fine threads is this doctrine spread over the entire Old Testament (comp. Pss. xvii. 1, 2; xxvi. 1, 2; xxviii. 1–3; xxxv.; liv. 7–9; lv. 20–24; xc.; cxii.; cxxv. 3; cxxvii.; cxl.; cxli. 10; Prov. x. 6; xi. 5–8, 19; xii. 7; Hag. ii. 15–20; Zech. i. 2–6; viii. 9–17; Malachi ii. 17). By limiting the bar of judgment to this side of the grave, the Old Testament yielded no explanation of, or succour under, the distracting sight of the righteous suffering *all their life*, and then dying for their righteousness, and of the wicked prospering and prolonging their days through their wickedness. It was under such despairing circumstances that Psalms xxxvii., xlix., and lxxiii were written. But these very Psalms endeavour to allay the prevailing scepticism in the moral government of God, by declaring that the righteous shall ultimately prosper and prolong their days *upon the earth*, and that the wicked shall suddenly be cut off in great misery. Hence the recurrence of this perplexity passing over into despair when these reassurances and consolations were not realized by experience, and when the sufferers, however conscious of their innocence, were looked upon as rejected of God in consequence of some secret sin. The book of Job, which so successfully combats the latter notion by showing that afflictions are not always a proper test of sin committed, only confirms the old opinion that the righteous are visibly rewarded here, inasmuch as it represents their calamities as transitory, and Job himself as restored to double his original wealth and happiness *in this life*.

Under the Persian and Ptolemeian dominion over Palestine, the political affairs of the Jews were such as to render the incongruity between the destinies of men and their morals still more striking. Hence people began to arraign the character of God.

> "Every one that doeth evil
> Is good in the sight of Jehovah, he delighteth in them,
> Or where is the God of justice?"—Mal. ii. 17.
> "It is vain to serve God,
> And what profit is it that we keep his ordinance
> And walk mournfully before Jehovah of Hosts?
> For now we pronounce the proud happy;
> They also that work wickedness are built up;
> They even tempt God, yet they are delivered."—Mal. iii. 17, 18.

Under these circumstances, when the inheritance of the Lord, which was to be the praise and the ruler of all the earth, was reduced and degraded to the rank of a mere province; when her inhabitants were groaning under the extortions and tyranny of hirelings; when her seats of justice were filled by the most venial and corrupt men (Eccl. iii. 16); when might became right, and the impunity and success with which wickedness was practised swelled most alarmingly the ranks of the wicked (viii. 10, 11); when the cherished faith in temporal retribution was utterly subverted by the melancholy experience of the reversion of destinies; when the longing minds of the desponding people, released from the terrors of the law, began to import as well as to construct philosophic systems to satisfy their cravings (xii. 12), and to resort to various other experiments to obtain happiness, Coheleth disclosed a new bar of judgment in the world to come. There the Judge of the quick and the dead will rectify all the inequalities which take place here.

On the Continent, where Biblical criticism has been cultivated to the highest degree, and where Old Testament exegesis has become an exact science, the attempt to prove that Solomon is not the author of Ecclesiastes would be viewed in the same light as adducing facts to demonstrate that the earth does not stand still. In England, however, some scholars of acknowledged repute still adhere to the Solomonic authorship. Their principal argument is that the unanimous voice of tradition declares it to be so. We at once concede the fact. The Jewish synagogue undoubtedly believed that Solomon wrote Canticles when young, Proverbs when in middle life, and Ecclesiastes in his old age (*Midrash Yalkut*, Eccl. i. 1), and the Christian church has simply espoused the Jewish tradition. But with all due deference, we submit that tradition has no authority whatever to determine points of criticism. It is an acknowledged fact that the ancients, both Jews and Christians, and indeed the leaders of thought to the beginning of the 16th century, had not the slightest appreciation of peculiarities of style. The different shades of meaning in which the same expression is used by different authors, the variations in forms, phrases, constructions, and sentences which obtained at diverse periods, and which supply definite data to philologists, and have been reduced to a science in modern days, began only to be noticed at the time of the Reformation, when the vital power of criticism was first applied to traditional dogmas. The spell of tradition once broken, thinking men soon began to recognize the literary style and the respective artistic merits of the component parts of the Bible. Hence Luther already declared, "Solomon did not write the book of Ecclesiastes; it was compiled by Sirach, at the time of the Maccabees. . . . . It is, like the Talmud, made up of many books, which perhaps belonged to the library of King Ptolemy Euergetes in Egypt." No impartial student, with even a moderate knowledge of the genius of the Hebrew language, can fail to see the striking difference in the style of the pre- and post-exile books of the Old Testament. In the case of Ecclesiastes the difference is still more unmistakable. Of the vocabulary and phrases in Ecclesiastes a part is to be found in the post-Babylonian biblical writings, and that only in the Chaldee portions, whilst another part has no parallel in the Bible, but is only to be met with in the Mishna, the Talmud, and other post-biblical productions. Unless, therefore, it is maintained that the Hebrew of the Bible, which extends over a period of several thousand years, and purports to exhibit the styles of a number of writers who lived in different districts, is unlike any other known literary language, that it had no development and no epochs in its literature, the striking Rabbinic complexion of Ecclesiastes must assuredly stamp it as the latest composition in the Old Testament. Those who know the ultra-orthodoxy of the eminent Hebrew scholar, Professor Delitzsch, will feel the convincing power of this fact when they find that he assigns to Ecclesiastes the latest date of any book in the Hebrew Bible, because it is written in this unquestionably late language. We have abstained from adducing any other arguments derived from its contents, because this appears superfluous. An intelligent reader even in the English translation can see that the representation of Coheleth as indulging in sensual enjoyments and acquiring riches and fame in order to ascertain what is good for the children of men (chap. ii. 3–9; iii. 12, 22, &c.), making philosophical experiments to discover the *summum bonum*, is utterly at variance with the conduct of the historical Solomon, and is an idea of a much later period; that the recommendation to individuals not to resent a tyrannical sovereign, but to wait for a general revolt (chap. viii. 2–9), would not proceed from King Solomon; that the complaint about the multiplication of profane literature (chap. xii. 12) could only have been made at a time when the Jews became acquainted with the Greek writings and Alexandrian philosophy. The book, however, is of Palestinian origin, as is evident from the frequent allusion to rain (xi. 3, xii. 2), which does not fall in Egypt; the reference to the Temple and its worship (iv. 7); and the mention of "the city" (viii. 10), though, from the remark במדינה, *in the city* (v. 7), it would seem that the writer did not live in Jerusalem itself but in the neighbourhood.

From the records we possess of the discussions on the Hebrew canon we see that at the synod at Jerusalem, *circa* 65 A.D., and at a subsequent synod in Yabne, *circa* 90 A.D., the question was still an open one whether Ecclesiastes was canonical. The school of Shammai then decided against its canonicity, whilst the school of Hillel passed it as canonical (*Mishna Yadaim*, iii. 5, iv. 6; *Edayoth*, v. 3). The reasons assigned for its rejection, as given in the Talmud, are that chap. ii. 2, vii. 3, and viii. 5 contradict each other, and that the book does not exhibit any signs of its being inspired (*Sabbath* 30 *b*, *Megilla* 7 *a*). According to the *Midrash Rabba* on Eccl. xi. 9, the advice to enjoy sensual pleasures was considered as contradicting the law of Moses (comp. Eccl. xi. 9 with Numb. xv. 39) and inclining to heresy. The admonition, however, to fear God and the doctrine of a future judgment were urged in its favour and ultimately prevailed. The sages showed that the contradictions were apparent only, and the book was declared canonical (*Aboth d' R. Nathan*, cap. i.). Hence it passed over into the Christian church as a part of the canon.

Literature.—The most important commentaries on Ecclesiastes which furnish the best materials for forming an independent opinion on this avowedly difficult book are—Knobel, *Commentar über das Buch Koheleth*, Leipzig, 1836; Ewald, *Qôhéleth*, in *Die Dichter des Alten Bundes*, 2d ed. vol. ii. 267, &c., Göttingen, 1867; Hitzig, *Der Prediger Salomo im Kurzgefassten exegetischen Handbuch zum alten Testament*, vol. vii., Leipzig, 1877; Stuart, *A Commentary on Ecclesiastes*, New York, 1851; Elster, *Commentar über den Prediger*, Gottingen, 1855; Graetz, *Koheleth*, Leipzig, 1871; Delitzsch, *Hoheslied und Koheleth*, Leipzig, 1875. The last two give complete vocabularies of the post-Babylonian diction of the book. For the history of the interpretation see Ginsburg, *Coheleth, commonly called the Book of Ecclesiastes*, London, 1861. (C. D. G.)

ECCLESIASTICAL COMMISSION. This is a standing commission invested with very important powers, under the operation of which extensive changes have been made in the distribution of the revenues of the Church of England. It was one of the results of the vigorous movements for the reform of public institutions which followed the Reform Act of 1832. In 1835 two commissions were appointed "to consider the state of the several dioceses of England and Wales, with reference to the amount of their revenues and the more equal distribution of episcopal duties, and the prevention of the necessity of attaching by commendam to bishoprics certain benefices with cure of souls; and to consider also the state of the several cathedral and collegiate churches in England and Wales, with a view to the suggestion of such measures as might render them conducive to the efficiency of the established church, and to provide for the best mode of providing for the cure of souls, with special reference to the residence of the clergy on their respective benefices." And it was enacted by 5 and 6 Will. IV. c. 30 that during the existence of the commission the profits of dignities and benefices without cure of souls becoming vacant should be paid over to the treasurer of Queen Anne's Bounty. In consequence of the recommendation of these commissioners, a permanent commission was appointed by 6 and 7 Will. IV. c. 77, for the purpose of preparing and laying before the king in council such schemes as should appear to them to be best adapted for carrying into effect the alterations suggested in the report of the original commission and recited in the Act. The new commission was constituted a corporation with power to purchase and hold lands for the purposes of the Act, notwithstanding the statutes of mortmain. The first members of the commission were the two archbishops and three bishops, the lord chancellor and the principal officers of state, and three laymen named in the Act. By a later Act (3 and 4 Vict. c. 113) all the bishops, the chiefs of the three courts at Westminster, the master of the Rolls, and the judges of the Prerogative Court and Court of Admiralty, and the deans of Canterbury, St Paul's, and Westminster were added to the commission; and power was given to the crown to appoint four, and the archbishop of Canterbury to appoint two additional lay commissioners. The lay commissioners are required to be "members of the United Church of England and Ireland, and to subscribe a declaration to that effect." Five are a quorum; but two bishops at least must be present at any proceeding under the common seal of the commission, and if only two are present they can demand its postponement to a subsequent meeting. Paid commissioners, under the title of church estates commissioners, are also appointed—two by the crown and one by the archbishop of Canterbury. These three are the joint treasurers of the commission, and constitute, along with two members appointed by the commission, the church estates committee, charged with all business relating to the sale, purchase, exchange, letting, or management of any lands, tithes, or hereditaments. The commission has power to make inquiries and examine witnesses on oath. The schemes of the commission having, after due notice to persons affected thereby, been laid before the Queen in Council, may be ratified by orders, specifying the times when they shall take effect, and such orders when published in the *London Gazette* have the same force and effect as Acts of Parliament.

The recommendations of the commission recited in 6 and 7 Will. IV. c. 97 are too numerous to be given here. They include an extensive re-arrangement of the dioceses, equalization of episcopal income, providing residences, &c. By 3 and 4 Vict. c. 113 the fourth report of the original commissioners, dealing chiefly with cathedral and collegiate churches, was carried into effect, a large number of canonries being suspended, and sinecure benefices and dignities suppressed. The emoluments of these suppressed or suspended offices, and the surplus income of the episcopal sees, constitute the fund at the disposal of the commissioners. By 23 and 24 Vict. c. 124, on the avoidance of any bishopric or archbishopric, all the land and emoluments of the see, except the patronage and lands attached to houses of residence, become, by Order in Council, vested in the commissioners, who may, however, reassign to the see so much of the land as may be sufficient to secure the net annual income named for it by statute or order. All the profits and emoluments of the suspended canonries, &c., pass over to the commissioners, as well as the separate estates of those deaneries and canonries which are not suspended. Out of this fund the expenses of the commission are to be paid, and the residue is to be devoted to increasing the efficiency of the church by the augmentation of the smaller bishoprics and of poor livings, the endowment of new churches, and employment of additional ministers.

The substitution of one central corporation for the many local and independent corporations of the church, so far at least as the management of property is concerned, was a constitutional change of great importance, and the effect of it has undoubtedly been to correct the anomalous distribution of ecclesiastical revenues by equalizing incomes and abolishing sinecures. At the same time it is regarded as having made a serious breach in the legal theory of ecclesiastical property. "The important principle," says Cripps, "on which the inviolability of the church establishment depends, that the church generally possesses no property as a corporation, or which is applicable to general purposes, but that such particular ecclesiastical corporation, whether aggregate or sole, has its property separate, distinct, and inalienable, according to the intention of the original endowment, was given up without an effort to defend it" (*Law Relating to the Church and Clergy*, p. 46).

ECCLESIASTICAL LAW generally means the law of the church, in countries where an established religion is recognized by the state, but in a more general sense it would include the whole body of the law relating to religion. It is in this sense that the phrase is used by American lawyers, and it is only in this sense that it can be used of Ireland since the disestablishment of the state church in that country. The relation of the ecclesiastical law to the rest of the law, especially in respect of legislation and judicature, is one of the most important points in the constitution of a country. Where the Roman Catholic religion is recognized by the state the jurisprudence of the canon law prevails, but the relations between the Papal See and the state are governed by special conventions, or concordats. See CANON LAW.

The ecclesiastical law of England is remarkable for its complete dependence upon the authority of the state. The Church of England cannot be said to have a corporate existence nor even a representative assembly. The Convocation of York and the Convocation of Canterbury are provincial assemblies possessing no legislative or judicial authority. The ecclesiastical judicatories are for the most part officered by laymen, and the last court of appeal is the Judicial Committee of the Privy Council. In like manner changes in the ecclesiastical law are made directly by Parliament in the ordinary course of legislation, and in point of fact a very large portion of the existing ecclesiastical law consists of Acts of Parliament.

The sources of the ecclesiastical law of England are thus described by the leading text-writer on this subject:[1]—"The ecclesiastical law of England is compounded of these four main ingredients—the civil law. the canon law, the common law, and the statute law. And from these, digested in their proper rank and subordination, to draw out one uniform law of the church is the purport of this book. When these laws do interfere and cross each other, the order of preference is this:—'The civil law submitteth to the canon law; both of these to the common law; and all three to the statute law. So that from any one or more of these, without all of them together, or from all of them together without attending to their comparative obligation, it is not possible to exhibit any distinct prospect of the English ecclesiastical constitution.' Under the head of statute law Burn includes 'the Thirty-nine Articles of Religion, agreed upon in Convocation in the year 1562; and in like manner the Rubric of the Book of Common Prayer, which, being both of them established by Acts of Parliament, are to be esteemed as part of the statute law.'"

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[1] *The Ecclesiastical Law*, by Richard Burn, LL.D.

The first principle of the ecclesiastical law is the assertion of the supremacy of the crown, which in the present state of the constitution means the same thing as the supremacy of Parliament. This principle has been maintained ever since the Reformation. Before the Reformation the ecclesiastical supremacy of the Pope was recognised, with certain limitations, in England, and the church itself had some pretensions to ecclesiastical freedom. The freedom of the church is, in fact, one of the standing provisions of those charters on which the English constitution was based. The first provision of Magna Charta is *quod ecclesia Anglicana libera sit*. By the various enactments of the period of the Reformation the whole constitutional position of the church, not merely with reference to the Pope but with reference to the state, was definitely fixed. The legislative power of Convocation was held to extend to the clergy only, and even to that extent required the sanction and assent of the Crown. The common law courts controlled the jurisdiction of the ecclesiastical courts, claiming to have "the exposition of such statutes or Acts of Parliament as concern either the extent of the jurisdiction of these courts or the matters depending before them. And therefore if these courts either refuse to allow these Acts of Parliament, or expound them in any other sense than is truly and properly the exposition of them, the king's great courts of common law may prohibit and control them."

The design of constructing a code of ecclesiastical laws was entertained during the period of the Reformation, but never carried into effect. It is alluded to in various statutes of the reign of Henry VIII., who obtained power to appoint a commission to examine the old ecclesiastical laws, with a view of deciding which ought to be kept and which ought to be abolished; and in the meantime it was enacted that "such canons, institutions, ordinances, synodal or provincial or other ecclesiastical laws or jurisdictions spiritual as be yet accustomed and used here in the Church of England, which necessarily and conveniently are requisite to be put in ure and execution for the time, not being repugnant, contrarient, or derogatory to the laws or statutes of the realm, nor to the prerogatives of the royal crown of the same, or any of them, shall be occupied, exercised, and put in ure for the time within this realm" (35 Henry VIII. c. 16, 25 c. 19, 27 c. 8).

The work was actually undertaken and finished in the reign of Edward VI. by a sub-committee of eight persons, under the name of the *Reformatio Legum Ecclesiasticarum*, which, however, never obtained the royal assent. Although the powers of the 25 Henry VIII. c. 1, were revived by the 1 Elizabeth c. 1, the scheme was never executed, and the ecclesiastical laws remained on the footing assigned to them in that statute,—so much of the old ecclesiastical laws might be used as had been actually in use and was not repugnant to the laws of the realm.

The statement is, indeed, made by Sir R. Phillimore that the "Church of England has at all times, before and since the Reformation, claimed the right of an independent church in an independent kingdom, to be governed by the laws which she has deemed it expedient to adopt." This position can only be accepted if it is confined, as the authorities cited for it are confined, to the resistance of interference from abroad. If it mean that the church, as distinguished from the kingdom, has claimed to be governed by laws of her own making, all that can be said is that the claim has been singularly unsuccessful. From the time of the Reformation no change has been made in the law of the church which has not been made by the king and parliament, sometimes indirectly, as by confirming the resolutions of Convocation, but for the most part by statute. The list of statutes cited in Sir R. Phillimore's *Ecclesiastical Law* fills eleven pages. It is only by a kind of legal fiction that the church can be said to have deemed it expedient to adopt these laws.

The terms on which the Church Establishment of Ireland was abolished by 32 and 33 Vict. c. 42 may be mentioned. By sect. 20 the present ecclesiastical law is made binding on the members for the time being of the church, "as if they had mutually contracted and agreed to abide by and observe the same;" and by section 21 it is enacted that the ecclesiastical courts shall cease after 1st January 1871, and that the ecclesiastical laws of Ireland, except so far as relates to matrimonial causes and matters, shall cease to exist as law. (E. R.)

ECCLESIASTICUS. See APOCRYPHA.

ECHIDNA, or PORCUPINE ANT-EATER (*Echidna hystrix*), one of the four known species of Monotremata, the lowest order of Mammalia. It is a native of Australia, where it chiefly abounds in New South Wales, inhabiting rocky and mountainous districts, where it burrows among the loose sand, or hides itself in crevices of rocks. In size and appearance it bears a considerable resemblance to the hedgehog, its upper surface being covered over with strong spines directed backwards, and on the back inwards so as to cross each other on the middle line. The spines in the neighbourhood of the tail form a tuft sufficient to hide that almost rudimentary organ. The head is produced into a long tubular snout, covered with skin for the greater part of its length. The opening of the mouth is small, and from it the echidna puts forth its long slender tongue, lubricated with a viscous secretion, by means of which it seizes the ants and other insects on which it feeds. It is entirely destitute of teeth. Its legs are short and strong, and form, with its broad feet and large solid nails, powerful burrowing organs. In common with the other monotremes, the male echidna has its heel provided with a sharp hollow spur, connected with a secreting gland, and with muscles capable of pressing the secretion from the gland into the spur; but as the animal has never been observed to use this in defending itself, the spur probably serves some other purpose than that of offence or defence. It is a nocturnal or crepuscular animal, generally sleeping during the day, but showing considerable activity by night. When attacked it seeks to escape either by rolling itself into a ball, its erect spines proving a formidable barrier to its capture, or by burrowing into the sand, which its powerful limbs enable it to do with great celerity. "The only mode of carrying the creature," says Bennet (*Gatherings of a Naturalist in Australasia*) "is by one of the hind legs, when it may be removed to any place with great facility, for an attempt to seize it by any other part of the body, from its powerful resistance and the sharpness of the spines, will soon oblige the captor to relinquish his hold." They are exceedingly restless in confinement, and constantly endeavour by burrowing to effect their escape. From the quantity of sand and mud always found in the alimentary canal of the echidna, it is supposed that these ingredients must be necessary to the proper digestion of its insect food. The only other members of this family are the Short-spined Echidna (*Echidna setosa*), confined to Tasmania, and differing from the former species chiefly in the shortness of its spines, which are nearly hidden by the long harsh fur, and the Echidna Bruijnii—a new species discovered in 1877 in the mountains on the north-east coast of New Guinea, at an elevation of 3500 feet. By many naturalists the generic term *Echidna* has lately been abandoned in favour of *Tachyglossus* of Illiger.

NODERMATA (from ἐχῖνος, a hedgehog or sea-
id δέρμα, skin), a class of marine animals which
s with the class *Scolecida* the sub-kingdom
z of Huxley, or, according to some authorities, is
sub-kingdom of the Invertebrata. Familiar ex-
: the Echinodermata are the Sea-urchins, Star-
ather-stars, and Sea-cucumbers of the coasts of
The characteristics of the group may be briefly
ed thus. The adult presents a more or less
lthough never perfect, radial symmetry of parts;
in most instances, is bilaterally symmetrical. The
or dermis develops a calcareous skeleton of numer-
ocking plates or of detached plates or spicules.
ular tissue consists chiefly of unstriped fibres.
tinal canal terminates in a distinct anal aperture.
rous or ambulacral system of organs, regarded as
us with the water-vascular system of the Scolecida,
ly present; and there is a nervous system con-
a ganglionated circular or polygonal cord, which
the œsophagus, and sends off branches parallel
superficial to the ambulacral canals. The sexes
majority of cases distinct, and the reproductive
generally placed symmetrically with respect to
ly disposed skeleton.

Echinodermata of which the life-history has been
it, the larva, *echinopædium*, or, as it has been
y Sir Wyville Thomson, the *pseud-embryo*, pro-
m the egg is, with but one or two exceptions,
ee-swimming, and provided with cilia, which
fter a time confined to one or more bilaterally
cal bands running transversely or obliquely to
axis of the body, and frequently borne on pro-
the same. In the Asteridea and Holothuridea
is vermiform and devoid of skeleton; in the
, it is pluteiform (Latin, *pluteus*, a pent-house,
work), and has a continuous calcareous skeleton,
nto and affording support to the body pro-
A stomach, with an œsophagus and intestine,
ake with each other an angle open towards
al side of the body, is early developed in the
rm larva. The peritoneal cavity and ambula-
m of vessels are developed from diverticula of
ntary canal. A tube formed by an involution
tegument of the pseud-embryo to one side of
l line may remain connected with the ambu-
stem of the adult as the madreporic canal.
chinidea, Asteridea, Ophiuridea, and Crinoidea
wall of the adult is formed from the blastema;
body, more or less of the intestine, and, when
he skeleton are cast off or absorbed into the new
and another mouth appears in the centre of the
essel. It is by this peculiar metagenetic mode
oment of the Echinoderm within its larva that the
nodermata is specially allied to the orders *Turbel-*
Tæniada of the class Scolecida.

chinodermata may be divided into the following
(I.) *Echinidea*, or Sea-urchins; (II.) *Asteridea*,
shes; (III.) *Ophiuridea*, or Sand-stars; (IV.)
, or Feather-stars; (V.) *Cystidea*; (VI.) *Edrio-*
(VII.) *Blastoidea*; (VIII.) *Holothuridea*, or Sea-
f these orders V., VI., and VII. have been
nce the Palæozoic period. By some authorities
asterida are included with the Cystidea.

I.—ECHINIDEA.—The body in the Echinidea is
l, oval, discoid, or heart-shaped, and the shell, test,
ie bears numerous spines. A common European
e group is the species *Psammechinus* (*Echinus*, L.)
(see fig. 1). In certain forms (*Scutellidæ*) the
forated by slit-like apertures, and curiously lobed
s (fig. 2). With few exceptions the test is a rigid structure of numerous plates nuited by their edges. In the *Echinothuridæ*, however (*Calveria*, *Phormosoma*, and the extinct *Echinothuria* and *Lepidocentrus*), and also in the Palæozoic genera *Archæocidaris*, *Lepidesthes*, and *Lepidechinus*, the plates of the corona overlap, so as to resemble the peristomial plates of *Cidaris*. The plates are composed of a dense calcareous network, consisting chiefly of calcium carbonate. As the test is invested with an epidermis, and is produced mainly by calcification of the mesoderm, it is to be regarded as an internal shell or endo-skeleton. In the typical recent echini the walls of the corona or main body of the shell, when freed from spines, are seen to consist of five zones or areas, the *ambulacra* (Latin, *ambulacrum*, a walk), composed of double rows of pentagonal plates, and alternating with five other double rows, the *interambulacra*. In the Palæozoic forms, which constitute the sub-order *Perischoechinidæ* of M'Coy, the interambulacrum is made up of more than two rows of plates, of which the intermediate and central are hexagonal in form (see figs. 3 and 4). In the genera *Melonites* and *Oligoporus* there are extra ambulacral as well as interambulacral plates. The ambulacra, which

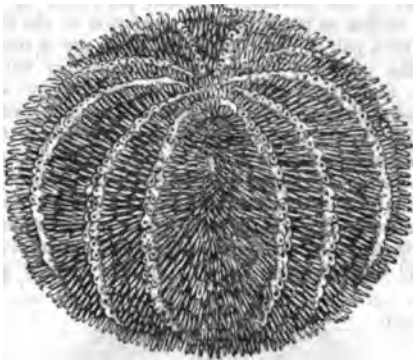

FIG. 1.—Psammechinus esculentus.

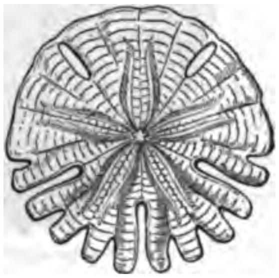

FIG. 2.—Rotula augusti.

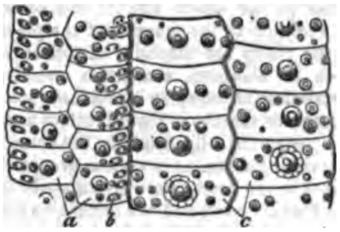

FIG. 3.—Echinus gracilis.

a, ambulacral plates; *b*, poriferous zone; *c*, interambulacral plates. (After Agassiz.)

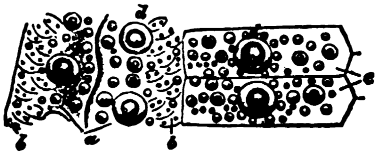

FIG. 4.—Stomechinus intermedius.

a, portion of ambulacral area; *b*, poriferous zones; *c*, two interambulacra. plates; *d*, primary tubercles. (After Wright.)

are usually narrower than the interambulacra, have near their outer edge small shield-like spaces, *umbones*, bounded by a more or less elevated wall, and perforated by pairs of small orifices or pores for the protrusion of the feet or *pedicels*, each pair of pores corresponding to one of the pore plates—the primitive ossicles which commonly unite to form the ambulacral plates. The ambulacra are either homogeneous, *i.e.*, composed of similar elements gradually diminishing in size towards the poles of the test, or (as in the *Spatangoida* and most of the *Clypeastroida*) are heterogeneous, having the upper portion petaloid in shape, and the lower with pores scattered in areas not always confined to the ambulacral plates, or arranged in ramifying fasciæ. In the *Spatangoida* the anterior unpaired ambulacrum is commonly obsolete (see fig. 5).

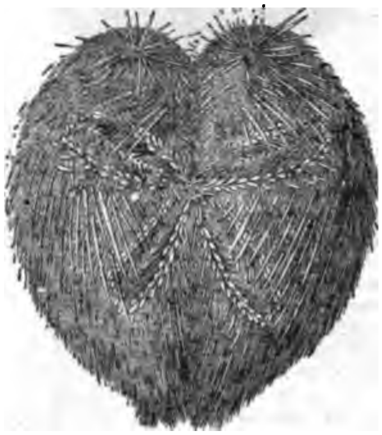
FIG. 5.—Spatangus purpureus.

In the Oolitic genus *Dysaster*, the two postero-lateral ambulacra, forming the *bivium*, are separate from the rest, and converge over the anal opening; while the three anterior, the *trivium*, unite at the apical disk (see fig. 8). The growth of the urchin in length is effected by the formation of new plates at the apical end of the corona, and in breadth by additions to the margins of the plates. On the surface of the plates are tubercles of different sizes, each with a knob or elevation, sometimes crenulated, by which the acetabulum of the spine is attached (see figs. 4 and 5). The presence or absence in the tubercle of a central perforation for the passage of a ligament for the spine is an important distinguishing character in various groups of fossil echini. The spines in the young state are ciliated; like the plates of the test they are composed of a calcareous network, and are interpenetrated and covered by the perisome, which contains the muscular fibres by which they are moved. They are short in the *Clypeastroida* and *Spatangoida*, and of various lengths in the *Echinoida*, and offer a considerable diversity of form and ornamentation. Dr Gray (*Ann. of Nat. Hist.*, i. p. 414) mentions the discovery in Sicily of the fragment of a spine of an echinus, the circumference of which was nearly 1½ inches, and the length more than 8 inches. In *Porocidaris purpurata*, a deep-sea form, the spines are paddle-shaped, and very flat, and are serrate on the edges; in *Cœlopleurus* the long curved spines resemble the antennæ of certain beetles. Scattered over the surface of the test, and more especially on the oral membrane, are the pedicellariæ, generally regarded as peculiarly modified spines; these, when well developed (fig. 6), consist of a long flexible stem, furnished at the summit with a forceps of three pieces or prongs, which snap together, and seize firm hold of any object that comes in their way. They serve for the removal from the neighbourhood of the shell of dirt of all kinds, and apparently also for defence.

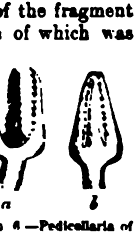

FIG. 6.—Pedicellaria of *Echinus saratilis*. *a*, open; *b*, closed. (After Gegenbaur.)

Calveria fenestrata has pedicellariæ with four valves. In some Spatangoid genera the corona bears symmetrical bands of minute tubercles with attached spines, the *semitæ* or *fascioles*, distinguished, according to their position with respect to the anus or to the apical or the marginal terminations of the petaloid ambulacra, as *sub-anal*, *circum-anal*, *intrapetalous*, and *peripetalous*. The spines of the semitæ have a thick integumentary covering, and except at the enlarged apex, are closely studded with cilia. Lovén has shown the occurrence, in all Echinidea but *Cidaris*, of another kind of appendages of the test, possibly sensory organs, to which he has given the name of *sphæridia*. These are button-like, spheroidal bodies, seldom above $\frac{1}{100}$th inch in length, furnished with a short stalk, and normally articulated with small projecting tubercles on the plates of the ambulacra and peristome. Sometimes they become concealed by a layer of the test, in which there remains only a fine external fissure. At the summit or apical pole of the test is a space occupied by the ocular and genital plates, which in the *Echinoida* (Endocyclica) encircle the anus with its anal plates. The five genital plates, which are opposite the interambulacra, or interradial in position, are perforated by apertures for the exit of the reproductive products. In the *Clypeastroida* and *Spatangoida* (Exocyclica), in which the anus is eccentric, and exterior to the apical disk, one of the genital plates is usually imperforate (fig. 7). The five ocular plates are situated radially, crowning the apical ends of the ambulacra; on the surface of each is a depression, having a pore for an ocellus or eye-spot. Always, except in the *Clypeastridæ*, the right antero-lateral genital plate, or, in other words, that situated to the right of the anterior ambulacrum of the trivium, is larger than the others, and bears the convex, perforated *madreporic tubercle* or *madreporite*. In the *Clypeastroida* this is most frequently extended over the other apical plates.

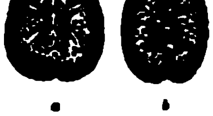

FIG. 7.—Echinocyamus pusillus.
Upper surface (a), showing four genital pores, and lower surface (b), with anus half-way between mouth and posterior border.

The hinder genital plate, with apparently one exception, is wanting in the *Spatangidæ*, its place being occupied by the madreporite. The Palæozoic Echinidæ differ from the more modern forms by the greater number of perforations of their ocular and genital plates. At the base of the test is the mouth with its buccal membrane and plates. The species *Leskia mirabilis* (the type of the sub-family *Leskiadæ*, family *Spatangidæ*) has both mouth and anus closed by converging triangular valves. In the *Echinoida* and *Clypeastroida* the mouth is central in position, and provided with teeth; in the *Spatangoida* it is eccentric and edentulous. The teeth resemble those of Rodents in form, and are arranged in hard wedge-shaped sockets or alveoli, which by their union form a pentagonal cone. As the outer substance of the tooth is harder than the inner, it is less readily worn away, and thus always presents a sharp edge. Each alveolus is composed of two halves united in the middle line, and each half, again, consists of a superior and inferior portion. The alveoli are inter-radial in position, or opposite the interambulacra. They are connected by transverse muscular fibres, and alternate with superiorly placed, thickish, radial structures, the *rotulæ* or *falces*, which, in the *Echinoida*, bear each a bifurcated piece, the radius. This skeletal mouth-apparatus is commonly known as

"Aristotle's lantern." The calcified internal arched processes termed *auriculæ*, at the oral end of the ambulacra in the *Echinoida* (of the interambulacra in *Cidaris*), regarded as homologous with the internal ambulacral ossicles of the Asteridea and Ophiuridea, are formed each of two pieces. From the top of the auriculæ pass retractor muscles to the outer edge of the alveoli. The oral skeleton is provided also with protractors proceeding from the alveoli to the lower interambulacral edge of the corona, besides special muscles connected with the radii. In the *Clypeastroida* arched (in *Cidaris* unarched) processes are given off from the ambulacral plates, at the sides of the ambulacral canals; and in the Clypeastroid genus *Scutella* the dorsal and ventral walls of the corona are connected by vertical calcareous plates or trabeculæ. None of the abovementioned internal calcareous processes is developed in the *Spatangoida*. The mouth communicates by a tortuous œsophagus with the stomach. The intestine forms a sort of festoon on the inner side of the shell, and is attached to it by a mesentery.

Of the internal organs of the Echinidea the most important and characteristic are those constituting the ambulacral system. These are (1) a circular or slightly pentagonal vessel placed around and traversed by the œsophagus, on the inside of the alveoli, and between the nervous and blood-vascular rings; (2) cæcal appendages of this vessel, called Polian vesicles (absent in the *Clypeastroida* and *Spatangoida*), answering to the racemose appendages of the Holothuridea; (3) the membranous or calcareous madreporic canal, termed also the sand-canal, which runs nearly vertically through the axis of the body, and, communicating with the exterior by the madreporic tubercle, supplies water to 1; (4) vessels radiating from 1 along the parietes of the body, and opening eventually into basal sacs, or *ampullæ*, proceeding from the canals of the pedicels shortly above their origin. In the vessels of the ambulacral system is contained a watery fluid strained from the perivisceral cavity. The pedicels, which may vary considerably in shape, are tubular structures, usually terminated by a sucking-disk; they have contractile, muscular walls, and are capable of being protruded beyond the extremities of the spines. They subserve locomotor, tactile, or branchial functions. The corpusculated perivisceral fluid is kept in motion by the cilia clothing the lining membrane of the body and the viscera. Where modified pedicels or ambulacral gills are absent, as in the *Echinoida*, the *Cidaridæ* excepted, aeration of that fluid is apparently promoted by branchial developments from the peristome, the hollow stems of which communicate with the body-cavity. The nervous system consists of a slender, pentagonal, red or violet hoop around the gullet, superficial to the circular ambulacral vessel, with five ganglia sending off as many cords, which, passing out between the alveoli, take a course similar to that of the ambulacral radial canals, giving off fine side branches which pass in their course through the ambulacral pores, probably supplying the pedicels, spines, and pedicellariæ, and terminate eventually in the pigmented eye-spots. The principal vessels of the pseud-hæmal or blood-vascular system of the Echinidea appear to be two trunks, the one on the dorsal, the other on the ventral side of the alimentary canal; these, according to Hoffmann, communicate either directly or by a distinct trunk with the water-vascular ring.

From an examination of *Echinus sphæra*, *Psammechinus miliaris*, *Toxopneustes lividus*, and *Amphidetus cordatus*, Perrier determined that, as maintained by Hoffmann, the circulatory and aquiferous systems are identical; that the so-called "heart" is only a gland, which opens by a canal into a funnel-shaped space bounded by the lining membrane of the test and the madreporite; that the artery proceeding from the water-vascular ring is distributed upon the first loop of the intestine, forming there ramifications which unite with those of the intestinal vein; and that the vein has no communication with the water-vascular ring, but is connected by ten branches and by its two extremities with a collateral canal, which floats freely in the perivisceral cavity beneath the intestine. Further, he found that the ambulacral vessels and their branches terminate blindly, the circulation consisting simply in a to-and-fro movement of their contents.

The reproductive organs are large racemose glands, situated beneath the upper termination of the interambulacra, and opening externally by the genital pores. The sexes are distinct. The spermatozoa have vibratile filaments: the egg is fecundated after leaving the body of the female, and in about eight hours undergoes complete yelk-division.

The pseud-embryo or echinopædium, at first ciliated and spheroidal, becomes after a time wedge-shaped: at its broad end appears the mouth or *pseudostome*, and at the other the anus or *pseudoproct*. Simultaneously with these the skeletal rods and ciliated bands of the pluteus begin to be produced. The development of the ambulacral system commences with the formation of a sac which lies to the left of the junction of the pseud-embryonic gullet and stomach, and is prolonged into a canal opening by a pore on the dorsal surface of the larva. The blind end of the sac becomes a quinque-petaloid rosette, from which radiate the ambulacral vessels; a new mouth is formed in the centre of this, at the bottom of a depression in the integument of the pseud-embryo, and the canal of the sac becomes the madreporic tube. The skeleton of the pluteus separates, as development proceeds, into several pieces, and is by degrees discarded, whilst its processes atrophy, and the body assumes the rounded form of the embryo urchin. This, however, has in many cases to undergo sundry important changes before its resemblance to the adult is complete. Thus in the young of species of *Spatangus* the peristome is almost central, and is pentagonal in form. In the *Echinoida*, before the appearance of the anus in the embryo, its place is occupied by a single plate, the *sub-anal*, and the anus appears near its border, towards the posterior right ambulacrum. It lies within a circle formed by five imperforate pieces, the future genital plates, and these again are surrounded by five imperforate ocular plates, with intervening ambulacral plates. The central anal plate persists in the family *Salenidæ* among the *Echinoida*. If it be considered as homologous with the dorso-central plate of *Marsupites*, or the basalia of the calyx in other Crinoids, the genital plates correspond to the parabasalia, and the ocular to the first radialia.

The food of the Echinidea consists either of seaweed, and small shell-fish and crustaceans, which are conveyed to the mouth by the pedicels, or, as in the case of the edentulous forms, of sand and earth containing nutritive material. In the species *Anochanus sinensis*, one of the *Cassidulidæ*, Grube discovered the presence of an incubatory chamber at the apical pole of the test, containing embryos in various stages of their growth. Certain species, as observed by Cailliaud, Deshayes, and Lory, have the power at a very early age of drilling for themselves burrows in the hardest rocks, such as granite and grit.

Allusion is made to the echinus in the writings of Aristophanes, Horace, Martial, and other classical authors. By the ancients it was considered a delicacy, and the common species *Psammechinus* (*Echinus*, L.) *esculentus*, Ag., especially in spring, when the ova are matured, is still eaten in some parts of Europe. Sir Thomas Browne, in his *Vulgar Errors*, mentions a notion formerly current that the spines of the echinus were a remedy for the stone, and "films in horses' eyes." They are put to practical use in some countries as slate-pencils.

Various systems of classification have been adopted for the Echinidea. In the following scheme the principal groups are arranged chiefly according to the position of the anal opening and the nature of the ambulacra.

Sub-order I.—TESSELATA. Echinidea with interambulacra of more than two rows of plates.

Sub-order II.—TYPICA. Echinidea with interambulacra of but two rows of plates.

Group I.—REGULARIA or ENDOCYCLICA. Mouth central or subcentral; anus usually central and opposite the mouth, and never exterior to apical disk.

- A. Anus central.
  - i. Shell round.
    - *Cidaridæ*. Tubercles smooth, perforate, peristome unnotched; anal plates ten; auriculæ unclosed; buccal branchiæ absent.
    - *Diadematidæ*. Tubercles crenulate, perforate, peristome notched, spines hollow. Allied forms are the fossil *Hemicidaridæ*.

Arbaciadæ. Tubercles smooth, imperforate; four large anal plates; auriculæ closed.

Echinidæ. Tubercles imperforate, or perforate and crenulate; anal plates numerous; pairs of pores in ranks of three, four, or more.

ii. Shell oval or elliptical.

Echinometridæ. Pores in ranks of five or six pairs.

B. Anus eccentric through intervention of one or several supernumerary apical plates.

Salenidæ. All fossil forms, with exception of *Salenia rarispina.*

Group II.—Irregularia or Exocyclica. Anus eccentric, not within the apical disk.

A. Ambulacra simple, not petaloid.

Galeritidæ. Mouth central; shell globular or sub-pentagonal; a single apex at which the ambulacra converge.

Dysasteridæ. Mouth eccentric; shell ovoid or heart-shaped; two apices, at which the bivium and trivium respectively converge.

B. Ambulacra more or less petaloid.

i. Dental apparatus present.

Clypeastridæ. Shell more or less flattened, sub-pentagonal.

Scutellidæ. Shell depressed, discoidal, often digitate or perforated; lower surface with ramifying grooves.

ii. Dental apparatus absent.

Cassidulidæ. Mouth central or nearly so; peristome sub-pentagonal.

Spatangidæ. Mouth eccentric, transverse or reniform.

To the group Regularia must be added the Cretaceous and Recent family of *Echinothuridæ.* The Echinidea are represented in Palæozoic strata by the Tesselata or Perischoechinidæ, *Palæchinus* (see 1 in fig. 8), *Perischodomus*, *Lepidechinus*, *Eocidaris*, *Archæocidaris* (2 in fig. 8), *Melonites*, *Oligoporus*, and *Lepidesthes* (see *Quart. Jour. Geol. Soc.*, xxx. 307). The *Echinidæ* and *Dysasteridæ* occur first in the Trias, and are represented by numerous species in Mesozoic strata; the *Salenidæ*, *Galeritidæ*, and *Cassidulidæ* make their earliest appearance in rocks of Jurassic, and the *Spatangidæ*, including the sub-family *Ananchytidæ*, in rocks of Cretaceous age. The accompanying figures represent fossil forms of Echinidea characteristic of various strata. Some account of the distribution in space of the Echinidea, together with that of other classes of the Echinodermata, will be found at page 278 of the present volume. See also Sir Wyville Thomson, *Proc. Roy. Soc.*, xx. 1872.

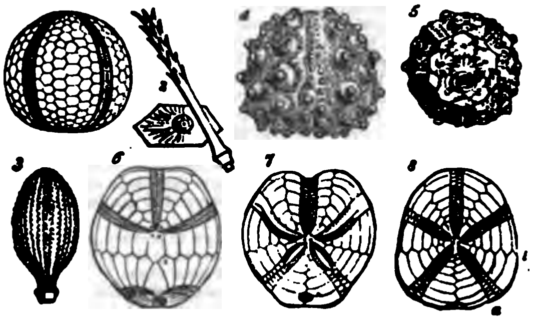

Fig. 8.—Fossil Echinidea.

1. Palæchinus sphæricus, Scouler; *Carboniferous*, Ireland.
2. Archæocidaris Urii, Flem. (spine and intermediate plate); *Carboniferous*, Ireland.
3. Cidaris glandifera, Goldf. (spine); *Jura*, Mount Carmel.
4. Hemicidaris intermedia, Flem.; *Corallian*, Calne.
5. Salenia petalifera, Desm.; *U. Greensand*, Wilts.
6. Dysaster ringens, Ag.; *Inferior Oolite*, Dorset.
7. Hemipneustes Greenovii, Forbes; *U. Greensand*, Blackdown.
8. Catopygus carinatus, Goldf.; *U. Greensand*, Wilts.

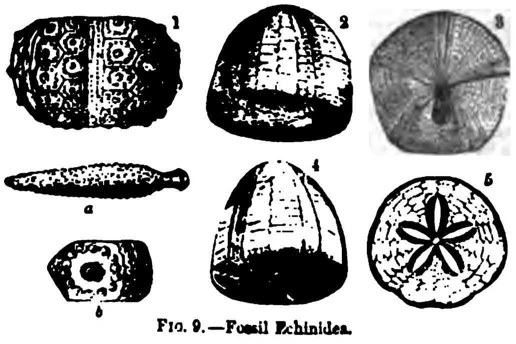

Fig. 9.—Fossil Echinidea.

1. Cidaris florigemma, with spine, *a*, and single ambulacral plate, magnified, *b* (after Wright); Coral Rag.
2. Ananchytes ovatus, Lam.; *U. Chalk*, Europe.
3. Pygaster semisulcatus, Ph.; *Inf. Oolite*, Cheltenham.
4. Galerites albogalerus, Lam.; *U. Chalk*, Kent.
5. Scutella subrotunda; *Miocene*, Malta.

Order II.—Asteridea.—The Asteridea, or Star-fishes, have mostly a star-shaped body, composed of a central disk and five or more rays. The common British species of *Solaster*, *S. papposus* (fig. 10), has ordinarily 13 rays; *S. helianthoides*, a South American species, has as many as 34, the extinct *S. Moretoni* of the Great Oolite had 33, and another fossil species, of Devonian age, *Helianthaster Rhenanus*, had 16 rays. The rays are sometimes very short (fig. 11), or altogether wanting, the body having the form of a pentagonal disk. In the *Brisingidæ* they may attain a length of many feet. The perisome in the *Asteridea* is coriaceous, and consists of an ectoderm with a thin ciliated cuticle, a muscular mesoderm which contains calcareous skeletal plates or ossicles, and as

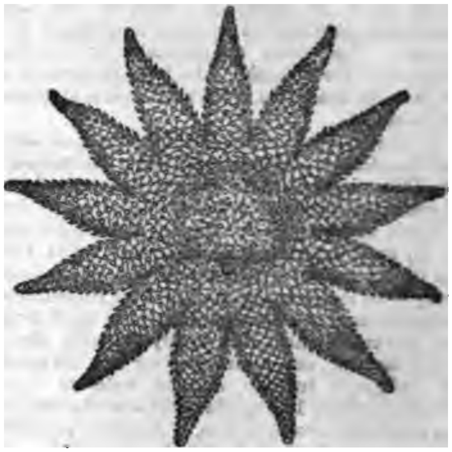

Fig. 10.—Solaster papposus (upper surface).

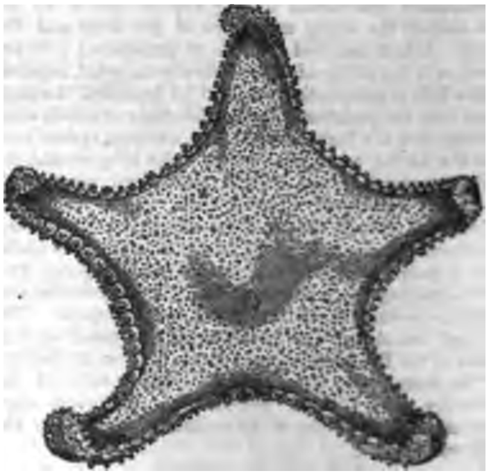

Fig. 11.—Astrogonium phrygianum (upper surface).

ciliated epithelium. Studding the perisome are us spines, attached to the ossicula on the dorsal and to those bordering the ambulacral grooves; ies also there are tufts of bristles, the *paxillæ*. The ariæ are attached to the perisome and spines, and er sessile or provided with short foot-stalks. Ex- one group, they have two blades only, which are by divaricator and adductor muscles.

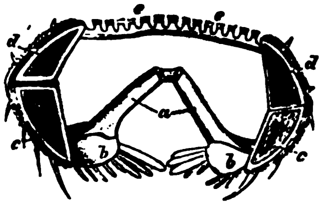

Fig. 12.—Section of ray of *Astropecten aurantiacus*.

a, vertebral ossicles; *b*, adambulacral ossicles; *c*, *d*, marginal ossicles; *e*, paxillæ. (After Gaudry.)

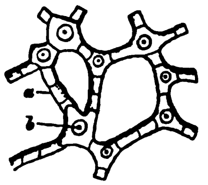

Fig. 13.—Tergal skeleton of *Asterias rubens*.

a, connecting pieces; *b*, spine-bearing plates. (After Gaudry.)

ower or oral surface of the star-fish with the ambu- orresponds to the ambulacral, the aboral or ant- ral surface to nterambulacral the echinus. ep ambulacral which occupy lleof the lower each ray are each bya series , the *vertebral* articulated to ther by their pposed ends, ited by their outer ends to plates, the *adambulacral ossicles*, which form the of the grooves, and are themselves succeeded by more series of *marginal ossicles* (fig. 12). The ds of the innermost pairs of ambulacral ossicles und the mouth to form ts, which bear spines and riæ. On the aboral sur- the body are the *tergal* (fig. 13). Transverse r fibres unite the lateral of the arm-segments; fibres supply the floor of bulacral groove; besides here are intervertebral rambulacral longitudinal

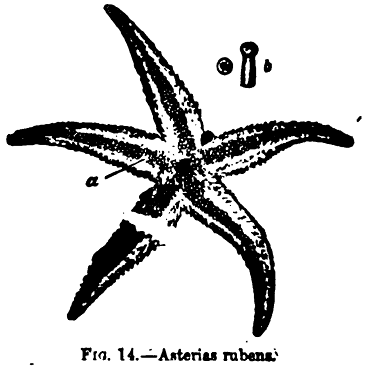

Fig. 14.—Asterias rubens.

a, 4-ranked pedicels; *b*, end of pedicel, magnified.

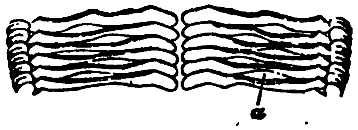

Fig. 15.—Ossicles of ambulacral groove of *Asterias rubens*, viewed from above. *a*, pore for pedicel.

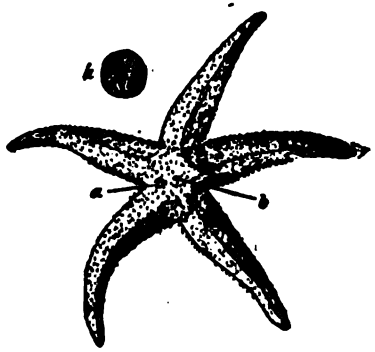

Fig. 16.—Antambulacral surface of *Asterias rubens*.

a, madreporite; *a'*, the same magnified; *b*, anus.

The ambulacral grooves ly filled with the tube-feet els, which have a nervous external and muscular layer, are usually cylindrical in form and furnished minal sucking-disks, and communicate by ducts through the ambulacral pores with vesicles lying he ambulacral ossicles and opening into the ral canal of the ray. In the common star-fish, (*Asteracanthion*) *rubens* the pores form a zig-zag each side of the ambulacral groove, and the passing through them thus come to be four- (fig. 14). They are formed by notches or semi- cised one on the distal and the other on the oral surface of each ambulacral ossicle, and lying alternately external and internal to one another in position on successive ossicles (fig. 15). The mouth, which is devoid of dentary apparatus, is situated in the middle of a membranous disk in the centre of the oral surface. It leads by a short gullet into the stomach. The stomach in most star-fishes is produced into five sacculated prolongations (*cardiac sacs*); above these it contracts, but again widens to form the *pyloric sac*; this gives rise to five tubes, which open out in each ray into a pair of parallel diverticula having numerous cæcal dilatations, and connected by a mesentery with the antambulacral perisome. The pyloric sac in most cases leads into a short intestine terminating in an anus situated in the left posterior interradial space. In *Astropecten*, *Ctenodiscus*, and *Luidia* there is no anus. The madreporic tubercle is situated dorsally in the body disk, near one of the interradial angles; it is oval or slightly pentagonal in form, and the surface is marked with undulating grooves, and is finely perforated (fig. 16). In some genera (*Ophidiaster*, *Echinaster*) there are several interradially placed madreporic tubercles. The doubly involuted madreporic canal is invested by the peritoneal membrane, which incloses a sinus, or "heart," as it has been termed; it passes downwards into a pentagonal circum-oral ring which gives off the five radial canals occupying the uppermost part of the ambulacral grooves. The circum-oral ring may or may not possess Polian vesicles. A dorsal or aboral ring has been described as communicating with the "heart," and sending off interradial branches to the genital glands, the products of which, in the case of star-fishes devoid of external genital apertures, it has been supposed they are the means of removing. The genital glands are racemose masses placed interradially in pairs; their processes sometimes extend a considerable distance into the arms. The nervous system consists mainly of a circular canal around the gullet, with five ambulacral trunks opening into it at their inner ends. The ambulacral neural trunk in each ray underlies a strong band of transverse fibres, by which it is separated from the ambulacral canal above. At the extremity of the ray the nerve terminates in an eye and its tentacle. The eyes are small processes of the ectoderm, having a convex surface or cornea containing a large number of simple, conical, pigmented ocelli. In the peritoneal cavity and ambulacral vessels is a watery fluid containing corpuscles. Respiration appears to be effected by means of water supplied to the interior by fine closed tubuli or *dermal branchiæ* between the plates of the perisome. In *Solaster* water can enter the body-cavity by the interbrachial cribriform plates through which the genital ducts pass.

Among the Asteridea several modes of development have been observed. In some species reproduction appears at times to be effected by division of the rays. The species *Pteraster militaris* hatches its young in a special pouch on the dorsal surface. The larva on leaving its egg is oval, but subsequently assumes a pentagonal form, and the provisional mouth comes to be placed at one of the body angles. The central mouth and stomach afterwards developed open into each other at the time that the young star-fish leaves the maternal pouch. In other cases the breeding-chamber may be formed by the bringing together of the bases of the rays, and the ciliated embryo develops at its anterior end club-shaped tubercles, by which it can attach itself to the breeding-chamber or to submarine objects. Until these processes appear the breeding-chamber remains closed. In general, the larva of the Asteridea begins life as a lobed and ciliated pseud-embryo, a common form of which is the *Bipinnaria*. Another form, the *Brachiolaria*, is distinguished principally by three tuberculated processes at the anterior end of the body. The ambulacral vessels of the adult are developed in the pseud-embryo from a portion of one of the diverticula of the stomach in which originate the peritoneal cavity and the whole or great portion of the mesodermic structures.

The Asteridea are classed by M. Edmond Perrier as follows:—

DIVISION I. Pedicellariæ pedunculated; pedicels (except in *Labidiaster* and *Pedicellaster*) quadriserial.
    ASTERIIDÆ. Ex. *Asterias* (*Asteracanthion*), *Heliaster*, *Calvasterias*, *Anasterias*, *Labidiaster*, *Pedicellaster*.

DIVISION II.—Pedicellariæ sessile; pedicels ordinarily biserial.
  i. Dorsal skeleton reticulate.
    ECHINASTERIDÆ. Ex. *Acanthaster*, *Solaster*, *Echinaster*, *Cribrella*.
  ii. Dorsal skeleton of longitudinal series of rounded or quadrangular ossicles; integument generally granulated.
    LINCKIADÆ. Ex. *Ophidiaster*, *Linckia*, *Scytaster*.
  iii. Skeleton, at least of lower surface, of tesselated ossicles; dorsal and ventral marginal plates very distinct.
    GONIASTERIDÆ. Ex. *Pentagonaster*, *Goniodiscus*, *Goniaster*, *Culcita*, *Asterodiscus*, *Choriaster*.
  iv. Skeletal ossicles imbricated; with spines on the free border, or rounded and completely covered with small spines.
    ASTERINIDÆ. Ex. *Palmipes*, *Asterina*, *Nepanthia*.
  v. Skeleton of paxillæ.
    ASTROPECTINIDÆ. Ex. *Chætaster*, *Luidia*, *Astropecten*, *Archaster*, *Ctenodiscus*.
  vi. Dermal investment supported by spines radiating from the prominent skeletal ossicles.
    PTERASTERIDÆ. Ex. *Pteraster*.
  vii. Arms long, straight, distinct from disk, with minute spines on dorsal surface.
    BRISINGIDÆ. Ex. *Brisinga*.

Distribution in time of Asteridea (fig. 17).—The Asteridea are represented in the Lower Silurian series of strata by the genera *Edriaster*, *Palæaster* (ranging to Carboniferous), *Stenaster*, *Tæniaster*, and *Urasterella*; in the Upper Silurian by *Glyptaster*, *Palæasterina*, *Palæocoma*, *Petraster*, *Palmipes*, *Lepidaster*, and *Trochitaster*; in the Devonian by *Aspidosoma*, *Ptilonaster*, *Asterias* (also in Carboniferous), and *Helianthaster*; in the Carboniferous by *Schœnaster* and *Cribellites*; by *Pleuraster* in the Trias; by *Tropidaster* in the Lias; and by *Astropecten* with other still living genera in the Lias and Oolites. The Cretaceous strata are more especially characterized by species of the recent genera *Oreaster*, *Astrogonium*, *Goniodiscus*, and *Stellaster*.

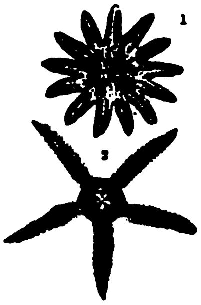

FIG. 17.—Fossil Asteridea.
1. Lepidaster Grayi, Forbes; U. Silurian, Dudley.
2. Protaster Miltoni, Salter; L. Ludlow rock, Salop.

Order III.—OPHIURIDEA. The Brittle-stars (fig. 18) have a general external resemblance to the Asteridea. The body consists of a central disk with five or more simple or less usually ramifying rays, which are sharply distinguished from the disk, are without ambulacral grooves, and contain no prolongations of the stomach. Spines and plates, also hooks (considered to be the representatives of the pedicellariæ of the Asteridea), are developed in the perisome. The dermal skeleton of the arms is constituted usually of a ventral or superambulacral row of plates, a dorsal median or antambulacral row, and two side rows of spinous imbricated plates. More rarely the perisome of the arms is leathery in consistence, and bears small plates, of which the ventral are the largest, and perforated with a double line of pores. The internal axial skeleton is formed by the *vertebral* or *axial* ossicles (fig. 19), the right and left halves of which are united by a longitudinal suture. The axial ossicles are articulated to one another by means of peg-and-socket joints. On the lower surface of each, corresponding to a depression on its dorsal surface, there is a groove for the passage of a radial ambulacral vessel and a nerve. The innermost of the axial ossicles is in two articulated halves, and the neighbouring halves of every two arms are connected with a couple of interambulacral pieces, with the inner edges of which is articulated a single ossicle, the *torus angularis*. The last-mentioned bears the *papillæ angulares*, and beneath these the *palæ angulares*, which are short flat processes, moved by muscles, and serving as teeth (see fig. 20). Right and left of the origin of each arm, within the body disk, on the ventral side, is an elongated ossicle, which in the *Euryalidæ* unites at the margin of the disk with an arched piece running towards the centre of the dorsal surface. The mouth is in the centre of the ventral face, and at each of its angles is a pair of tentacles. It leads into a simple sac-like alimentary canal, which is without anus. The madreporic canal, the walls of which are strengthened with calcifications, leads from the surface of one of the interradially situated *scuta buccalia* on the ventral side of the disk into a circular ambulacral canal, upon which rest minute plates, the homologues of the Holothuridean calcareous ring. Opening into the circular ambulacral canal, and corresponding in position to the madreporic canal, there

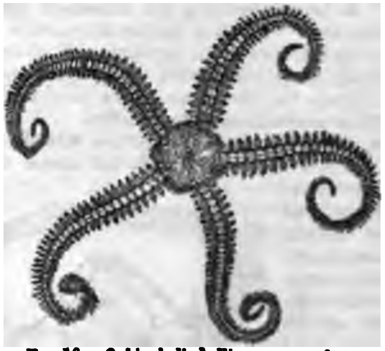

FIG. 18.—Ophiopholis bellis, upper surface.

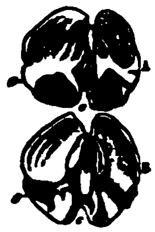

FIG. 19.—Axial ossicle of *Ophiolepis*. (After Müller.)
A, adoral surface; B, aboral surface; c, ventral groove; e, facet for tentacle.

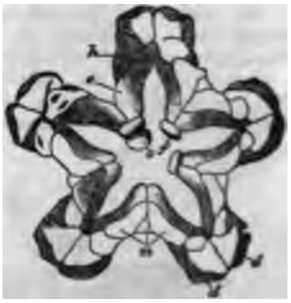

FIG. 20.—Mouth skeleton of *Ophioderma longicauda*. (After Müller.)
a, a, first vertebral ossicles; a, interambulacral piece of oral angle; t, torus angularis; b, groove for nerve-ring; m, peristomial plates; e, palæ angulares.

are usually four interradially placed Polian vesicles. The necks of the Polian vesicles and the ambulacral ring give off the diverticula termed by Simrock *vasa ambulacralia ani*. From the ambulacral ring proceed, the five radial canals between the superambulacral plates and the axial ossicles. In front of each ossicle they give off right and left branches to the pedicels. These are tentacle-like, devoid of basal vesicles, and, except in the *Euryalidæ*, pass out through openings between the superambulacral and lateral plates. The nervous system consists of an oral ring, which supplies a branch to each arm, running superficial to its radial ambulacral canal. Between the nerve and the latter is a neural canal. The genital organs are pairs of racemose glands attached to the inner dorsal surface of the disk; their products are shed into the perivisceral cavity, whence they make their way through the genital clefts between the origins of the arms.

Hermaphrodism has been observed in the species *Ophiolepis squamata*; and in some genera, as *Ophiocoma* and *Ophiactis*, scissiparous reproduction occurs. According to Lütken, this at an early age is more especially exhibited by the six-rayed forms. In certain cases development takes place within the egg, without any free pseudembryonic stage; but most generally metamorphosis from a pluteiform larva takes place. The bilaterally symmetrical skeleton of the pluteus consists of eight radially diverging calcareous rods. The development of the embryo commences with the production of two cylindrical solid bodies, one on each side of the gullet, which form cellular blastemic masses, one behind and another in front of the stomach, and a third to the left of the pseudostome. The ambulacral system of the adult is developed from the last of these, which unites with the mass in front of the stomach to form the ventral portion of the body, whilst the posterior mass furnishes the dorsal portion.

The Ophiuridea may be classified as follows :—

Sub-order I.—OPHIURIDÆ. Arms unbranched; ambulacral furrows covered with plates; genital clefts ordinarily five; habit creeping.

- A. Oral clefts armed.
    - (i.) No *papillæ angulares.*
        - OPHIODERMATIDÆ. Buccal scutes trigonal; disk granulated. Ex. *Ophiura* (*Ophioderma*), *Ophiochæta*, *Ophiopsammus.*
        - OPHIOLEPIDÆ. Buccal scutes pentagonal; disk scales naked. Ex. *Ophiolepis*, *Ophioceramis*, *Ophiopus.*
        - AMPHIURIDÆ. Disk rugged and scaly; ray-plates spinous. Ex. *Amphiura*, *Ophiacantha*, *Ophiopholis*, *Ophiostigma*, *Ophiactis.*
        - OPHIOMYXIDÆ. Disk naked; rays clothed with soft integument. Ex. *Ophiomyxa*, *Ophioscolex.*
    - (ii.) *Papillæ angulares* present.
        - OPHIOCOMIDÆ. Disk covered with solid plates. Ex. *Ophiocoma*, *Ophiomastix*, *Ophiarthrum.*
- B. Oral clefts unarmed.
    - OPHIOTHRICIDÆ. Radial plates very large. Ex. *Ophiothrix*, *Ophiocnemis*, *Ophiogymna.*

Sub-order II.—EURYALIDÆ. Arms simple or ramified, and capable of being rolled up towards the mouth; ambulacral furrows covered by soft integument. Spines are not present, but there are tufts of papillæ on the ventral surface of the arms; genital clefts ten.

- ASTROPHYTIDÆ. *Astrophyton*, *Trichaster*, *Asteronyx*, *Asteromorpha*, *Asteroporpa.*

Distribution in time of Ophiuridea.—The following Palæozoic genera are commonly referred to the Ophiuridea :—*Protaster* (Lower Silurian); *Palæodiscus*, *Acroura*, and *Eucladia* (Upper Silurian); *Eugaster* (Devonian of New York). Ophiura (?) occurs in the Carboniferous Limestone of Russia. In the Muschelkalk occur *Aspidura* and *Aplocoma*, and in higher Secondary strata *Ophioderma*, *Ophiocoma*, *Amphiura*, and other genera.

The Ophiuridea and Asteridea possess, in a marked degree, the power exhibited by the whole of the Echinodermata of reproducing lost portions of the body. The former have received the name of "Brittle-stars" on account of the remarkable facility with which species of the genus *Ophiocoma* not merely cast away their arms entire, but, at will, rapidly break them into little pieces. The same property has been noticed in the genus *Luidia* among the star-fishes, in the Crinoidean genus *Comatula*, and the *Synaptidæ* among the Holothuridea. Writing of a species of *Luidia*, Prof. E. Forbes remarks: "The first time I ever took one of these creatures I succeeded in getting it into the boat entire. Never having seen one before, and quite unconscious of its suicidal powers, I spread it out on a rowing bench, the better to admire its form and colours. On attempting to remove it for preservation, to my horror and disappointment, I found only an assemblage of rejected members. My conservative endeavours were all neutralized by its destructive exertions, and it is now badly represented in my cabinet by a diskless arm and an armless disk." Major Fred. H. Lang relates (*Nature*, Oct. 12, 1876), that during a dredging expedition in Torbay, presuming on the fact that as a rule he could take up the specimens of *Comatula rosacea* and *Ophiocoma rosula* he had captured without occasioning their dismemberment, he "put about a hundred of the two sorts into a sponge-bag; but this was asking too much of them;" for on reaching home he found "that both Feather-stars and Brittle-stars had converted themselves into a mass of mince-meat! It would have been difficult to find a single portion of an arm a quarter of an inch long."

Order IV.—CRINOIDEA.—The body in the Crinoidea is cup-shaped or bursiform, and its base always in the young state and usually in the adult is attached by the apical pole either directly or, as more commonly, by means of a calcareous stem to submarine objects. The inferior or dorsal wall of the body or *calyx* is formed of polygonal plates articulated by their edges, and the superior or ventral face or disk, which may be either flat or arched, is formed either by a perisomal membrane, occasionally strengthened with scattered calcifications, or, as in the *Tessulata*, by regularly arranged plates, *tegminalia*, resembling those of the inferior wall. At the border of the calyx are 2–18, usually 5, arms or *brachia*, which are movable, and can be closed together over the oral disk (fig. 22). Between them, commonly in the centre of the disk, is the mouth, and near it, in one of the interradial spaces, is the anus.

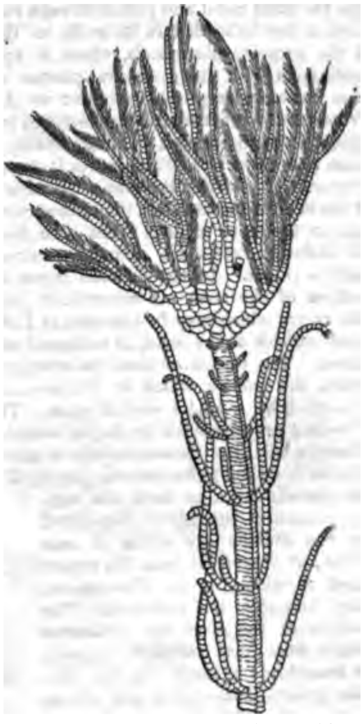

FIG. 21.—Pentacrinus caput-Medusæ. (After Guttard.)

It has been shown by Sir Wyville Thomson, (*Phil. Trans.* vol. clv. pt. 2), that the skeleton of *Antedon rosaceus* may be divided into two systems of plates, the *radial* and the *perisomatic*, the former including the articuli of the stem, the centro-dorsal plate, the radial plate, and the joints of the arms and pinnules, and the latter the basal, oral, and anal plates, and the interradial and other plates or spiculæ developed in the disk-membrane. "The body of the pentacrinoid is at first, while yet included within the pseud-embryo, and during its earliest fixed stage, surrounded and inclosed by plates of the perisomatic system alone." The predominance of the perisomatic system in the calyx of the older Crinoids and forms allied to them is hence a fact of considerable interest to the embryologist.

The stem is made up of numerous ossicles articulated and interpenetrated by elastic fibres and soft connective tissue. It is attached at its distal end by a root-like expansion, or by numerous, filamentous, branched cirri, having joints similar to those of the stem. Other and unbranched cirri are attached in whorls to many of the ossicles of the stem. Through the centre of the stem runs a canal containing a soft solid substance. In the adult *Antedon*, as has been pointed out by Dr Carpenter (*Proc. Roy. Soc.*, 1876), the medullary portion of the Crinoidal axis passes up through a pentangular five-chambered dilatation of its cortical portion within the centro-dorsal plate, and, reaching the cavity of the calyx, forms the pedicle by which chiefly the basal or dorsal surface of the visceral mass is attached to the calyx. The pedicle enters into the axial canal and passes through out its entire length, more or less imbedded in its walls, to the commencement of the subtentacular canals, where it apparently becomes continuous with the generative plexus of the disk. The stem varies in length, being short in *Apiocrinus*, long in *Pentacrinus*; it is round and sometimes moniliform in most Palæozoic Crinoids, but in *Platycrinus* compressed as it nears the calyx; in *Woodocrinus* it tapers from the calyx downwards. In the Palæozoic Crinoids the articulations of the ossicles radiate from the central canal, which is larger than in the more modern forms. In the Mesozoic genera the articular facets are commonly united by crescentic or stellate ridges. In the Silurian genus *Periechocrinus* the ossicles of the stem are alternately thicker and thinner. The calyx, which may be regarded as formed of the uppermost ossicles of the stem, is composed of several series of plates. The lowest of these is commonly formed by 2–6 pieces, the *basalia*, which in *Rhizocrinus* appear to be represented by a single central plate. The basalia in the *Tesselata* are succeeded by the *parabasalia* or *sub-radialia*; after the basalia or these come one or more rows of plates (in *Rhizocrinus* three), the *radialia* (see fig. 23). In *Pentacrinus* the radialia seem to form the commencement of the calyx. Supported by the radialia are series of arm plates, or *brachialia*, from the uppermost of which, as in *Pentacrinus*, may bifurcate the *palmaria*. The ossicles of the arms are sometimes single, sometimes united by syzygies, or immovable sutures. In the Silurian genera *Actinocrinus* and *Cyathocrinus* the subdivisions of the arms are very numerous, and by their lateral articulation form web-like expansions. The arms of *Pentacrinus* [illegible] bifurcate 4 times, giving 80 rays; the total number of plates in this species has been estimated at [illegible] [illegible] [illegible] [illegible] ... are plates [illegible] present between the radialia. In *A*[illegible] the central portion of the viscera is [illegible] formed by the 1st and 2d pairs of brachialia and the basal segments of the pinnules borne by the second; and the calycine cavity is completed by the perisome uniting the basal segments of the arms. Where, as in the *Articulata*, represented by the modern Crinoids, the disk is more or less membranous, four or five deep furrows radiate upon its surface from the mouth, which pass on to the oral surface of the arms and extend to the extremity of their pinnules. They carry the hollow ambulacral tentacles, which pass out through pores in the perisome. In 1865 Mr J. Rofe demonstrated (*Geol. Mag.*, ii. 245) in the case of several genera of Tesselate Crinoids from the Mountain Limestone (*Actinocrinus*, *Amphoracrinus*, *Cyathocrinus*, and *Platycrinus*) that the groove on the upper surface of the arms divides at their base into two channels—(1) a superior channel passing up beneath (in some cases partly within) the plates of the dome or disk to its apex, and there uniting with an internal circular aperture, probably the mouth; and (2) an inferior channel which goes direct into the visceral cavity. These channels, since their discovery by Mr Rofe, have been shown to be generally present in the Tesselate Crinoids. The superior channels, on the supposition that the central opening is a mouth, doubtless served for the supply of food and of water for respiration; whilst the inferior channels probably gave passage to the motor muscles of the arms, and placed the visceral cavity in connection with the ovaries, if the latter, as in modern Crinoids, were situated in the arms. In the Palæozoic genus *Rhodocrinus* the arm is cylindrical, and without a groove on the upper surface, but immediately below its base is situated the orifice of a passage which turns upwards under the dome. What in the Palæozoic Crinoids is commonly regarded as the anal opening, is situated at the extremity of a proboscidiform tube (fig. 24) interradially placed, and often of great length—as much as 4½ inches in *Poteriocrinus plicatus*. In existing Crinoids there are two apertures in the disk—the mouth, usually central, as in *Rhizocrinus*, and the interradially situated anus. The mouth is closed by lobes of the perisome, the *oral valves*, which may contain calcareous plates. Between these run the oral or ambulacral grooves from the mouth to the arms. In *Antedon* (*Comatula*) the alimentary canal passes obliquely downwards from the mouth, then horizontally, and after more than a complete turn bends upwards again, and ends in a rectal chamber terminating in a spout-like prominence. Between the exterior of the mucous wall of the alimentary canal and its peritoneal covering is the intramural space. The double wall of the canal is strengthened by calcareous disks; and it is by the folding of the inner side of the wall, and the resultant piling together of layers of these plates that the vertical *columella* is produced. The body cavity is lined by a smooth peritoneal membrane. The ambulacral furrows are bordered by plates, the *ambulacral* or *marginal lamellæ*, as in *Rhizocrinus* and *Pentacrinus*, or, as in *Antedon*, by elevated ridges of the perisome, produced at the edge into a series of small lobes or valvulæ, and having grouped on their inner side the pedicels. The epithelial floor of the groove, there is good reason to believe, is lined with cilia, which, like those of the gullet, serve to create currents in the water and thus to bring into the mouth Diatomaceæ, spores of Algæ, minute Entomostraca, and other nutritive material.

In *Antedon*, as has been shown by Dr Carpenter

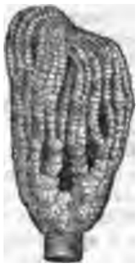
Fig. 22.—Cyathocrinus tuberculatus. (After Goldfuss.)

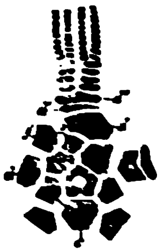
Fig. 23.—Dissection of calyx of [illegible] [illegible] (After [illegible])

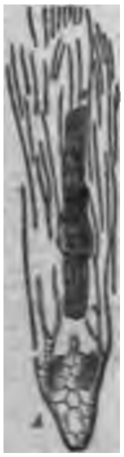
Fig. 24.—Dendrocrinus longidactylus. A, calyx; B, proboscis.

i), the tentacles communicate at their bases with non trunk, the *tentacular canal.* Beneath this, ing no communication with it, lies the *subtentacular* rhich is usually divided by a less incomplete septum. Each subtentacular canals is con- with a branch of the *axial* which communicates with the portion of the perivisceral by means of a minute pore . nearly at the centre of the irface of the visceral mass, and ccupied by the pedicel before . to. As the axial canal ex- ownward through the visceral comes into contiguity with the ary canal, and opens into it by r passages. There is in the third canal, the *cœliac*, which ntinuation of the body-cavity m, and is separated from the acular canal by a transverse n. At the junction of this ı with the septum of the sub- lar canal there is a passage, *ital-canal*, in which lies the cord known as the *generative rachis*, in connection ıe visceral genital tissue. Enlargements of the n the pinnules constitute the genital glands of the e, the products of which may or may not be dis- by special orifices. Towards the extremity of the s, in *Antedon*, the partition between the cœliac and ıcular canals thins away, and becomes finally obso- ıs possibly affording a means for the circulation of ritive fluid of the body, the subtentacular canals ıting an arterial or distributive and the cœliac a or collective system of vessels.

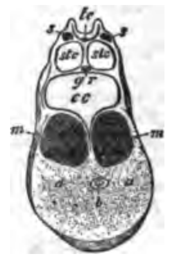

FIG. 25.—Section of arm of *Antedon rosaceus*. (After Carpenter.)

tc, tentacular canal, giving off lateral branches to the saccular (sensory?) organs, *s*, *s*; *stc*, the two subtentacular canals; *gr*, genital rachis; *cc*, cœliac canal; *m*, muscles; *a*, organic basis of calcareous segment; *b*, solid cord from quinquelocular organ.

ı the arms the tentacular canals proceed inwards to ith a circular canal situated around the gullet, and connected with it numerous short processes similar *vasa ambulacralia cavi* of the Ophiuridea (see 35). There is no madreporic tubercle, and the oric canal is apparently unrepresented in the Cri- Respiration seems to be effected by the tentacles, *Comatula* also by the access of water through pores ral perisome, communicating with a series of sinuses s under surface by means of funnel-shaped canals. ıtral organ of the nervous system in *Antedon*, accord- Carpenter, is the dilated cortical portion of the axis stem within the centro-dorsal plate, which supplies s to the cirri and the arms, and corresponds pro- ith the axial sheath which, in *Pentacrinus*, sends ls at the nodes of the stem into the whorls of cirri , 21). A fibrillar band underlying the epithelial the brachial furrows is regarded by Ludwig as a nerve afferent rather than a motor nerve" (Carpenter).

evelopment commences with the formation from the egg of norula, which acquires four hoop-like ciliated bands, and a terminal tuft of cilia. An endodermal sac or archenteron rom an invagination of the blastoderm between the third h ciliated bands; and from this three diverticula, two lateral ventral, take their rise, the remainder of the archenteron g an alimentary cavity communicating with an anterior us. The lateral diverticula are transformed into peritoneal on the dorsal the other on the ventral side of the alimen- ity, and their walls coming in contact produce a circular ry. In the ventral diverticulum the ambulacral vessels eir origin. Around the alimentary cavity, when the nbryo is scarcely a line in length, there are formed two each of five calcareous plates, which eventually become the basal ossicles of the calyx. From the centre of the posterior xtends a row of eight calcareous rings, the future stem of noid, surrounding a backward prolongation of the dorsal peritoneal sac. At the posterior extremity of the row is a cribriform disk, by which the young Crinoid subsequently attaches itself. The sarcodic body of the pseud-embryo begins to shrink, the pseudostome and the two lower bands of cilia disappear, and afterwards the two upper bands, and the embryo then becomes fixed to a stone, seaweed, or some other object. A new mouth is formed in the centre of the disk by the separation of the oral plates, and the intestine by the production of a diverticulum of the alimentary cavity. In the early Pentacrinoid stage of *Comatula* the basals rest upon the centro-dorsal segment, but become at length metamorphosed into a single piece, the *rosette;* and the centro-dorsal segment by degrees increasing in size, the first radials come to rest upon its enfolded lip. During the same period, after the formation of an anus, the oral and basal plates disappear. The development of the dorsal cirri takes place as the proximal joint of the column enlarges to form the centro-dorsal piece. At the end of five or six months, when about ½ an inch in diameter, the young *Comatula* detaches itself from its stalk, and is then able to swim by means of its arms. The Pentacrinoid larval form of *Comatula* (fig. 26), previous to his discovery of the ultimate stages of its growth, had been termed by Vaughan Thompson *Pentacrinus europaeus*.

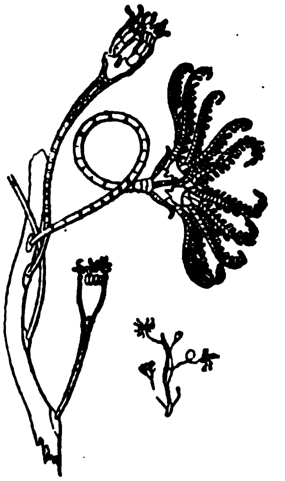

FIG. 26.—Pentacrinoid larval forms of *Comatula*, natural size and magnified.

The Crinoidea are classified as follows :—

Order I. TESSELATA. Calyx completely formed of calcareous plates, oral face without ambulacral furrows.

Family. *Tesselata*. Ex. *Cyathocrinus*, *Actinocrinus*.

Order II. ARTICULATA. Oral face of calyx usually membranous or sub-membranous, with ambulacral furrows.

Family 1. *Pentacrinidæ*. Always attached. Ex. *Pentacrinus*, *Rhizocrinus*.

Family 2. *Comatulidæ*. Attached only in the young state. Ex. *Antedon*, *Phanogenia*. The Cretaceous genus *Marsupites* appears to have been unattached.

The Crinoidea are represented by *Glyptocrinus*, *Eucalyptocrinus*, *Marsupiocrinus*, *Taxocrinus*, *Ichthyocrinus*, *Periechocrinus*, *Cupressocrinus*, *Poteriocrinus*, *Woodocrinus*, *Cyathocrinus*, *Rhodocrinus*, and numerous other genera in Palæozoic strata, where their remains, especially in the Carboniferous series, are often the chief constituents of vast masses of compact limestone.[1] From their form the insulated articuli of the stem have come to be known as *entrochi*, *screw-stones*, or *wheel-stones*, and in the north of England, as "St Cuth-

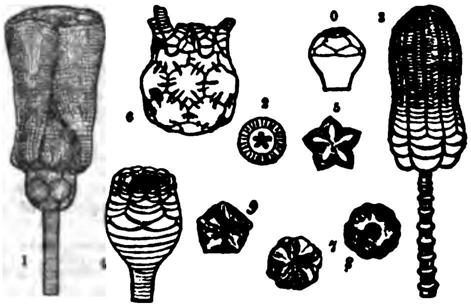

FIG. 27.—Fossil *Crinoidea*.

1. Crotalocrinus rugosus, Mill.; *U. Silurian*, Dudley.
2. Poteriocrinus (joint of column); *Carboniferous*, Yorkshire.
3. Encrinus entrocha; *L. Muschelkalk*, Germany.
4. Apiocrinus Parkinsoni, Mill.; *Bradford Clay*.
5. Pentacrinus basaltiformis, Mill.; *Lias*, Lyme.
6. Marsupites ornatus, Mill.; *Chalk*, Sussex.
7. Comatula Glenotremites (upper surface of body).
8. Comatula (lower surface); *Chalk*, Sussex.
9. Eugeniacrinus quinquedactylus, Schl.; *Oxfordian*, Würtemberg.
10. Bourgueticrinus ellipticus, Mill.; *Chalk*, Kent.

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[1] On Crinoidal Limestone, see J. Rofe, F.G.S., *Geol. Mag.*, x. p. 262.

bert's beads." Among the various forms by which the Crinoidea were represented during the Mesozoic period, towards the close of which they diminished markedly in number, are Encrinus (Muschelkalk; [illegible]) (Rhaetic); *Apiocrinus*, *Millericrinus*, *Eugeniacrinus*, and such forms as *Saccocoma* and *Pentacrinus*, [illegible] and *Bourguetticrinus*, *Marsupites*, and [illegible]. The Tertiary genera are but few. They include *Bourguetticrinus* and *Cainocrinus* (London Clay), and *Pentacrinus* (Coralline Crag). *Pentacrinus*, *Rhizocrinus* allied to *Apiocrinus* and *Bourguetticrinus*, and the related forms *Bathycrinus* and *Hyocrinus*, the [illegible] genera *Holopus*, *Antedon*, and *Comatula* are living forms.

Order V.—Cystidea.—The body in the Cystidea is in most cases rounded, and is covered with polygonal plates; it is attached by a stem, and may be provided with arms or pinnules developed from the upper or oral surface. The stem is short, usually similar to that of the Crinoidea in construction, but without cirri; the joints are rounded and sometimes moniliform, and usually become broader but thinner towards the base of the body. In *Ateleocystites* (see H. Woodward, *Geol. Mag.* 1871, p. 71) the calyx is compressed laterally, and shows sculpturing similar to that of the plates of the pedunculated *Cirripedia*. The plates of the calyx are pentagonal, hexagonal, or imperfectly triangular, and are closely united together; they vary in number, and in *Sphæronites* (1 in fig. 28) are very numerous. In *Cryptocrinus* the calyx is composed of three rows of plates, which may be regarded as basalia, parabasalia, and radialia. According to Professor E. Forbes (*Mem. of the Geolog. Survey of Great Britain*, 1848, vol. ii. part 2), the following series of plates may be generally distinguished:—a *basal* series; *subovarian*, *centro-lateral*, and *supra-ovarian* series on a plane below, on the same plane with, and on a plane above the ovarian pyramid respectively; *circa-ovarian* plates or ossicles, encircling that structure; and *oral* plates, immediately surrounding the mouth, which vary considerably in number (fig. 29). The plates are frequently ornamented with grooves and tubercles. Arms and pinnules are not universal. In *Comarocystites punctatus*, Billings, the arms are free; sometimes they are wanting, and the pinnules are attached to the upper portion of the calyx. Commonly the arms resemble ambulacra, and are reflected towards the base of the calyx, and closely applied to its surface. Pores on the antambulacral surface may be absent (*Cryptocrinus*), irregularly scattered (*Caryocrinus*), in pairs (*Sphæronites*), or, as in *Pseudocrinus* (2 in fig. 28), *Echinoencrinus*, and other genera, slit like, and arranged to form "pectinated rhombs," or "hydrospires," the two halves of each rhomb being on separate plates.

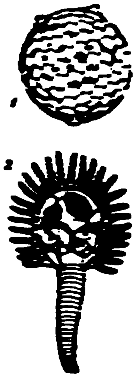


Fig. 28. Cystidea. 1. *Sphæronites aurantium*, Wahl.; L. Silurian, Sweden. 2. *Pseudocrinites bifasciatus*, Pearce; U. Silurian, Dudley.

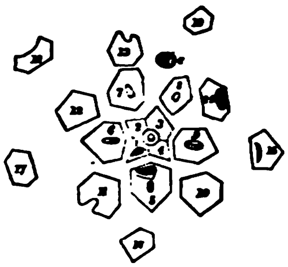


Fig. 29.—*Echinoencrinus armatus*; dissection and projection of plates. (After Forbes.)

1-4, basal; 5-9, subovarian; 10-14, centro-lateral; 15-19, supra-ovarian; c, genital pyramid and plates. Plates 1, 5, 14, and 15 bear semi rhombs.

In [illegible] *ornatus* there are thirty pectinated rhombs, consisting each of a number of parallel internal flat tubes communicating at both ends with pores opening internally. The rhombs in *Pseudocrinites* are not tubular as in *Caryocystites*, but are made up of numerous parallel inward folds of an exceedingly thin part of the [illegible] in *[illegible] tessellatus* the whole surface [illegible] when compared, have a complete though very thin calcareous covering, and communicate by a small pore at their base with the body-cavity. (See Billings, *Ann. and Mag. of Nat. Hist.* 1871, p. [illegible].)

What is usually regarded as the mouth is situated in the centre of the ventral surface of the calyx, opposite the point of attachment of the stem, and from it radiate the furrows for the arms, when those appendages are present. It is apparently small and circular in *Sphæronites*; in *Caryocystites* it is transversely elongated and lobed; in *Hemicosmites* elevated on a proboscis; in *Echinoencrinus* usually longitudinal and bordered by peculiar plates. A small perforation alongside the mouth, considered to be the anus, is generally present. It has sometimes, as in *Echinoencrinus* (fig. 30) and *Apiocystites*, the form of "an arched or crescentic groove terminating apparently at each end with a pore, and having united with it, or placed a little below it, an orifice in the middle line of a suture, as if in the junction of two oral plates" (Forbes). Almost invariably, on the oral portion of the body, interradially placed, is a round or oval aperture covered by a pyramid of 5 or 6 triangular valves. This in the opinion of most authorities is probably the ovarian orifice; but according to Mr Billings it is an oro-anal aperture, the central opening or mouth above mentioned being an "ambulacral orifice." *Cystidea* first occur in strata of Cambrian age. They especially characterize the Lower and Upper Silurian series of rocks, and apparently died out in the Carboniferous epoch.

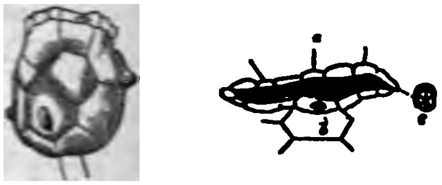


Fig. 30.—Echinoencrinus armatus. (After Forbes.)

a, mouth; b, anal aperture; and c, ovarian pyramid of the same, enlarged.

Order VI.—Edrioasterida.—Under this head are grouped such forms as *Edrioaster*, *Agelacrinites*, and *Hemicystites*. The shape is that of a rounded star-fish or flattened echinus with a concave base. There is an ovarian pyramid, but stem and arms are wanting, and the ambulacra communicate by perforations with the calycine cavity. The Edrioasterida are exclusively Palæozoic. Their nearest living ally is the Australian species *Hyponome Sarsii*, Lov., which approaches *Agelacrinites* in form.

Order VII.—Blastoidea.—In this group of fossil Echinoderms the bud-shaped or prismatic, armless, and closely plated calyx is supported on a short, jointed stem. Of the three basal plates in *Pentremites* two are double; succeeding the basals is a row of five pieces, and into the deep clefts of the upper portion of these fit the lower ends or apices of the ambulacra; a third series of five small, deltoid, interradial plates occupy the spaces between the oral portions of the ambulacra. The ambulacra, or "pseudambulacral areas," present a superior surface formed by a double series of ossicles running from a median line to the border, where they support pinnules; beneath the ossicles is usually a lanceolate plate formed in many if not all species of *Pentremites* of two contiguous plates, and edged by a simple row of transverse pieces, which are pierced with marginal pores.

Fig. 31. Pentremites florealis.

Each row of pores opens below into one or more flat canals, or, according to the definition of Billings (*Ann. and Mag. of Nat. Hist.*, vol. v. 4th ser. p. 263), into a "hydrospire" consisting of "an elongated internal sac, one side of which is attached to the inside of the shell [or while the side opposite, or towards tne central axis of sceral cavity, is more or less deeply folded longilly" (see fig. 32). These internal canals, as sug- by Rofe, may possibly represent the tubes under ome of the Crinoidea. In *Codonaster* the ambulacra ifined to the upper portion only calyx. Pores and attached are wanting; but there are d structures between the arms, : in appearance and probably a function to the pectinated s of the *Cystidea*, their ridges, ; shown by Rofe (*Geol. Mag.*, ii. p. 251), being the tops of a of folds of a thin test or mem- which were perhaps "respira- ica, lined with cilia, and constructed of a porous test, h which air from the water could pass by diffusion." xpanded ends of the neighbouring tubes of each two acra form at the summit of the test four double and ngle apertures commonly termed "ovarian orifices;" n the two latter there is usually a third, apparently pening. In *Eleutherocrinus* there are three paired, wo single pores only. The Blastoidea, which are resented by *Pentremites* in Upper Silurian strata, d their principal development during the Carboni- epoch, at the close of which they seem to have e extinct.

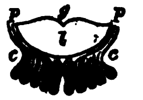
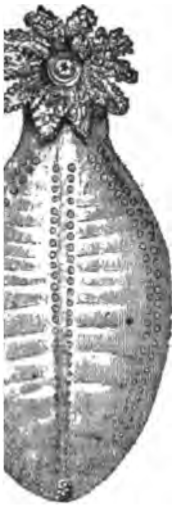


Fig. 32.—Transverse section of ambulacrum of *Pentremites Godoni*, × 3. (After Billings.) *l*, lancet plate; *g*, ambulacral grove; *p*, *p*, pores leading into the canals, *c*, *c*.

er VIII.—Holothuridea.—The Holothuridea, Sea-Trepangs, or Sea-cucumbers (figs. 33 and 34) have a ylindroid, sometimes flattened body, which is without and is brown to purplish-red in colour. The peri- which is unciliated, is composed of three layers,— tureless epidermis, a cellular dermis, and an internal layer. The two interior layers contain calcareous spiculæ, which vary much according to the species, and may take the shape of perforated disks, wheels, anchors, and hooks (fig. 35). Rarely the dorsal integument may develop an armature of overlapping plates (*Psolus*), which may bear spines (*Echinocucumis*). Underlying the perisome is a layer of circular muscular fibres, some of which pass into the mesenteries; a second internal set of five simple or paired bands of longitudinal muscular fibres are attached at one end to the radial pieces of the calcareous oral ring, and supply branches to the oral tentacles, and at the other are inserted into the sphincter of the anus. It is by means of the longitudinal muscles that the Holothurid, when irritated, effects the discharge of its viscera at the hinder extremity of its body. In the midst of a circle of tentacles, five or multiples of five in number, is the mouth, which is without dental apparatus. The tentacles vary considerably in shape, and may be cylindrical, shield-shaped, pinnate, or ramified. They serve as organs of touch, of nutrition, and occasionally also of locomotion. The alimentary canal is simple, and usually longer than the body, so as to be two or three times folded on itself; it is attached to the interior surface of the body by mesenteries, and may terminate in a cloaca. Its walls are composed of an external layer of circular, and an internal layer of longitudinal muscular fibres, and an innermost cellular lining. In common with the peritoneal surface of the body, it is ciliated. Two, or more rarely four or five, branched processes of the cloaca, the *respiratory trees* or *water-lungs*, are ordinarily present, and are connected to the body-wall by a mesentery or by threads (fig. 36). They appear to be excretory in function, water being continually passed into and out of them through the contractile cloaca. Their ultimate ramifications terminate in minute openings, by means of which they appear to have communication with the peritoneal cavity. In *Echinocucumis* the respiratory trees are only single-branched. In *Synapta*, in which they do not occur, there are funnel-shaped ciliated bodies attached to the mesentery of the alimentary canal. The respiratory tree occupying the ventral left interradial space has been observed in many cases to be surrounded by a plexus of the pseudhæmal system of vessels. What are termed *Cuvierian organs* are appendages of the cloaca, which, according to Semper (*Reisen im Archipel der Philippinen*, i. pp. 139, 140), are muscular, and can be used as a means of defence, being capable of protrusion externally. The main trunks of the pseudhæmal system, which is often exceedingly complex, are two vessels, one on the dorsal, the other on the ventral face of the intestine, which are connected with each other by capillary reticulations. The calcareous ring surrounding the gullet, already referred to,


.—Holothuria papillosa.

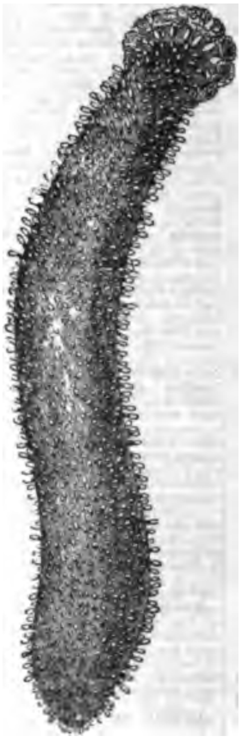


Fig. 34.—Holothuria tubulosa.

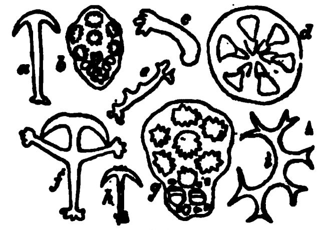


Fig. 35.—Spicules of Holothuridea. (After Semper.)

a and *b*, anchor and anchor-plate of *Synapta indivisa*, Semper; *c*, spicule of *Chirodota rigida*, Semper; *d*, wheel-spicule of *Chirodota chilensis*, Gräffe; *e*, spicule of *Thyone chilensis*, Semper; *f*, *g*, *h*, anchors and anchor-plate of *Synapta Godeffroyi*, Semper; spicule of *Rhopalodina lageniformis*, Gray.

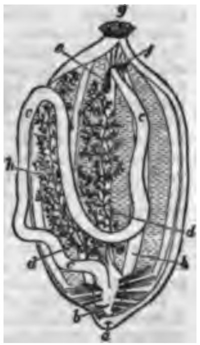


Fig. 36.—Diagrammatic section of a Holothurid. (After Gegenbaur.)

a, anus; *b*, cloaca; *c*, alimentary canal; *d*, *d*, respiratory trees; *e*, Polian vesicle; *f*, ambulacral ring; *g*, tentacles; *h*, longitudinal muscle.

[illegible] usually of five interradial, and five notched or perforated radial plates united by muscles—the homologues of the auriculæ of the Echinidea. A circlet of plates, in certain species, surrounds the anus. The fluid filling the various canals of the ambulacral system contains nucleated cells. The ambulacral circular vessel lies behind the calcareous ring; it gives off from one to five or more Polian vesicles, also one or more madreporic canals. Calcareous spiculæ are contained in the wall of the madreporic canal, and often it is terminated at the free end by a cribriform plate similar to a madreporite. By means of the madreporic canal the ambulacral vessels communicate with the peritoneal cavity. From the ambulacral ring there proceed five, sometimes more tentacular canals, which supply cæcal branches to the tentacles, and usually, also, five ambulacral canals, which give rise to as many rows of pedicels situated in most cases radially, and forming a dorsal bivium and ventral trivium. Sometimes, as in *Psolus*, the pedicels are irregularly dispersed over the whole perisome, or they may be met with only on the lower surface of the body, where they subserve locomotion. In *Molpadia* and its allies there are ambulacral canals, but no pedicels; in the *Synaptidæ* the canals are wanting. The sexual organs are one or two groups of branched tubuli, which open either on the dorsal surface or between the two dorsal tentacles. Except in the *Synaptidæ*, and apparently also the *Liodermatidæ*, the sexes are distinct. The nervous system consists of a circular cord, lying above the ambulacral ring, and giving off five apparently hollow branches, which pass through holes or notches in the radial plates of the calcareous ring, to proceed down the centre of the longitudinal muscular bands of the body

Development is direct in *Holothuria tremula* and *Pentacta doliolum*: and a species of *Synapta* is viviparous. The majority of the Holothuridea undergo metamorphoses, during which, however, no portion of the echinopædium is discarded. By invagination of the morula an intestinal cavity is produced, into which an ectodermic invagination opens, forming the upper portion of the alimentary canal. The cilia that at first clothe the body commonly become limited to a doubly bent band, the larva developing into an *auricularia*, which has sac-like processes, and occasionally spicules, but never a skeleton. Growing less transparent, the auricularia loses its lateral processes, the mouth disappears, and the larva reaches the "pupa-stage," in which the body is surrounded by five ciliated hoops. A new mouth with tentacles is now developed, the ciliated bands are lost, and the animal attains the same shape as the adult. The peritoneal cavity and the ambulacral system both originate in a cæcal process of the archenteron or primitive endodermal sac, which, separating from the latter, forms what has been termed the *vaso-peritoneal vesicle*. This gives off a process which opens on the dorsal surface, and which eventually furnishes the madreporic canal. A portion of the vesicle remains in connection with this process, and is transformed into the ambulacral vessels; the other portion becomes two sausage-shaped vesicles at the sides of the alimentary canal, above and below which they grow together, and form a continuous space, the future peritoneal cavity. The inner and outer wall of the chamber thus resulting become attached respectively to the parietes of the body and to the alimentary canal, and mainly contribute to the production of their peritoneal and muscular layers.

The Holothuridea are creeping in habit; some, however, of the *Synaptidæ* are able to swim. The apodal forms move themselves by contractions of the body, and by means of their tentacles. The Holothuridea derive their nourishment from the sand which they swallow, and from Diatomaceæ, Foraminifera, and other minute marine organisms. Among the internal parasites of the Holothuridea are small fishes of the genus *Ficrasfer*, embryos of the gasteropod *Entoconcha mirabilis*, and Copepod crustaceans ([illegible]). Certain species of *Holothuria* are much esteemed in China as food, and constitute an important article of commerce with that country.

The Holothuridea may be grouped as follows:—

I. APNEUMONA. Respiratory trees and Cuvierian organs absent; mouth and anus at opposite ends of the body; ambulacral canals five; hermaphrodite.

(1.) *Synaptidæ*. Pedicels absent. Ex. *Synapta*, *Chirodota*.

(2.) *Oncinolabidæ*. Pedicels present. Ex. *Echinosoma*.

II. TETRAPNEUMONA. Respiratory trees four; body flask-like; mouth and anus at the same end of it, the former surrounded by ten tentacles and ten calcareous plates, the latter by as many papillæ and plates; five ambulacra diverge from the anal, and five from the oral region of the body; pedicels in two rows. Ex. *Rhopalodina lageniformis* only—the class *Diplostomidea* of Semper.

III. DIPNEUMONA. Respiratory trees two; Cuvierian organs present; mouth and anus polar; pedicels single-ranked.

(1.) *Liodermatidæ*. Pedicels absent; tentacles shield-like, cylindrical, or branched. Ex. *Liosoma*, *Haplodactyla*, *Molpadia*.

(2.) *Dendrochirotæ*. Tentacles branched. Ex. *Thyone*, *Phyllophorus*, *Ocnus*, *Psolus*.

(3.) *Aspidochirotæ*. Tentacles shield-like. Ex. *Aspidochir*, *Stichopus*, *Sporadipus*, *Holothuria*.

Mr C. Moore, F.G.S. (*Rep. Brit. Assoc.*, 1872, p. 117), has described wheel-like spiculæ of four species of *Chirodota*, one from the Inferior Oolite, one from the Upper Lias, and two from the Middle Lias. "They are formed of a number of minute wheel-spokes, varying from 5 to 13, which start from a central axis, and are surrounded on the outside by a wheel-tire; on the inner edge of some species are a series of very minute teeth, extending over the central cavity." Mr R. Etheridge, jun. (in the *Memoirs of the Geol. Survey of Scotland, Explanation of Sheet* 23, 1873), has called attention to the discovery by Mr J. Bennie, survey-collector, of similar specimens in the Lower Carboniferous Limestone group of E. Kilbride, and in shales of the Upper Limestone group of Williamwood, near Glasgow.

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ECHO, in Greek mythology, one of the Oreades or mountain nymphs. The word denotes mere sound; and the stories told of her are so transparent that they can scarcely be said to belong to the class of fully-developed myths. As Selene to the Greek was clearly the moon, so Echo was the being who could not speak until she was spoken to, and then could only repeat the last words of the speaker. This penalty is said to have been inflicted upon r by Hera, whom the nymph by her chatter had prevented ɔm discovering the sports of Zeus among her sister eades. Another tale relates that Echo fell in love th Narcissus, who was deaf to her entreaties, and at in her grief she wasted away until nothing remained t her bones and her voice. The name Narcissus, again, notes one who is oppressed by lethargy, and thus the ɔry becomes a counterpart to that of Selene and ıdymion. Another legend speaks of her as being loved Pan, the Latin Favonius, the soft and purifying breeze, d represents her lover as seeking in vain to see her form, hough everywhere he hears her voice.—Ovid, *Met.* iii. 6 *et seq.*; Paus. ix. 31, 6.

For ECHO, in physics, see ACOUSTICS, vol. i. p. 107.

ECIJA, a city of Spain, in the province of Seville, 53 iles E.N.E. of the city of that name, on the left bank of e Jenil, Xenil, or Genil, the ancient Singulis, a tributary the Guadalquivir. The river, thus far navigable, is there ɔssed by a fine old bridge; and the antiquity of the town trays itself both by the irregularity of its arrangement, and its walls and gateways, and its numerous inscriptions and her relics. Among its public buildings it numbers six rish churches, seven nunneries, thirteen secularized nvents, two hospitals, a theatre, a foundling asylum, and rracks. The principal square is surrounded with pillared rticoes, and has a fountain in the centre; and along the ver bank there runs a fine promenade, planted with poplar es and adorned with statues. From an early period the oemakers of Ecija have been in high repute throughout ɔain; and woollen cloth, flannel, linen, and silks are anufactured in the town. The vicinity is fertile in corn d wine, and cotton is also cultivated to some extent. he heat is so great that the spot has acquired the briquet of El Sarten, or the Frying-pan of Andalusia. cija, called Estija by the Arabs, is the ancient Astigis, hich was raised to the rank of a Roman colony with the le of Augusta Firma, and, according to Pliny and ɔmponius Mela, was the rival of Cordova and Seville. If cal tradition may be believed, it was visited by the apostle ul, who converted his hostess Santa Xantippa; and, cording to one version of his life, it was the see of the mous Crispin. Among its modern celebrities the most markable is Luis Valez de Guerara, the dramatist. ɔpulation 27,216.

ECK, JOHANN MAIER VON (1486–1543), the most in-fatigable and important opponent of Martin Luther, was ɔrn 13th November 1486, at Eck in Swabia. His father s a peasant, who becoming bailiff of the village, added k to the family name Maier. The son entered in his eventh year the university of Heidelberg, from which he nt to Tübingen, where he took his master of arts degree his fourteenth year, and afterwards studied theology. e then went to Cologne, and afterwards to Freiburg, ere, besides studying jurisprudence and mathematics, he ught philosophy. In 1506 he published a work on logic. om this time he appears to have devoted his attention iefly to theology; and his skill and versatility in scho-stic disputations having attracted considerable notice, the ke of Bavaria, in 1510, presented him to the chair of eology in the university of Ingolstadt. In 1515 he ok part in a public disputation at Bologna, and in 16 in one at Vienna, on both occasions gaining great miration. In 1518 he circulated privately his *Obelisci* ainst Luther's thesis on the mass. Luther intrusted his fence to Carlstadt, who, besides answering the insinua-ns of Eck in 400 distinct theses, declared his readiness meet him in a public disputation. The challenge was cepted, and the disputation took place at Leipsic in the llowing year. It lasted for three weeks, and Luther as ll as Carlstadt opposed himself to Eck. The general impression was that victory rested with Eck; but apparently success only embittered his animosity against his opponents, for from that time his whole efforts were devoted to Luther's overthrow. He induced the universities of Cologne and Louvain to condemn the Reformer's writings, and in 1520 went to Rome to obtain strict regulations against what he called the "Lutherans." He returned with the celebrated papal bull against Luther's writings, and with the commission to publish it, but at Leipsic met with so bad a reception from the inhabitants, that he was compelled to take refuge in the Pauline convent. Eck took a leading part in the Augsburg diet of 1530, and in the conferences at Worms in 1540 and at Ratisbon in 1541. He died in 1543. He is said to have been a bad linguist, and not an able theologian, but to have possessed great readiness and fluency, a retentive memory, and remarkable dexterity in sophistical argumentation. Among his numerous writings is a translation of the Bible, which was written to supersede that of Luther, but met with no success.

ECKERMANN, JOHN PETER (1792–1854), friend of Goethe, and editor of his works, was born at Winsen in Hanover in 1792. After serving as a volunteer in the War of Liberation (1813–1814), he obtained an appointment in the war office at Hanover. At the age of twenty-five he became a student at the gymnasium of Hanover and afterwards at the university of Göttingen, returning to Hanover in 1822. His acquaintance with Goethe began in the following year, when he sent to him the manuscript of his *Beiträge zur Poesie*. Soon afterwards he went to Weimar, and was appointed private secretary to the poet. For several years he was also engaged as tutor to the son of the grand duke. In 1830 he travelled in Italy with Goethe's son. In 1838 he was named councillor of the grand duchy, and appointed librarian to the grand duchess. Eckermann is chiefly remembered for the important contributions to our knowledge of the great poet contained in his *Gespräche mit Goethe*, the first and second parts of which appeared in 1836, and the third in 1848. This work was first translated into English by Margaret Fuller, and published at Boston, U.S., in 1839. Another English translation, by John Oxenford, appeared in London in 1850. It has been translated into almost all the European languages, not excepting Turkish. To Eckermann Goethe intrusted the publication of his posthumous works (1832–1833). He was also joint-editor with Riemer of the complete edition of Goethe's works in 40 vols. (1839–1840). Eckermann died at Weimar, December 3, 1854.

ECKERSBERG, CARL VILHELM (1783–1853), Danish painter, was born in South Jutland in 1783. He became successively the pupil of Abildgaard and of David. From 1810 to 1813 he lived at Paris under the direction of the latter, and then proceeded, as an independent artist, to Rome, where he worked until 1816 in close fellowship with Thorwaldsen. His paintings from this period—The Spartan Boy, Bacchus and Ariadne, and Ulysses—testify to the influence of the great sculptor over the art of Eckersberg. Returning to Copenhagen, he found himself easily able to take the first place among the Danish painters of his time, and his portraits especially were in extreme popularity. It is claimed for Eckersberg by the native critics that "he created a Danish colour," that is to say, he was the first painter who threw off conventional tones and the pseudo-classical landscape, in exchange for the clear atmosphere and natural outlines of Danish scenery. But Denmark has no heroic landscape, and Eckersberg in losing the golden common-places scarcely succeeds in being delightful. His landscapes, however, are pure and true, while in his figure-pieces he is almost invariably conventional and old-fashioned. He became the president of the Danish Academy of Fine Arts in Charlottenberg, and died in 1853.

ECKHART, Johannes, or, according to the general designation, Meister Eckhart, the first of the great speculative mystics, flourished during the latter part of the 13th century and the early part of the 14th. Extremely little is known of his life; the date and place of his birth are equally uncertain. According to some accounts, he was a native of Strasburg, a town with which he was afterwards closely connected; according to others, he was born in Saxony. Trithemius, one of the best authorities, speaks of him merely as "Teutonicus." 1260 has frequently been given as the date of his birth; it was in all probability some years earlier, for we know that he was advanced in age at the time of his death, about 1327. He appears to have entered the Dominican order, and to have acted for some time as professor at one of the colleges in Paris. His reputation for learning was very high, and in 1302 he was summoned to Rome by Boniface VIII., to assist in the controversy then being carried on with Philip of France. From Boniface he received the degree of doctor. In 1304 he became provincial of his order for Saxony, and in 1307 was vicar-general for Bohemia. In both provinces he was distinguished for his practical reforms and for his power in preaching. In what manner he ceased to hold his high office we do not know; indeed, several years of his life about this time are a complete blank. Towards 1325 we hear of him as preaching with great effect at Cologne, where he gathered round him a numerous band of followers. Before this time, and in all probability at Strasburg, where he appears to have been for some years, he had come in contact with the Beghards (*q. v.*) and Brethren of the Free Spirit, whose fundamental notions he may indeed be said to have systematized and expounded in the highest form to which they could attain. In 1327 the opponents of the Beghards laid hold of certain propositions contained in Eckhart's works, and he was summoned before the Inquisition at Cologne. The history of this accusation is by no means clear. Eckhart appears, however, to have made a conditional recantation—that is, he professed to disavow whatever in his writings could be shown to be erroneous. Further appeal, perhaps at his own request, was made to the Pope, and in 1329 a bill was published condemning certain propositions extracted from Eckhart's works. But before its publication Eckhart was dead. The exact date of his death is unknown. Of his writings, several of which are enumerated by Trithemius, there remain only the Sermons and a few tractates. Till recently the majority of these were attributed to Tauler, and it is only from Pfeiffer's careful edition (*Deutsche Mystiker d. XIV. Jahrhunderts*, vol. ii., 1857) that one has been able to gather a true idea of Eckhart's activity. From his works it is evident that he was deeply learned in all the philosophy of the time. He was a thorough Aristotelian, but by preference appears to have been drawn towards the mystical writings of the neo-Platonists and the pseudo-Dionysius. His style is unsystematic, brief, and abounding in symbolical expression. His manner of thinking is clear, calm, and logical, and he has certainly given the most complete exposition of what may be called Christian pantheism.

Eckhart has been called the first of the speculative mystics, but such a designation requires some qualification. Within the Christian church from the time of Erigena there had been a constant stream of what must be called mysticism, originating for the most part from the writings of the neo-Platonists and of Dionysius the Areopagite. This tendency may be noted in Bonaventura, in Albert (under whom Eckhart is said to have studied), and in Aquinas; it is more prominent in Hugo and Richard of St Victor, though with them it took a practical rather than a speculative direction. But in all these writers, with the partial exception of Erigena, who occupies a quite peculiar position, the mystical element was in strict subordination to the church doctrines, which might be speculatively *symbolised*, but were not thereby explained or rationalised. In Eckhart's writings and preaching, on the other hand, the element of mystical speculation for the first time comes to the front as all-important. By its means the church doctrines are made intelligible to the many, and from it the church dogmas receive their true significance. It was but natural that he should gradually diverge more and more widely from the traditional doctrine, so that at length the relation between his teaching and that of the church appeared to be one of opposition rather than of reconciliation. Eckhart is thus in truth the first who attempted with perfect freedom and logical consistency to give a speculative basis to religious doctrines.

It is not possible to expound in detail how Eckhart endeavours to explain the main principles of the Christian faith, but it is necessary to note the two most important points in his as in all mystical theories. These are first, his doctrine of the divine nature, and second, his explanation of the relation between God and human thought. The two are logically connected, and a complete exposition of his theory might start from either his theology or his psychology. Lasson, the author of a most valuable monograph on Eckhart, adopts the latter course, but for many reasons the other appears the most systematic.

The fundamental thought from which Eckhart's theology starts is that of the Absolute or Abstract Unity as the only real existence. Apart from God no thing has real being. But this Absolute is, for Eckhart, the *Deus absconditus*, the θεὸς ἄγνωστος of the neo-Platonic theology. With Dionysius the Areopagite, Eckhart describes this divine essence, the Godhead, as absolutely without predicates; all determinations are limitations which destroy its infinite being. The Godhead is incomprehensible, inexpressible. It is in truth nothing; yet as the most real of beings it must be conceived as absolutely potential, as containing in itself the origin and final end of all things. This Godhead is not God as known to us. From the Godhead the triune God *proceeds* or is evolved. At this point, at the transition between the divine absolute and the personal deity, Eckhart is face to face with the crucial difficulty of all speculative mysticism, and it is of interest to compare his method of solution with that adopted by later thinkers of like tendencies, *e.g.*, Boehme and Baader. In the Godhead, as in everything, according to Eckhart, there must be distinguished matter and form, or, as they are here called, essence and nature. The matter or essence is the potentiality, what the thing is in itself; the form or nature is that which it becomes as an object for others. The Godhead reveals itself in the personal God, the Father. For the Godhead is a spiritual substance, and as such can only become real by consciousness, by reflection on self, by self-expression. That which reflects and expresses is the Father. The Son is the Word, or expression through and in which the Father becomes self-conscious. As there is here no distinction of time or space, Father and Son are in very truth one. The Father eternally begets the Son, and the return of the Son into the Father in love and mutual will is the Spirit. The Father is not before the Son; only through the begetting of the Son, only through arriving at self-consciousness, does He become the Father.

The genesis of the Son from the Father involves also, according to Eckhart, the production of the world of things. For God is reason, and in reason is contained the ideal world, the world of creatures, not in time and space, which becomes materialised. In the Son are all things made, but only, Eckhart is careful to point out, in ideal form. He holds strongly to the so-called Platonic view that, over and above sensible things, there exists a realm of ideal forms or exemplars, to be apprehended by pure thought, through thought freed from the limitations of space and time. How this ideal world is related to the world of real things he does not show, nor does he explain the apparent independence of the material universe. When, therefore, Eckhart speaks of the world as necessary to the divine existence, of God as loving Himself in created things, and of all things being God, he must be understood to speak of this ideal world, not of things as known to us.

As all things have arisen from God, so all things desire to return into the unity of the divine being. Repose in God is the final end of all things. In man, the noblest of created things, this return is brought about. In man, specially, there is the faculty of supra-rational cognition, the power of reaching to the absolute, the ground both of God and of the universe. This peculiar power, called by Eckhart the spark (*Fünklein*, *Scintilla*), is in truth God working in man. In cognition of God, God and man are one; there is no distinction of knower and known, and hence, as opposed to empirical knowledge, it may be called faith. In such faith, there is involved not only reason, but will, for the divine illumination becomes operative or takes real effect through the will.

To attain to full union with God is the final end of activity, and the means, it is clear, must be the resignation of all individuality. Absolute quietism appears to be the only method whereby the birth of the Son in the soul may be brought about. When this state has been reached, then the human soul is one with God; its will is God's; no evil can be wrought by it; it cannot sin. The practical consequences which would flow from such a doctrine, and which did appear among the Brethren of the Free Spirit, were evaded, rather than overcome, by Eckhart. For, according to his teaching, all the above applies only to the "spark" in the soul; the other faculties may be reasonably and legitimately employed about other and temporal matters. By this loop-hole, also, he escapes the doctrine that works are entirely inefficacious. He is careful to hold the balance between inward feeling and outward action, and on this point his teaching is important in relation to the later Reformation thinkers.

On the specifically theological doctrines of Eckhart, such as Grace, Incarnation, the Fall, Redemption and Sin, it is not possible to enter in brief compass. A most adequate account of them will be found in Lasson's monograph above referred to.

The most important of the many works upon Eckhart are—Pfeiffer, *Deutsche Mystiker*, vol. ii.; Martensen, *Meister Eckhart*, 1842; Bach, *Meister Eckhart der Vater der Deutschen Speculation*, 1864; Lasson, *Meister Eckhart der Mystiker*, 1868; Ullmann, *Reformatoren vor der Reformation*, 1842; Preger, *Geschichte d. Deutschen Mystik*, i., 1874.

ECKHEL, Joseph Hilarius (1737–1798), one of the most distinguished numismatists, was born at Enzersfeld in Lower Austria, January 13, 1737. His father was farm-steward to Count Zinzendorf, and he received his early education at the Jesuit's College, Vienna. Here at the age of fourteen he was admitted into the order, still pursuing his studies with earnestness, and especially devoting himself to antiquities and numismatics. After being engaged as professor of poetry and rhetoric, first at Steyer and afterwards at Vienna, he was appointed in 1772 keeper of the cabinet of coins at the Jesuit's College, and in the same year he went to Italy for the purpose of personal inspection and study of antiquities and coins. At Florence he was employed to arrange the collection of the grand duke of Tuscany; and the first fruits of his study of this and other collections appeared in his *Numi Veteres Anecdoti*, published in 1775. On the dissolution of the order of Jesuits in 1773, Eckhel was appointed by the empress Maria Theresa professor of antiquities and numismatics at the university of Vienna, and this post he held for twenty-four years. He was in the following year made keeper of the imperial cabinet of coins, and in 1779 appeared his *Catalogus Vindobonensis Numorum Veterum*. Eckhel's great work is the *Doctrina Numorum Veterum*, in 8 vols., the first of which was published in 1792, and the last in 1798. The author's rich learning, comprehensive grasp of his subject, admirable order and precision of statement in this masterpiece drew from Heyne enthusiastic praise, and the acknowledgment that Eckhel, as the Coryphæus of numismatists, had, out of the mass of previously loose and confused facts, constituted a true science. A volume of *Addenda*, prepared by Steinbüchel from Eckhel's papers after his death, was published in 1826. Among the other works of this great scholar are—*Choix de Pierres gravées du Cabinet Imperial des Antiques* (1788), a useful school-book on coins entitled *Kurzgefasste Anfangsgründe zur alten Numismatik* (1787), of which a French version enlarged by Jacob appeared in 1825, &c. Eckhel died at Vienna, May 16, 1798.

ECLECTIC (from ἐκλέγω, I select), a term of which the most important application is in philosophy, denotes a thinker whose views are borrowed partly from one, partly from another, of his predecessors. It perhaps requires to be noted that, where the characteristic doctrines of a philosophy are not thus merely adopted, but are the modified products of a blending of the systems from which it takes its rise, the philosophy is not properly eclectic.

The history both of ancient and of modern eclecticism shows that eclecticism naturally springs up when, while literary culture makes the doctrines of the chief philosophies familiar and preserves an interest in philosophy, the first pursuit of thinkers is not purely speculative truth.

In the 2d century B.C., a remarkable tendency toward eclecticism began to manifest itself. The longing to arrive at the one explanation of all things which had inspired the older philosophers became less earnest; the belief, indeed, that any such explanation was attainable began to fail; and thus men, not feeling the need of one complete logical system, came to adopt from all systems the doctrines which best pleased them. In Panætius we find one of the earliest examples of the modification of Stoicism by the eclectic spirit; and about the same time the same spirit displayed itself among the Peripatetics.

The philosophy that took root in Rome, where philosophy never became other than a secondary pursuit, was naturally for the most part eclectic; of this Cicero is the most striking illustration,—his philosophical works consisting of a mixture, with little or no blending, of doctrines borrowed from Stoicism, Peripateticism, and the scepticism of the Middle Academy. And, not to mention numerous names of minor importance, eclecticism had another representative at Rome in the school of Sextius and Sotion, who were half Stoic, half Pythagorean.

In the last stage of Greek philosophy the eclectic spirit produced remarkable results outside the philosophies of those properly called eclectics. Thinkers chose their doctrines from many sources—from the venerated teaching of Aristotle and Plato, from that of the Pythagoreans and of the Stoics, from the old Greek mythology, and from the Jewish and other Oriental systems. Yet, it must be observed that neo-Platonism, Gnosticism, and the other systems which are grouped under the name Alexandrian, were not truly eclectic, consisting, as they did, not of a mere syncretism of Greek and Oriental thought, but of a mutual modification of the two. It is true that several of the neo-Platonists professed to accept all the teaching both of Plato and of Aristotle, but, in fact, they arbitrarily interpreted Aristotle so as to make him agree with Plato, and Plato so as to make his teachings consistent with the Oriental doctrines which they had adopted, in the same manner as the schoolmen attempted to reconcile Aristotle with the doctrines of the church. Among the early Christians, Clement of Alexandria, Origen, and Sinesius were eclectics in philosophy.

The eclectics of modern philosophy are too numerous to name. Of Italian philosophers the eclectics form a large proportion. Among the German we may mention (though details cannot here be given) Wolf and his followers, as well as Mendelssohn, Eberhard, Platner, and to some extent Schelling, whom, however, it would be incorrect to describe as merely an eclectic. In the first place he cannot be denied the praise of originality; and, in the second place, it is not so much that his views of any time were borrowed from a number of philosophers, as that his thinking was influenced first by one philosopher then by another.

But, during the present century, the term eclectic has come to be specially applied to a number of French philosophers who differ considerably from one another. Of these the earliest were Royer-Collard, who was mainly a follower of Reid, and Maine de Biran; but the name is still more appropriately given to the school of which the most distinguished members are Victor Cousin, Théodore Jouffroy, Damiron, St Hilaire, Rémusat, Garnier, and Ravaisson. Cousin, whose views varied considerably at different periods of his life, not only adopted freely what pleased him in the doctrines of Laromiguière, Royer-Collard, and Maine de Biran, of Kant, Schelling, and Hegel, and of the ancient philosophies, but expressly maintained that the eclectic is the only method now open to the philosopher, whose function thus resolves itself into critical selection and nothing more. "Each system," he asserted, "is not false, but incomplete, and in reuniting all incomplete systems, we should have a complete philosophy, adequate to the totality of consciousness." But this assumes that every philosophical truth is contained somewhere in the various philosophies; and if, as it would be surely rash to deny, there still remains philosophical truth undiscovered, but discoverable by human intelligence, it is evident that eclecticism is not yet the only philosophy. For a discussion of the question how far the above dicta of Cousin represent his own method of philosophizing we must refer the reader to the article COUSIN. Eclecticism gained great popularity, and, partly owing to Cousin's position as minister of public instruction, became the authorized system in the chief seats of learning in France, where it has given a most remarkable impulse to the study of the history of philosophy.

ECLIPSE. See ASTRONOMY.

ECSTASY (ἔκστασις, from ἐξίστημι, to put out of its place, to alter), a term applied to a morbid mental condition, in which the mind is entirely absorbed in the contemplation of one dominant idea or object, and loses for the time its normal self-control. With this there is commonly associated the prevalence of some strong emotion, which manifests itself in various ways, and with varying degrees of intensity. This state resembles in many points that of catalepsy already described, but differs from it sufficiently to constitute it a separate affection. The patient in ecstasy may lie in a fixed position like the cataleptic, apparently quite unconscious, yet, on awaking, there is a distinct recollection of visions perceived during this period. More frequently there is violent emotional excitement, which may find expression in impassioned utterances, and in extravagant bodily movements and gesticulations. This disease usually presents itself as a kind of temporary religious insanity, and has frequently appeared as an epidemic. It is well illustrated in the celebrated examples of the dancing epidemics of Germany and Italy in the Middle Ages, and the *Convulsionnaires* of St Medard at the grave of the Abbé Paris in the early part of the last century, and in more recent times has been witnessed during periods of religious excitement in this country. This disorder is highly contagious, and readily spreads by imitation. As a disease it is more curious than important, and for its treatment requires the judicious exercise of moral influences rather than medical remedies, although these also, as in the case of similar ailments, may often be used with advantage.

ECUADOR, or, in full, LA REPUBLICA DEL ECUADOR, an independent state of South America, traversed by the equator, from which it takes its name, and bounded on the N. by the United States of Colombia, E. by Brazil, S. by Peru, and W. by the Pacific Ocean (see plate xi. vol. i.). Its area cannot be stated with any close approximation to accuracy, for large districts along the frontiers are equally claimed by Ecuador and the neighbouring powers; and even within the limits of undisputed possession no systematic survey has been undertaken. According to Villavicencio, the area is only 127,205 English square miles; but F. Hanemann, quoted by Behm and Wagner (*Bevölkerung der Erde*, 1874, p. 76), makes it 248,580 by planimetric calculation on the basis of H. Kiepert's map in his *Handatlas*, 1872. Kiepert places the eastern limit at 70° W. of Greenwich, but does not assign to Ecuador the disputed territory along both sides of the Marañon. The population was stated by Villavicencio at 1,108,082 in 1857, exclusive of 200,000 "wild" Indians; but an official estimate for the same year is quoted by Wappaus, which gives only 881,943, exclusive of 150,000 "wild" Indians, and even this he thinks is probably too high. His opinion is so far confirmed by the memoir of the minister Leon, published in 1875 at Quito, according to which the total population, exclusive of about 200,000 Indians, was 866,137. The Galapagos Islands, an uninhabited group with an area of 2951 square miles, are dependent on Ecuador.

Mountains.—The great South American chain of the Andes traverses Ecuador from south to north, and forms the predominant factor in its physical constitution. Its two Cordilleras run parallel with each other, and inclose an elevated longitudinal valley about 40 miles wide and 300 miles long, which is divided by the transverse ridges, or *nudos*, of Tiupullo and Assuay into the three great basins of Quito, Ambato, and Cuenca, which are again subdivided by inferior ridges into irregular sections. The eastern Cordillera attains in several of its summits a height of more than 18,000 feet; the western has only one (Chimborazo) which exceeds 17,500. The Quito plain lies 9500 feet above the sea, Ambato 8500, and Cuenca 7800: the last two are comparatively barren and melancholy, while the first, though so much the loftiest of the three, is clothed with luxuriant vegetation. The altitude of the Tiupullo or Chisinche ridge, stretching across from Cotopaxi to Iliniza, is 11,500 feet, and that of the Assuay ridge about 13,500. Both the western and eastern slopes of the chain are marked by magnificent valleys of erosion; the former, which contains at least six successive terraces, has an average gradient of 275 feet per mile, while that of the latter is only 125. Granitic, gneissoid, and schistose rocks are the main materials of the gigantic pile; the summits are capped with trachyte and porphyry, and the sides are strewn with immense beds of gravel and volcanic debris. Nowhere in the whole Andean system do the individual mountains attain so magnificent a development as in the Ecuadorian section. Around the valley of Quito alone there are twenty noble volcanic summits, presenting a beautiful variety of form,—here a perfect and there a truncated cone, there a jagged and blasted crest, and there again a smooth and snow-covered dome.

In the Eastern Cordillera the following are capped with perpetual snow—Cayambi, Antisana, Cotopaxi, Llanganati, Sincholagua, Sangai, Sara-urcu, Tunguragua, Collanes, and Assuay; in the Western—Chimborazo, Iliniza, Casalagua, Cotacachi, Pichincha, Corazon, Atacazo, Chiles, Carahuirazo, Yana-urcu, and Quilindaña. Imbabura may either be assigned to the eastern range, or perhaps, more properly regarded as the common point of junction. It is situated at the northern end of the great central valley, attains a height of 15,029 feet, and is remarkable for its vast eruptions of mud and water, the most extensive of which took place in 1691. The name, equivalent to the "fish-producing," from *imba*, fish, and *bura*, mother, is supposed to refer to the quantities of *Pimelodus cyclopum* said to have been contained in its discharges—a phenomenon, however, which has been called in question by Wagner, after a searching investigation into the origin of the report. Cayambi (or by mistake, Cayamburo) is situated exactly on the equator, and is thus distinguished, as Humboldt observes, from every other snow-capped mountain in the world. It is the loftiest summit in the eastern Cordillera, and spreads out at the base over a very extensive area. Antisana rises with a double dome to the height of [illegible] feet, and presents the proof of its former activity in its magnificent lava-streams, of which one, according to Orton, is ten miles long and five hundred feet deep. It may now be classed with the *apagados*, though Humboldt saw smoke issuing in 1802. On the side is the famous *tambo* of Antisana at a height of 13,300 feet above the sea. To the next two peaks—Sincholagua and Rumiñagui, respectively 16,360 and 15,608 feet in height—comparatively little attention has been paid, perhaps from the rivalry of their southern neighbour Cotopaxi. This magnificent mountain has already been briefly described (vol. vi. p. 490). It is the loftiest active volcano in the world. The slope, according to Orton, is 30°, according to Wagner 29°, the north-western side being very slightly steeper than the south-eastern. The apical angle is 122° 30′. On the east it is covered with snow, but on the west it is usually kept bare by the action of the trade winds. Its crater, estimated by Wagner as less than that of Mount Etna, is bordered by a band of trachytic rock, forming a black coronet above the white. On the southern slope, at a height of 15,060 feet, a small one of porphyritic andesite, called *el Picacho*, the beak, or *Cabeza el Inca*, the Inca's head, lifts its bare cliffs far above a thousand et, and from its general appearance gives some show of reason to he tradition which regards it as the original summit of the moun-ain blown off at the first eruption in 1532. The present summit usually enveloped in clouds; and even in the clearest month of e year it becomes visible only for eight or ten days. "On the acunga plateau," says Wagner (*N. Reisen im trop. Amerika*, . 514), "at a height of 8000 Paris feet the prevailing direction of e wind is meridional, usually from the south in the morning, and equently from the north in the evening; but over the summit of otopaxi, at a height of 18,000 feet, the north-west wind always revails throughout the day. The gradually-widening volcanic cloud ntinually takes a south-eastern direction over the rim of the ater; at a height, however, of about 21,000 feet, it suddenly urns to the north-west, and maintains that direction till it reaches height of at least 28,000 feet. There are thus from the foot of e volcano to the highest level attained by its smoke-cloud three uite distinct regular currents of wind."

The principal product of the Cotopaxi eruptions is pumice stone; nd the flanks of the mountain are covered with deep beds of this aterial mingled with trachytic rocks. In the vicinity fragments f obsidian are found in great profusion. Llanganati or Cerro ermoso has been little visited except by natives in search of the olden treasures of the Incas believed to be hid in one of its lakes; nd even their curiosity was quenched by the mysterious fate of adre Longo. Its height is 17,8[illegible]3 feet, and it is said by Villavi-ncio to contain large quantities of pyrites. In regularity of ructure the cone-shaped summit of Tunguragua is similar to otopaxi. It attains an altitude of 16,685 feet above the Pacific; nd, inasmuch as it rises directly from a plain only 5700 feet bove the sea, and is connected with the Cordillera only by a *uchilla* or "knife-edge" from its southern side, it has a much reater apparent elevation than many a mountain that really over-ops it. Its slope is 38°. A cataract fed by the snows on the ummit descends 1500 feet in three leaps; and an enormous asaltic lava-stream, black and smooth and barren as when first t cooled, may be traced in a north-east direction across the channel f many a chafing torrent. The most notable eruption was in 1777. Whether the mountain is now to be classed with the *apagados* ppears doubtful. In 1832 Dr Terry reported that smoke was lmost always ascending from the top; Spruce saw smoke issuing rom the western side in 1857; two years later Wagner could find o trace of activity though he ascended several times to the snow-line; but since that date Prof. Orton, on the authority of Dr Taylor of Riobamba, reports a continual fuliginous discharge. El-Altar is of very irregular shape, consisting of eight snow-clad peaks, the highest of which is 17,735 feet in height. According to an account accepted by Humboldt, there existed at the time of his visit an ancient Quichua manuscript with a description of a terrific catastrophe by which Capac-urcu, the "Chief Mountain"—for so the natives call El-Altar—was blown into its present picturesque confusion, and lost the rank it had previously held of the loftiest summit in all the Andes; but more modern inquiries throw the gravest doubt on the trustworthiness of Humboldt's informant, and the manuscript has never been seen by European eyes. The crater, surrounded by a steep and jagged wall of rocks, is remarkable as the bed of the only real glacier known to exist in the Ecuadorian Andes. Sangai, which brings the list of the summits of the Eastern Cordillera to a close, is perhaps the most restless volcano in the world. Since the Spanish conquest three hundred years ago it has been in uninterrupted activity. Small outbursts of lava, accompanied by explosions of steam and reports as of platoon-firing, succeed each other at intervals usually of 10 or 15 minutes, the fiery discharge shooting about 700 or 800 feet above the rim of the crater. From time to time, especially during the rainy season, the symptoms become more violent, the gigantic jet of molten rock leaps up 2000 feet, the explosions are louder and more terrible than the cannonading of armies, and the noise of the thunders amidst the clouds is answered by still more awful *bramidos* from the inferno below. Though of exceptional interest to the physical investigator, not only on account of this perpetual activity, but also on account of its peculiar position in the Andean range, Sangai, by reason of the difficult and dangerous country by which it is surrounded, has been but rarely visited by European travellers. Wisse and Garcia Moreno, and afterwards Schmarda, attempted the ascent. Our knowledge of Chimborazo, the most southern of the predominant summits of the Western Cordillera, has on the other hand received continuous augmentation from explorer after explorer. The "Mountain of Snow"—for such is the meaning of Chimpu-raza, the original form of the name—attains, according to Humboldt, a height of 21,420 feet,[1] and was long regarded as the culminating point of the Andes. The fact that it only makes the plumb-line deviate 7″ or 8″ shows that it is probably hollow; and there is no doubt the now silent peak was once eloquent with volcanic thunders. The magnificence of its mass, imposing though it be from almost any point of view, can be fully appreciated only from the Pacific. The summit has never been reached; Humboldt attained to a height of 19,381 in 1802; Bolivar afterwards exceeded this limit; and Bossingault and Hall reached 19,682 in 1831. Access can be obtained either by Chillapullo or by the *arenal*—a stretch of sand and gravel about three miles in length which crosses the N.W. side of the mountain at an elevation of more than 14,000 feet. In ascending by the *arenal* the traveller can reach about 16,219 feet above the sea on horseback, and pursus his difficult path on foot till about 19,698; taking the other route he sleeps at the hacienda about 12,664 feet, may proceed to a height of 15,270 by his mule, and attains his furthest limit at 16,777. To the north of Chimborazo, and separated from it only by a narrow valley, Carahuairazo, or, as the Indians call it, Chimborazo's Wife, rises to a height of 16,748 feet. It owes its present diminished stature and picturesque profusion of peak and crag to the sudden collapse of its hollow summit in 1699. Quirotoa, still further north, is supposed to have suffered a similar fate. It now contains in its hollow summit an extensive lake, which, according to Velasco and Villavicencio, has frequently, and most noticeably in 1740, been covered with flames. The height is calculated at about 13,510 feet. Iliniza is a magnificent mountain with two pyramidal peaks, of which the loftiest rises 17,395 feet above the sea. In the 18th century it was trigonometrically measured by the French Academician Bouguer; and Wagner succeeded in reaching within 800 feet of the top, and was only prevented by a sudden storm from completing the ascent. Mules can only be used to a height of 13,200 feet. The geological phenomena furnish no evidence of any volcanic activity either from the summit or the sides. Corazon, so called from its heart-shaped appearance, is equally destitute of a crater. Its summit, 15,796 feet above the sea, has been reached by La Condamine and Bouger, Humboldt and Bonpland, and José Caldas. Atacazo, about 16,000 feet in height, has nothing very remarkable in its appearance or history. According to Wagner, it has no activity, and from its weather-worn aspect seems of older date than its mightier neighbour Pichincha. The summit of the latter, the "Boiling Mountain," presents three groups of rocky peaks, of which the most westerly, Rucu-Pichincha or Old Pichincha, alone displays volcanic activity. The crater, believed to be the deepest on the face of the globe, consists of a funnel-shaped basin 2500 feet deep, 1500 feet wide at the bottom, and upwards of a mile wide at the mouth. The inner sides rise in some places vertically, in others with an angle of 20°; the exterior of the cone has an angle of 30°. Bouger and La Condamine reached the brink in 1742; Wisse and Moreno entered the crater in 1844; and Farrand and Orton have descended to the bottom, the latter in 1867. Orton gives a thrilling description of his exploit. He found that the real cone of eruption was an irregular heap 250 feet in height and 800 feet in diameter, containing about seventy vents. The temperature of the vapour within the fumarole was 184°, and water boiled at 189°. There have been five eruptions of Pichincha since the Spanish conquest—in 1539, 1566, 1577, 1587, and 1660. The second covered Quito three feet deep with ashes and stones. The last, happily, broke down the western side of the crater, so that in any future outburst Quito will probably be safe. Since the earthquake of August 1867, the mountain has sent forth dense masses of black smoke, and large quantities of fine sand. Of Cotocachi, a conical summit 16,288 feet high, and Chiles, a truncated cone about 16,200 feet high, comparatively little is known. The latter is situated on the frontiers of Ecuador, and its northern neighbour Cumbal lies in the territory of Columbia.

Rivers.—The surplus waters of the eastern versant in Ecuador all find their way to the great head-stream of the Amazon; those of the western form a large number of independent rivers disemboguing in the Pacific. The Napo, which claims the first place, rises in the eastern defiles of Cotopaxi and Sincholagua—the principal source being the Rio del Valle, which traverses the Valle Vicioso. The river is still 1450 feet above the sea-level at the village of Napo, 858 at the mouth of the Coca, 586 at the mouth of the Aguarico, 500 at the mouth of the Curaray, and 385 where it joins the Marañon. The current, as observed by Orton in the month of November, was six miles an hour at Napo; in the course of the next eighty miles the river falls 350 feet, and produces a fine series of rapids; and from Santa Rosa downwards the rate is not less than four miles an hour. The breadth of the stream, which is only 120 feet at Napo, has increased to 1500 feet by the time it reaches Coca, and near the end of its course is little less than a full mile. The junction with the Marañon takes place by several distinct mouths. For some distance beyond the mouth of the Coca the channel is navigable for steam-boats, and the natives proceed in canoes as far as the Cataract del Cando, 3332 feet above the sea-level. The Curaray rises in the Llanganati Cordillera, and flows almost parallel with the Napo till their point of confluence, a distance of 490 miles. The waters are rendered unpalatable by a reddish slime in the lower part of its course, where the current is very gentle. The Aguarico, formed by the union of the Cofanes, San Miguel, and Azuela, which descend from the Pimampiro Cordillera in the northern limits of the country, has a course of about 420 miles. The Coca, rising in the neighbourhood of Cayambi and the Guamani Mountains, receives the Maspa and the Cosanga, flows eastward along the line of the equator as far as 76° 10′ W. long, turns southward, takes a leap of 137 feet, and maintains the same direction till it reaches the Napo rather as a rival than a tributary. The Napo system thus drains a district extending from 1° N. to 3° S. lat. and from 78° 10′ to 73° 50′ W. long. The only other Ecuadorian tributary of the Marañon that has any claim to special notice is the Pastassa. Instead of having its head-waters in the eastern slopes of the Eastern Cordillera, as is the case with most if not all of the rivers already described, it rises in the central plateau, within the shadow of Cotopaxi, forces its way through the range to the north of Tunguragua, and flows south-eastwards past the roots of Sangai, augmented from stage to stage by the numerous torrents that are fed by the eternal snows. It bears the name of Patate till its junction with the Chambo in the neighbourhood of Baños, and is not recognized as the Pastassa above the Agoyan falls. As early as 1741 it was navigated without difficulty by Don Pedro Maldonado; and it is believed that it would afford a passage for steamboats for a distance of 314 miles. Mr Simson, one of the most recent explorers of eastern Ecuador, gives a graphic account of the terrific floods to which its mountain tributaries, and more especially the Topo, are subject. The rise of the waters is sometimes so sudden, and their fury so irresistible, that trading parties are imprisoned for weeks in the narrow strip of land between one torrent and the next; and the whole country is traversed in the line of the currents by long ridges, or *cuchillas*, produced by the disintegration and removal of all the intermediate tracts. The same, indeed, holds true more or less of the whole eastern slope of the mountains and of the upper sections of all the rivers. On the western versant of the Ecuadorian Andes there are three river systems of considerable size—the Mira, the Esmeraldas, and the Guayaquil. The first has its head-waters—the Rioblanco, the Pisco, and the Puntal—in the vicinity of Imbabura, breaks through the Western Cordillera, receives from the left the San Pedro, Paramba, Cachiyacu, Chachavi, Canumbi, and from the right the San Juan, Gualpi, and Nulpe, and empties itself by several mouths into the Pacific near the island of Tumaco. The second, which is the largest of the three, collects its abundant waters from Cotopaxi and Sincholagua, the transverse ridge of Tiupullo or Chisinche, Iliniza, Pichincha, and Cayambi. The Cotopaxi tributary, known as the Rio Pedregal, forms three beautiful cascades, the highest of which is about 220 feet. To the Guayaquil system belong the Daule, the Babahoyo, and the Yaguachi, with their numerous tributaries,—the Daule rising in the Sandomo ridge, the Babahoyo in the slopes of the Western Cordillera, and the Yaguachi in the skirts of Chimborazo. They are all navigable for some distance inland by steamer, and are of great importance in connection with the transport of native produce to the port of Guayaquil. Floods are usual in the rainy season, and vast stretches of country are laid under water. In the Daule the tide is felt at Candelaria, 25 miles inland. Along the coast, between the mouth of the Esmeraldas and the Gulf of Guayaquil, a large number of streams find their way to the sea; but as they all have their sources in the comparatively insignificant line of hills that runs north and south about 25 or 30 miles inland, they are themselves comparatively insignificant.

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[1] Reiss and Stübel make it only 20,697 feet.

Lakes.—While Ecuador can boast of nothing worthy of the name of an inland sea, it possesses a large number of lakes, either lying in the laps and extinct craters of the Andes, or formed in the lowlands by the overflowing of its rivers. To the former class belong San Pablo, at the foot of Imbabura, 5 miles in circumference; Cuy-cocha, on the south-east skirt of Cotocachi, 10,200 feet above the sea, and thus one of the highest lakes in the world; Yaguar-cocha, or "Lake of Blood," not far from Ibarra; Quirotoa, about 4600 feet in diameter; Colta, to the east of Riobamba, with a powerful whirlpool in the centre; and Colay, to the south of Riobamba, which exhales gases poisonous enough to stupefy the birds that attempt to cross, and thus helps to fill the larder of the Indians in its neighbourhood. The largest specimens of the second class lie along the Napo. Thermal springs are mentioned in numerous localities,—as at Belermos and San Pedro del Tingo, north-east of Quito; at Cachillacta, in the district of Nanegal; in the skirts of Rumiñagui; at Timbugoyo, near Tacunga; on the slopes of Chimborazo; and at Baños, near the foot of Tunguragua.

Minerals.—Ecuador is less rich in minerals, especially in the precious metals, than any other of the South American states. Silver, gold, iron, mercury, lead, tin, zinc, copper, antimony, manganese, alum, sulphur, and salt are all said to be found; but very few of these exist in sufficient quantity to affect the destinies of national industry. Gold mixed with silver has long been obtained in the neighbourhood of Zaruma, in the province of Loja, and it is gathered by the Indians from the river beds in the Napo and Canelos territory, and more particularly from the Bobonaza. The gold of the Canelos is about 22 carats fine, and that of the Napo 20. The town of Azogues derives its name from its prolific quicksilver mines; and similar deposits are worked within the city of Loja. In the pueblo of Simiatug, to the south-east of Riobamba, the natives manufacture salt from brine springs, and export it under the name of *sal de Tomavela;* the produce of Salinas—a name which tells its own tale—in Imbabura, finds its way to Colombia. Coal of good quality occurs in the province of Cuenca and also on the banks of the Napo near Puca-urcu, the "Red Mountain." Marble, alabaster, gypsum, slate, and other industrial rocks are obtained in various localities; beautiful rock crystal is worked at Changua, in the province of Guayaquil; and in the coast districts there exist considerable deposits of asphalt.

Climate.—The description already given of the position and vertical arrangement of the country implies the main characteristics of Ecuadorian climate. The snow-line varies considerably in the different seasons of the year, as well as according to the form and situation of the individual mountain. Wagner found it in May on Cotocachi, 15,7[illegible] feet high; on Guagua-Pichincha in June, 15,741; on [illegible]-Pichincha in May, 15,762; on Iliniza in December, 15,[illegible]; on Carahuirazo in January, 15,858; on Tunguragua in February, 15,613; and on El-Altar in February, 15,[illegible]. The greatest difference, according to his observations, existed between the south side of Cotopaxi (15,279 feet) and the north side of Chimborazo (15,914). This elevation of the snow-line—so great when compared with its European position—of course renders [illegible]ble the existence of vegetable and animal life at a correspondingly great height. While St Bernard's, the highest point of permanent human habitation in Europe, is only 8[illegible]7 feet above the sea, and of the towns and villages of the central plateaux from Ibarra to Cuenca lie between 8500 and 9500 feet; many of the huts of the cattlemen are at a height of from 11,500 to 12,800; and the loftiest of these, at Cunayaco, on the north side of Chimborazo, in 1° 28′ S. lat., stands no less than 13,396 above the sea. The temperature of these upland districts is of course comparatively low. "At Quito," says Professor Orton, "it is never either spring, summer, or autumn, but each day is a combination of all three." The thermometric mean is 58° 8′; the range in the 24 hours about 10°, the annual maximum 70°, and the annual minimum 45°. In the lower coast-region the tropical position of the country is the main factor, and accordingly at Guayaquil we find the thermometric mean is 83°, and during the rainy season the oppressive and pestiferous air "reminds the geologist of the steaming atmosphere of the Carboniferous period." The rainy season, or *invierno*, in Ecuador continues from December to May, with a short period of dry weather called the *veranillo* shortly after the December solstice. The rest of the year forms the *verano*, or summer, which, however, is in like manner interrupted by a little rainy season called the *inviernillo*, or Cordonazo de San Francisco, after the September equinox. The mean annual rainfall at Quito is 70 inches. In the coast region the two seasons are not very distinctly marked: in the invierno the sky is sometimes perfectly cloudless, while during the verano there occasionally falls a continuous drizzle called *garúa*. According to Villavicencio, a gradual diminution of rain has been observed in this district of irregular seasons, and he predicts the assimilation of its climate to that of the rainless coasts of Peru. On the eastern side of the Andes, on the other hand, rain occurs almost at any time of the year, and almost every morning the woods are watered with the gentle showers of the *rocio*. During the verano the Cordilleras and *mesas* are visited by violent hail-storms, and winds of almost incredible force sweep across the wintry scene. In its relation to human health the climate of the upland region is interesting. Goitre is common; and it is found necessary to maintain three large hospitals for lepers. Tubercular disease of the lungs, on the contrary, is said to be completely unknown 8000 feet above the sea, while it is one of the most frequent of diseases in the coast districts of Tropical America. The effects on the human organism of the ascension of the loftier summits are very variously described, owing doubtless to individual differences of constitution. One thing seems established,—that the pugnacious instincts both of men and the lower animals are greatly weakened.

Botany.—The flora of the Quitonian plateau has been well explored by various European botanists, and more especially by Dr Jameson of the university of Quito;[1] that of the western slopes and lowlands is less perfectly ascertained; and that of the richly-wooded country stretching eastward from the Andes is still in great part undescribed. From the coast of the Pacific upwards to a height of about 3000 or 4000 feet, the vegetation is distinctively tropical, including among its economical species the banana, the sweet potato, rice, maize, the bread-fruit tree, indigo, cotton, cocoa, the yam, the mandioc, and the sugar cane. Most of these become rare above 3000 feet, but a few, like the sugar cane, are cultivated as high as 8000. Few parts of the world can vie in richness of vegetation with the alluvial valley of Guayaquil, which in the matter of fruit trees alone produces cocoa-nuts, pine-apples, pomegranates, shaddocks, oranges, lemons, apricots, chirimoyas, paltas, granadillas, tunas, mangos, pacays, and many others of less importance. Between 6000 and 10,000 feet above the sea the European cereals are successfully cultivated, along with the chick-pea, the broad-bean, the cabbage, the quinoa (*Chenopodium Quinoa*), potatoes, *Oxalis*, *Basella*, and *Tropæolum*. Wheat will not form the ear lower than at 4500 feet, or ripen higher than at 10,500; but barley and rye can be grown at a still greater elevation. The oak, the elm, the ash, and the beech never descend lower than to 5500 feet, and are seldom found higher than 9200. Further up, the larger forest trees, except the pine, begin to disappear; but the *Escallonia myrtalloides* is met with at an elevation of 13,000; and the shrubby *Befarias* ascend 400 or 500 feet higher. In the treeless region that lies between 11,600 and 13,800, or in other places between 12,000 and 14,000 feet, the similarity of the vegetation to that of the corresponding European region is, according to Wagner, especially striking. In the paramos of Chimborazo, Pichincha, Iliniza, &c., the relation of characteristic genera to those identical with genera in the Alpine flora of Europe is as 5 to 4; and the botanist might almost suppose himself in the Upper Engadine. As the region of cryptogams does not properly begin till about 17,000 feet on Cayambi and Chimborazo, most of the summits of the Cordilleras, failing, as they do, to reach this elevation, yield a considerable harvest of phanerogamous plants. Boussingault discovered a species of saxifrage (*Saxifraga Boussingaulti*) at a height of nearly 16,000 feet on Chimborazo, and Wagner found the trachytic rocks of Pichincha, Iliniza, and other peaks, far above the snow line, covered in many places with the gonda-plant, or *Culcitium nivale*, H. The species in these upper regions are frequently very remarkable, and a large number of strangely-modified forms have been collected from the craters of the volcanoes.

In its forest-lands alone Ecuador possesses almost inestimable resources. Seven different species of cinchona are known to exist within its borders; the *Ceroxylon andicola* and many lesser species of palm abound on both sides of the Cordilleras; and redwood, Brazil wood, palo de cruz, guaiacum or holy wood, ebony, cedar, and aguana are a few of the more usual timber trees. In the dripping forests of the west grows the sindi-caspi, which forms excellent fuel even in its moistest condition. Copal, dragon's blood, india-rubber, storax, and several valuable dye-stuffs are obtained from indigenous plants. The cabaya or agave, the chambiri palm, &c., yield textile fibres; and the leaves of the toquilla (*Carludovica palmata*) and the mocora, a cocoa-nut-like tree, furnish material for the well-known hats.

Zoology.—The fauna of Ecuador does not present a great variety among the mammalia; but the birds, and still more the insects, are very numerous. The jaguar, the puma, the ounce, and the ocelot are the chief representatives of the cat tribe; monkeys of various species are common; the four characteristic animals of the Andean range, the llama, the guanaco, the vicuña, and the alpaca, are fairly abundant; large herds and flocks of European cattle and sheep are found in the rich pasture of the paramos; and horses, asses, and mules are reared in sufficient numbers to be articles of export. Few rivers are more densely peopled with alligators than the Guayaquil and Esmeraldas; and several of the largest species of snakes are natives of the warmer regions of the country, though in the Cordilleras and plateaus the reptilia are very rare. The condor, the turkey-buzzard, the gallinazo, the crane, and the pelican are among the larger birds; and ducks, pheasants, and partridges are not uncommon. Of the lesser birds perhaps none appears in such number and such striking variety of form and colour as the humming bird, which is found frequently at a great height on the mountains. The flautero or flute-bird is especially noticeable for the artistic character of his song. That the entomologist finds a rich harvest of coleopterous insects in the low countries is in keeping with what might be expected; butterflies are so numerous in some parts as even to surprise the veteran collector; and in certain favoured regions, mosquitoes, sand-flies, and the equally troublesome piums seem nearly as prolific as their ancient congeners in Egypt. The silkworm has been successfully introduced, but bee-keeping is as yet practically unknown. The ichthyology of Ecuador, and more particularly that of the rivers of the Amazon system, is very partially ascertained; but the species of the two versants seem to be quite distinct. According to Wagner's investigations the distribution is mainly vertical, and to the N. of Chimborazo alpine forms go as high as 13,400 Paris feet; the forms of the lower region (or under 1000 feet), are closely connected with those of Brazil and Guiana; more peculiar genera appear in the middle region, (from 1000 to 7000 feet), and the upper region is exclusively occupied by characteristic and frequently very strangely-shaped genera; the number of species is comparatively small, and that of individuals great only in the lower parts of the rivers.

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[1] See his *Synopsis Plantarum Æquatoriensium*, 2 vols.

Produce and Industries.—The principal article of foreign export is cocoa, of which two kinds especially are distinguished in the market—the fine "up-river" quality and the so-called Machala quality. Spain is the greatest purchaser, then England, Germany, and Peru and Chili. In 1874 the total quantity that left the country was 250,216 quintals, valued at 2,752,381 pesos, or, taking the peso as equal to 4s. 2d., £573,412. The collection of india-rubber is becoming an important trade; and pupils trained at the Government expense have been sent into the various provinces to superintend the introduction of indigo cultivation. Cotton, not proving a profitable investment, is being somewhat neglected: the export in 1874 was only 440,091 lb, valued at 35,208 pesos. The other articles, arranged in the order of importance, were—coffee, 10,652 lbs, at 245,014 pesos; Cinchona bark, 981,132, at 196,226 pesos; vegetable ivory, 7,148,192 lb, at 142,963 pesos; straw hats, 7600 dozen, at 91,200 pesos; sole-leather, 19,744 pieces, at 88,848 pesos; dried skins to the amount of 43,115 pesos; bamboos to the amount of 23,002; and small quantities of sarsaparilla, algarroba, tamarinds, tobacco, pita, orchilla, rice, mats, and saibo-wool. A bank of issue and deposit, called the Bank of Ecuador, with a capital of a million dollars, was established in 1868.

Constitution. *Details of Political and Social Condition.*—The main basis of the Ecuadorian constitution dates from 1843, but several important modifications have been introduced at various periods. The executive power is vested in a responsible president elected by a majority of votes among a body of 900 electors appointed by popular suffrage. He has no right of veto, and cannot interfere in any way with the sitting of the congress. Besides a vice-president, who is elected in the same way as the president, and, according to the decree of 1869, discharges the functions of home secretary, the cabinet comprises a minister of war and marine, a minister of finance, the president of the supreme court, and a prominent member of the clerical body. The legislative assembly or congress is divided into two houses, the upper consisting of sixteen senators, the lower of thirty deputies elected by popular suffrage. Justice. The judicial system comprises a supreme court at Quito, three upper courts, provincial courts, municipal courts presided over by the alcaldes, and parochial courts. Jury trial is employed in criminal cases, but many districts are very evidently too ignorant for the satisfactory working of the method. A governor-general is appointed for Guayaquil and Quito respectively. Slavery was abolished in 1854: all races and classes are equal in the eyes of the law; and there are no hereditary distinctions of rank or title. The military force numbers only about 1200 men, and the marine consists of three small steamers. Finance. The finances have long been in a rotten condition, and trustworthy information is of difficult attainment. The public revenue in 1873 was stated at 3,650,510 dollars or piastres (about £730,102); and the expenditure at 3,985,560 dollars (about £797,112) In 1872 the receipts were thus divided:—Customs, 1,707,403 piastres; duty on tobacco, 19,084; duty on alcohol, 111,420; salt monopoly, 312,785; gunpowder monopoly, 30,477; stamped paper, 114,395; income-tax, 67,451; duty on sale of land, 216,110; tithes, 371,811; mont-de-piété, 1159; post-office, 96,280; national property, 52,866; miscellaneous, 512,297—total, 3,613,536. In 1857 the national debt amounted to 16,370,000 piastres (or £3,274,000), of which £1,824,000 was the English loan contracted in 1855.

Artificial means of communication are still for the most part in a very primitive condition, though few countries have ever so little reason to be content with their natural highways by land or water. Many of the roads, even between important centres of population, are mere mule-tracks, altogether impassable in bad weather it may be for weeks or months at a time; while the violent torrents which have so frequently to be crossed often present nothing better than more or less elaborate bridges of rope, similar to the *jhuler* or *sampur* of the Kashmirians. The simplest of these is the *taravita*, consisting of a single tight rope, with or without a travelling rope by which the passenger or his luggage may be hauled across; the most complex is the *chimba-chaca*, a rude prototype of the regular suspension bridge, constructed of four or five ropes of agave-root fibre, supporting transverse layers of bamboo. The best are hazardous to all except a practised foot, and they go out of repair in a few years. Since the middle of the century something has been done to improve this state of affairs; and a very great deal more has always been about to be done. According to Moreno's address to congress in 1873, Ecuador had at that time 30 miles of railway, nearly 200 miles of cart-road with substantial bridges, and about 250 miles of roads fit for the ordinary mule-traffic of the country. Wheeled conveyances are almost unknown, especially in the inland districts, the transport of goods of every description being effected by porters or mules. The first carriage was introduced into Quito in 1859, and the owner had to pay a tax for his innovation.

With the partial exception of such rude forms of belief as still linger among the semi-civilized Indians, the only religion professed by the Ecuadorian populations is the Roman Catholic. Nowhere in modern times have Jesuits and priests had it more their own way. Even in 1876 Dr Borrero, the "liberal" president, thought it expedient to declare that he would protect the religion of his fathers, which he believed "had not an enemy in all Ecuador." Two years before, in spite of the extremely depressed state of the finances, ten per cent. of the part of the church revenue belonging to the state was assigned to the Pope as an annual offering. The oath of a Protestant has no value in a court of justice; and it was regarded as an extraordinary stretch of liberality to allow the formation of a Protestant burial-ground at Quito in 1867. Monkish orders that lost their influence in Europe centuries ago still flourish in Quito—Trinitarians, Dominicans, Augustinians, Brown Franciscans, Black Franciscans, Lazarists, &c. According to Villavicencio, the number of the regular clergy at the time he wrote was 415, of the secular clergy 524, and of nuns 391. Quito is the seat of an archbishop; and there are bishoprics for Cuenca, Loja, Ibarra, Riobamba, Guayaquil, and Manabi.

Education has hitherto been left in the hands of the clergy, and primary education is consequently in a very defective condition. There has long been a university at Quito with about a dozen professors and nearly 300 students; and in 1875 the Ecuador academy was instituted in the city in accordance with the decree of the Spanish academy of Madrid. There are colleges in several of the larger towns, and nearly 600 schools exist throughout the country. The normal school at Guayaquil is open to Indian children.

For administrative purposes the country is divided into eleven provinces—Azuay, with 149,103 of a population in 1871; Chimborazo, 110,860; Pichincha, 102,281; Guayas, 87,427; Imbabura, 77,379; Leon, 76,140; Tunguragua, 73,143; Los Rios, [illegible]; Loja, 60,784; Manabi, 59,098; Esmeraldas, 8008. Besides the capital, whose inhabitants are variously estimated from [illegible] to 80,000, the largest cities are—Guayaquil, from 20,000 to 25,000; Tacunga, from 16,000 to 20,000; Cuenca, about 25,000; Riobamba and Ibarra, both perhaps about 16,000; Ambato, about [illegible]; Otavalo, about 8000; Guaranda, 8000; and Cotacachi, [illegible].

Antiquities.—Throughout Ecuador there are still considerable remains of the architectural and artistic skill of the ante-European period. At Cañar, to the north-east of Cuenca, stands the Ingapirca, a circular rampart of finely hewn stone, inclosing an open area with a roofless but well-preserved building in the centre; not far off is the Inca-chungana, a very much smaller inclosure, probably the remains of a pavilion; and in the same neighbourhood the image of the sun and a small cabinet are carved on the face of a rock called Inti-huaicu. On one of the hills running from Pichincha to the Esmeraldas there are remains at Paltatamba of a temple and a conical tower, the buttresses of a bridge composed of stone and bitumen, portions of a great causeway, and numerous tombs from which mummies and plates of silver have been obtained. At Hatuntaqui similar sepulchral mounds, called *tolas*, may be seen, as well as traces of military structures. On the plain of Callo, near Cotopaxi, at a height of 8658 feet, the ruins of an Incarial palace, Pachusala, are utilized by the *hacienda*; and a conical hill at its side is supposed to be of artificial construction. The remains of another fortress and palace are preserved at Pomallacta, and in the

ring pueblo of Achupallas an ancient temple of tne sun
es as parish church.
y.—The territory of the present republic of Ecuador, when
becomes dimly visible in the grey dawn of American
appears to be inhabited by upwards of fifty independent
nong which the Quitus seem to hold the most important
About 280 A.D. a foreign tribe is said to have forced
inland np the valley of the Esmeraldas; and the kingdom
ey founded at Quito lasted for abont 1200 years, and was
extended, both by war and alliance, over many of the
ring dominions. In 1460, during the reign of the four-
ran *Shyri*, or king of the Cara nation, Hualcopo Duchisela,
nest of Quito was undertaken by Tupac Yupanqui, the Inca
and his ambitious schemes were, not long after his death,
lly carried out by his son Huaina-Capac, who inflicted a
defeat on the Quitonians in the battle of Hatuntaqui, and
nis position by marrying Pacha, the daughter of the late
By his will the conqueror left the kingdom of Quito to
pa, his son by this alliance; while the Peruvian throne
gned to Huascar, an elder son by his Peruvian consort.
broke out between the two kingdoms, owing to Huascar's
ns to supremacy over his brother; but it ended in the
d imprisonment of the usurper, and the establishment of
pa as master both of Quito and Cuzco. The fortunate
, however, had not long to enjoy his success; for Pizarro
Spaniards were already at the door, and by 1533 the fate
untry was sealed. As soon as the confusions and rivalries
st-occupation were suppressed, the recent kingdom of Quito
e a presidency of the Spanish vice-royalty of Peru, and no
f importance took place till 1710. In that year it was
to the viceroyalty of Santa Fé; but it was restored to Peru

When, towards the close of the century, the desire for
lence began to manifest itself throughout the Spanish
of South America, Quito did not remain altogether indif-
The Quitonian doctor Eugenio Espejo, and his fellow-
Don Juan Pio Montufar, entered into hearty co-operation
riño and Zea, the leaders of the revolutionary movement at
é; and it was at Espejo's suggestion that the political
on called the *Escuela de Concordia* was instituted at Quito.
ot till 1809, however, that the Quitonians made a real
to throw off the Spanish yoke; and both on that occasion
812 the royal general succeeded in crushing the insurrec-
n 1820 the people of Guayaquil took up the cry of liberty;
pite of several defeats they continued the contest, till at
under Antonio José de Sucre, who had been sent to their
e by Bolivar, and reinforced by a Peruvian contingent
ndres de Santa Cruz, they gained a complete victory on
1822, in a battle fought on the side of Mount Pichincha,
ght of 10,200 feet above the sea. Two days after, the
president of Quito, Don Melchor de Aymeric, capitulated,
independence of the country was secured. A political
as at once effected with New Granada and Venezuela on
of the republican constitution instituted at Cucuta in July
he triple confederation taking the name of Colombia.
greement with Peru in 1828 resulted in the invasion of
and the temporary occupation of Cuenca and Guayaquil by
forces; but peace was restored in the following year after
adorian victory at Tarqui. In the early part of 1830 a
n was effected from the Colombian federation, and the
was proclaimed an independent republic. General Juan José
as the first president, and in spite of many difficulties,
mestic and foreign, he managed to maintain a powerful
in the state for about 15 years. Succeeded in 1835 by
Rocafuerte, he regained the presidency in 1839, and was
for the third time in 1843; but shortly afterwards he
the title of generalissimo and a sum of 20,000 pesos, and
country to his rivals. One of the most important measures
cond presidency was the establishment of peace and friend-
h Spain. Roca, who next attained to power, effected a
y settlement with Colombia, concluded a convention with
against the slave trade, and made a commercial treaty
gium. Diego Noboa, elected in 1850 after a period of great
n, recalled the Jesuits, produced a rupture with New
by receiving conservative refugees, and thus brought
s own deposition and exile. The democratic Urbina now
practically dictator, and as the attempt of Flores to reinstate
roved a total failure, he was quickly succeeded in 1856 by
Francisco Robles, who, among other progressive measures,
the adoption of the French system of coinage, weights, and
. He abdicated in 1859 and left the country, after refus-
tify the treaty with Peru, by which the defender of Guaya-
obtained the raising of the siege. Dr Gabriel Garcia
professor of chemistry, the recognized leader of the con-
party at Quito, was ultimately elected by the national
on of 1861. Distrust in his policy, however, was excited
ublication of some of his private correspondence, in which
favourably of a French protectorate, and the army which
he sent under Flores to resist the encroachments of Mosquera, the president of New Granada, was completely routed. His first resignation in 1864 was refused; but the despotic acts by which he sought to establish a dictatorship only embittered his opponents, and in Sept. 1865 he retired from office. While he had endeavoured to develop the material resources of the country he had at the same time introduced retrograde measures in regard to religion and education. The principal event in the short presidency of his successor, Geronimo Carrion (May 1865–Nov. 1867), was the alliance with Chili and Peru against Spain, and the banishment of all Spanish subjects. Several important changes were made by congress in the period between his resignation and the election of Xavier Espinosa, Jan. 1868: the power of the president to imprison persons regarded as dangerous to public order was annulled; and the immediate naturalization of Bolivians, Chilians, Peruvians, and Colombians was authorized. Espinosa had hardly entered on his office when, in August 1868, the country was visited by an earthquake, in which 30,000 people are said to have perished throughout South America. The public buildings of Quito were laid in ruins; and Ibarra, Otavalo, Cotacachi, and several other towns were completely destroyed. Next year a revolution at Quito, under Moreno, brought Espinosa's presidency to a close; and though the national convention appointed Carvajal to the vacant office, Moreno succeeded in securing his own election in 1870 for a term of six years. His policy had undergone no alteration since 1865: the same persistent endeavour was made to establish a religious despotism, in which the supremacy of the president should be subordinate only to the higher supremacy of the clergy. The tyranny, however, came to a sudden end in August 14th 1875, when the president was assassinated in Quito, by three of his private enemies. The consequent election resulted in the appointment of Dr Borrero, who, in his address to congress, December 1876, promised "to maintain, during the tenure of the responsible office to which he had never aspired, full political liberty and the freedom of the press." An insurrection headed by Veintemilla, the military commandant of Guayaquil, had already broken out; and on the 14th December the Government forces under Aparicio were completely routed at Galta.

See Ulloa, *Relacion hist. del Viaje*, Madrid, 1748; Caldas, *Seminario de la Nueva Granada*, Paris, 1749; Velasco, *Hist. del reino de Quito*, Quito, 1789 (French, by Ternaux-Compans, Paris, 1840); Humboldt and Bonpland, *Voyages aux régions équinox. du nouveau continent*, 1799, &c.; Villavicencio, *Geografía de la Rep. del Ecuador*, New York, 1858; Richard Spruce, "Visit to the Cinchona forests on the western slopes of the Quitenian Andes," in *Journ. of the Proc. of the Linnean Soc.* 1860; Pritchett, "Explor. in Ecuador in the years 1856 and 1857," in *Journ. of Roy. Geog. Soc.* 1860; Spruce, "On the Mountains of Llanganati," and Prof. Jameson, "Journey from Quito to Cayambe in 1859, in *Journ. Roy. Geog. Soc.*, 1861; Viscount Onffroy de Thoron, *Amérique équatoriale*, 1866; Hassaurek, *Four Years among Spanish Americans*, London, 1868; Juan Leon Mera, *Ojeada histórico-crítica sobre la poesía Ecuadoriana*, Quito, 1868; Wagner, *Naturwissensch. Reisen im trop. Amerika*, Stuttgart, 1870; Orton, *The Andes and the Amazon*, 1870; Flemming in the *Globus*, 1871 and 1872; Reiss and Stübel, "Höhenmessungen in Süd Amerika," in *Zeitsch. der Gesells. für Erdkunde zu Berlin*, 1874; "Die Zustände in der Rep. Ecuador," in *Das Ausland*, 1875; Dr W. Reiss, "Bericht über eine Reise nach dem Quilotoa und dem Cerro Hermoso," in *Zeitsch. der Deutsch. Geol. Gesells.*, 1875; Vadet, "L'Equateur," in *L'Explorateur géographique et commerciale*, 1875; Simson, "Notes of Journeys in the Interior of South America," in *Proc. of Roy. Geog. Soc.*, 1877. (H. A. W.)

EDAM, a town of the Netherlands, in the province of North Holland and arrondissement of Hoorn, about 11 miles north-east of Amsterdam, and hardly a mile from the present limits of the Zuider Zee, at the junction of two branch canals. It has a fine town-house, an exchange, and a fish-market, and one of its two Reformed churches is adorned with stained glass, and ranks among the most beautiful buildings of the kind in the province. Ship-building, rope-spinning, and salt-boiling are carried on, and the place gives its name to a well-known description of "sweet-milk" cheese—*Zoetemelks Kaas*. It was at Edam that nearly the whole of Admiral De Ruyter's fleet was constructed. Population of the commune in 1869, 5152, and of the town 3356.

EDDA, the original signification of which is "great-grandmother," is the title given to two very remarkable collections of old Icelandic literature. Of these only one bears that title from antiquity; the other is named *Edda* by a comparatively modern misnomer. The only work known by this name to the ancients was the miscellaneous group of writings attributed to Snorri Sturluson (1178–1241), a scholar of Jon Löftssön, and the greatest name in old Scandinavian literature. It is believed that the *Edda*, as he left it, was completed about 1222. Whether he gave this name to the work is doubtful; the title first occurs in the Upsala Codex, transcribed about fifty years after his death. The collection of Snorri is now known as the *Prose* or *Younger Edda*, the title of the *Elder Edda* being given to a book of ancient mythological poems, discovered by the Icelandic bishop of Skálaholt, Brynjulf Sveinsson, in 1643, and erroneously named by him the *Edda of Sæmund.*

1. The Prose *Edda*, properly known as *Edda Snorra Sturlusonar*, was arranged and modified by Snorri, but actually composed, as has been conjectured, between the years 1140 and 1160. It is divided into five parts, the Preface or *Formáli*, *Gylfaginning*, *Bragaræður*, *Skáldskaparmál*, and *Háttatal*. The preface bears a very modern character, and simply gives a history of the world from Adam and Eve, in accordance with the Christian tradition. *Gylfaginning*, or the Delusion of Gylfi, on the other hand, is the most precious compendium which we possess of the mythological system of the ancient inhabitants of Scandinavia. Commencing with the adventures of a mythical king Gylfi and the giantess Gefion, and the miraculous formation of the island of Zealand, it tells us that the Æsir, led by Odin, invaded Svithjod or Sweden, the land of Gylfi, and settled there. It is from the *Ynglingasaga* and from the *Gylfaginning* that we gain all the information we possess about the conquering deities or heroes who set their stamp upon the religion of the North. Advancing from the Black Sea northwards through Russia, and westward through Esthonia, the Æsir seem to have overrun the south lands of Scandinavia, not as a horde but as an immigrant aristocracy. The Eddaic version, however, of the history of the gods is not so circumstantial as that in the *Ynglingasaga;* it is, on the other hand, distinguished by an exquisite simplicity and archaic force of style, which give an entirely classical character to its mythical legends of Odin and of Loki. The *Gylfaginning* is written in prose, with brief poetic insertions. The *Bragaræður*, or sayings of Bragi, are further legends of the deities, attributed to Bragi, the god of poetry, or to a poet of the same name. The *Skáldskaparmál*, or Art of Poetry, commonly called *Skálda*, contains the instructions given by Bragi to Ægir, and consists of the rules and theories of ancient verse, exemplified in copious extracts from Eyvindr Skáldaspillir and other eminent Icelandic poets. The word *Skáldskapr* refers to the form rather than the substance of verse, and this treatise is almost solely technical in character. It is by far the largest of the sections of the *Edda* of Snorri, and comprises not only extracts but some long poems, notably the *Thorsdrapa* of Eilifr Guðrúnarson and the *Haustlaung* of Thjóðólfr. The fifth section of the *Edda*, the *Háttatal*, or Number of Metres, is a running technical commentary on the text of Snorri's three poems written in honour of Hakon, king of Norway.[1] Affixed to some MS. of the *Younger Edda* are a list of poets, and a number of philological treatises and grammatical studies. These belong, however, to a later period than the life of Snorri Sturluson.

2. The Elder *Edda*, Poetic *Edda*, or *Sæmundar Edda hins fróða* was entirely unknown until about 1643, when it came into the hands of Brynjulf Sveinsson, who, puzzled to classify it, gave it the title of *Edda Sæmundi multiscii.* Sæmund Sigfusson, who was thus credited with the collection of these poems, was a scion of the royal house of Norway, and lived from about 1055 to 1132 in Iceland. The poems themselves date in all probability from the 8th or 9th centuries, and are many of them only fragments of longer heroic chants now otherwise entirely lost. They treat of mythical and religious legends of an early Scandinavian civilization, and are composed in the simplest and most archaic forms of Icelandic verse. The author of no one of them is mentioned. It is evident that they were collected from oral tradition; and the fact that the same story is occasionally repeated, in varied form, and that some of the poems themselves bear internal evidence of being more ancient than others, proves that the present collection is only a gathering made early in the Middle Ages, long after the composition of the pieces, and in no critical spirit. Sophus Bugge, indeed, one of the greatest living authorities, absolutely rejects the name of Sæmund, and is of opinion that the poetic *Edda*, as we at present hold it, dates from about 1240. There is no doubt that it was collected in Iceland, and by an Icelander.

The most remarkable and the most ancient of the poems in this priceless collection is that with which it commences, the *Völuspá*, or Prophecy of the Völva or Sibyl. In this chant we listen to an inspired prophetess, "seated on her high seat, and addressing Odin, while the gods listen to her words." She sings of the world before the gods were made, of the coming and the meeting of the *Æsir*, of the origin of the giants, dwarfs, and men, of the happy beginning of all things, and the sad ending that shall be in the chaos of Ragnarök. The latter part of the poem is understood to be a kind of necromancy,—according to Vigfusson, "the raising of a dead völva;" but the mystical language of the whole, its abrupt transitions and terse condensations, and above all the extinct and mysterious cosmology, an acquaintance with which it presupposes, make the exact interpretation of the *Völuspá* extremely difficult. The charm and solemn beauty of the style, however, are irresistible, and we are constrained to listen and revere as if we were the auditors of some fugual music devised in honour of a primal and long-buried deity. The melodies of this earliest Icelandic verse, elaborate in their extreme and severe simplicity, are wholly rhythmical and alliterative, and return upon themselves like a solemn incantation. *Hávamál*, the Sayings of the High One, or Odin, follows next; this contains proverbs and wise saws, and a series of stories, some of them comical, told by Odin against himself. The *Vafthrúðnismál*, or sayings of Vafthrúðnir, is written in the same mystical vein as *Völuspá;* in it the giant who gives his name to the poem is visited by Odin in disguise, and is questioned by him about the cosmogony and chronology of the Norse religion. *Grimnismál*, or the Sayings of Grimnir, which is partly in prose, is a story of Odin's imprisonment and torture by king Geirröd. *För Skirnis*, or the Journey of Skirnir, *Harbarðsljóð*, or the Lay of Harbarð, *Hymiskviða*, or the Song of Hymir, and *Œgisdrekka*, or the Brewing of Œgir, are poems, frequently composed as dialogue, containing legends of the gods, some of which are so ludicrous that it has been suggested that they were intentionally burlesque. *Thrymskviða*, or the Song of Thrym, possesses far more poetic interest; it recounts in language of singular force and directness how Thor lost his hammer, stolen by Thrym the giant, how the latter refused to give it up unless the goddess Freyia was given him in marriage, and how Thor, dressed in woman's raiment, personated Freyia, and, slaying Thrym, recovered his hammer. *Alvíssmál*, or the Sayings of Alvis, is actually a philological exercise under the semblance of a dialogue between Thor and Alvis the dwarf. In *Vegtamskviða*, or the Song of Vegtam, Odin questions a völva with regard to the meaning of the sinister dreams of Balder. *Rigsmál*, or more properly *Rigsthula*, records how the god Heimdall, disguised as a man called Rig, wandered by the sea-shore, where he met the original dwarf pair, Ai and Edda, to whom he gave the power of child-bearing, and thence sprung the whole race of thralls; then he went on and met with Áfi and Amma, and made them the parents of the race of churls; then he proceeded until he came to Faðir and Moðir, to whom he gave Jarl, the first of free men, whom he himself brought up, teaching him to shoot and snare, and to use the sword and runes. It is much to be lamented that of this most characteristic and picturesque poem we possess only a fragment. In *Hyndluljóð*, the Lay of Hyndla, the goddess Freyia rides to question the völva Hyndla with regard to the ancestry of her young paramour Ottar; a very fine quarrel ensues between the prophetess and her visitor. With this poem, the first or wholly mythological portion of the collection closes. What follows is heroic and pseudo-historic. The *Völundarkviða*, or Song of Völundr, is engaged with the sufferings and adventures of Völundr, the smith-king, during his stay with Nidud, king of Sweden. Völundr, identical with the Anglo-Saxon Wêland and the German Welant, is sometimes confounded with Odin, the master-smith. This poem contains the beautiful figure of Svanhvít, the swan-maiden, who stays seven winters with Völundr, and then, yearning for her fatherland, flies away home through the dark forest. *Helgakviða Hiörvarðs Sonar*, the Song of Helgi, the Son of Hiörvarð, which is largely in prose, celebrates the wooing by Helgi of Svava, who, like Atalanta, ends by loving the man with whom she has fought in battle. Two Songs of Helgi the Hunding's Bane, *Helgakviða Hundingsbana*, open the long and very important series of lays relating to the two heroic families of the Völsungs and the Niblungs. Including the poems just mentioned, there are about twenty distinct pieces in the poetic *Edda* which deal more or less directly with this chain of stories. It is hardly necessary to give the titles of these poems here in detail, especially as they are, in their present form, manifestly only fragments of a great poetic saga, possibly the earliest coherent form of the story so universal among the Teutonic peoples. We happily possess a somewhat later prose version of this lost poem in the *Völsungasaga*, where the story is completely worked out. In many places the prose of the *Völsungasaga* follows the verse of the Eddaic fragments with the greatest precision, often making use of the very same expressions. At the same time there are poems in the *Edda* which the author of the saga does not seem to have seen. But if we compare the central portions of the myth, namely Sigurd's conversation with Fafnir, the death of Regin, the speech of the birds and the meeting with the Valkyrje, we are struck with the extreme fidelity of the prose romancer to his poetic precursors in the *Sigurðarkviða Fafnisbana*; in passing on to the death of Sigurd, we perceive that the version in the *Völsungasaga* must be based upon a poem now entirely lost. Of the further extension of the myth and its corruption into the romantic epic of *Der Nibelunge Nôt*, this is not the place for discussion. Suffice to say that in no modernized or Germanized form does the legend attain such an exquisite colouring of heroic poetry as in these earliest fragments of Icelandic song. A very curious poem, in some MSS. attributed directly to Sæmund, is the Lay of the Sun, *Sólarlióð*, which forms a kind of appendix to the poetic *Edda*. In this the spirit of a dead father addresses his living son, and exhorts him, with maxims that resemble those of *Hávamál*, to righteousness of life. The tone of the poem is strangely confused between Christianity and Paganism, and it has been assumed to be the composition of a writer in the act of transition between the old creed and the new. It may, however, not impossibly, be altogether spurious as a poem of great antiquity, and may merely be the production of some Icelandic monk, anxious to imitate the Eddaic form and spirit. Finally *Forspjallsljóð*, or the Preamble, formerly known as the Song of Odin's Raven, is an extremely obscure fragment, of which little is understood, although infinite scholarship has been expended on it. With this the poetic *Edda* closes.

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[1] The three oldest MSS. of the prose *Edda* all belong to the beginning of the 14th century. The Wurm MS. was sent to Ole Wurm in 1628; the Codex Regius was discovered by the indefatigable bishop Brynjulf Sveinsson in 1640. The most important, however, of these MSS. is the Upsala Codex, an octavo volume written probably about the year 1300. There have been several good editions of the *Edda Snorra Sturlusonar*, of which perhaps the best is that published by the Arne-Magnæan Society in Copenhagen in 1848, in two vols., edited by a group of scholars under the direction of Jón Sigurdsson.

The principal MS. of this *Edda* is the Codex Regius in the Royal Library at Copenhagen, written continuously, without regard to prose or verse, on 45 leaves. This is that found by Bishop Brynjulf. Another valuable fragment exists in the Arne-Magnæan collection in the University of Copenhagen, consisting of six leaves. These are the only MSS. older than the 17th century which contain a collection of the ancient mythico-heroic lays, but fragments occur in various other works, and especially in the *Edda* of Snorri. The poetic *Edda* was translated into English verse by Amos Cottle in 1797; the poet Gray produced a version of the *Vegtamskviða*; but the first good translation of the whole was that published by Benjamin Thorpe in 1866. An excellent edition of the Icelandic text has been prepared by Th. Möbius, but the standard of the original orthography will be found in the admirable edition of Sophus Bugge, *Norræn Fornkvæði*, published at Christiania in 1867. (E. W. G.)

EDELINCK, Gerard (1649–1707), one of the greatest copper-plate engravers, was born at Antwerp in 1649. The rudiments of the art, which he was to carry to a higher pitch of excellence than it had previously reached, he acquired in his native town under the engraver Cornelisz Galle. But he was not long in reaching the limits of his master's attainments; and then he went to Paris to improve himself under the teaching of De Poilly. This master likewise had soon done all he could to help him onwards, and Edelinck ultimately took the first rank among line engravers. His excellence was generally acknowledged; and having become known to Louis XIV. he was appointed, on the recommendation of Le Brun, teacher at the academy established at the Gobelins for the training of workers in tapestry. He was also entrusted with the execution of several important works. In 1677 he was admitted member of the Paris Academy of Painting and Sculpture. The work of this great engraver constitutes an epoch in the art. His prints number more than four hundred, and it is asserted that amongst them there is no work of poor or middling quality, although many of his subjects were poor and unworthy of the high art which he lavished upon them. Edelinck stands above and apart from his predecessors and contemporaries especially in this that he excelled, not in some one respect, but in all respects,—that while one engraver attained excellence in correct form, and another in rendering light and shade, and others in giving colour to their prints, and the texture of surfaces, he, as supreme master of the burin, possessed and displayed all these separate qualities, and that in so complete a harmony that the eye is not attracted by any one of them in particular, but rests in the satisfying whole. Edelinck was the first to break through the custom of making prints square, and to execute them in the lozenge shape. Among his most famous works are a Holy Family, after Raphael; a Penitent Magdalene, after Charles le Brun; Alexander at the Tent of Darius, after Le Brun; a Combat of Four Knights, after Leonardo da Vinci; Christ surrounded with Angels; St Louis praying; and St Charles Borromeo before a crucifix,—the last three after Le Brun. Edelinck was especially good as an engraver of portraits, and executed prints of many of the most eminent persons of his time. Among these are those of Le Brun, Rigaud, Philippe de Champagne (which the engraver thought his best), Santeuil, La Fontaine, Colbert, John Dryden, Descartes, &c. He died at Paris in 1707. His younger brother John, and his son Nicholas, were also engravers, but did not attain to his excellence.

EDEN, Hebrew (עֵדֶן, denoting pleasure or delight), was the first residence of Adam and Eve according to the Old Testament Scriptures. The passage in which its geographical position seems to be indicated (Gen. ii. 8–14) has been from the earliest times the subject of a discussion as ingenious and elaborate as it has been fruitless. Its general position is given as "eastward," *i.e.*, to the east of the place where the narrative was written. Of the four rivers mentioned the Euphrates is undoubtedly the same which is still known by that name, and the Hiddekel has been almost universally identified with the Tigris. The object of commentators who have sought to put a literal construction on the passage has, therefore, been to identify the Pison and the Gihon, by finding two rivers which together with the Euphrates and the Tigris fulfil the condition stated in Gen. ii. 10, "And a river went out of Eden to water the garden; and from thence it was parted and became into four heads." As there is no river which forms a common source for the Euphrates, the Tigris, and two others, recourse has been had to a strained construction of one kind or other. Josephus, for example, supposes the river which is the common source to have been the ocean stream which surrounds the earth, and identifies the Pison with the Ganges and the Gihon with the Nile; and in this he is followed by many of the fathers. Calmet, Rosenmüller, and others, again, suppose the river which is the common source to have been a region of springs, and, by making the Pison and the Gihon mountain streams, place the site of Eden in the highlands of Armenia. Calvin, Huet, and Bochart place Eden in lower Babylonia, on the supposition that the Pison and the Gihon are the two channels by which the united rivers Euphrates and Tigris enter the Persian Gulf. Luther and others, such as Clericus and more recently Baumgarten, have hazarded the supposition that the flood altered the course of the streams, and thus rendered it impossible to identify the locality of Eden from the description given in Genesis. These may suffice as specimens of the almost innumerable solutions that have been offered of what is now generally admitted to be an insoluble problem. On the theory that the narrative in Genesis is veritable history to be literally interpreted, it is impossible to fix the geographical position of Eden with any approach to certainty. This impossibility fully accounts for the immense variety of the conjectures that have been put forward. It deserves mention as a curiosity of criticism that the site of Eden has been assigned by different writers to each of the four quarters of the globe, and that the particular localities specified have ranged from Scandinavia to the South Sea Islands. The allegorical interpretations, which have been offered in great variety from the time of Philo downwards, are, of course, not hampered with any geographical difficulties. Philo supposes Eden to be a symbol of the soul that delights in virtue, the river which is the source to be generic virtue or goodness, and the four rivers to be the specific virtues of prudence, temperance, courage, and justice. Origen finds in the subject an excellent opportunity for applying his favourite allegorical method, and supposes Eden to be heaven, and the rivers wisdom. Similar interpretations, with individual variations, are given by several of the fathers who are prone to allegorize. In modern times Coleridge is perhaps the most celebrated of those who have interpreted the story of Eden as an allegory. It is to be observed, however, that this mode of explaining the narrative has found even less favour with recent interpreters than that which accepts it as literal history, meeting the obvious difficulties as best it can. The undoubted tendency of later criticism has been to discard alike the theory of literal history and the theory of allegory in favour of another, according to which the story of Eden is a mythical tradition of a kind similar to that which is to be found in the early sacred literature of most nations. According to this view the true explanation is to be sought for in a careful comparison of these various traditions as preserved in sacred scriptures, early histories, inscriptions, and otherwise. See Adam, vol i. p. 135-6, and Pentateuch.

EDEN, The Honourable Emily (1795-1851), novelist and miscellaneous writer, was the seventh daughter of the first Lord Auckland, and was born in 1795. Happily gifted by nature, her literary faculties and tastes were fostered by a liberal education. In 1835 she accompanied her brother, Lord Auckland, to India, on his appointment as governor-general, and remained with him during his term of office, which covered the period of the Afghan war. Returning to England in 1841, she made herself favourably known as a writer by the publication, three years later, of her *Portraits of the Princes and People of India*. She was also author of two novels entitled the *The Semi-detached House* and *The Semi-attached Couple*, which first appeared anonymously under the editorship of Lady Theresa Lewis. In these works she gives clever and amusing delineations of Anglo-Indian life and manners as she saw them. In 1866 was published a series of her letters to her sister written from India, and entitled *Up the Country*. Her private journal, at present unpublished, is said to be still more attractive and full of sparkling anecdote and graphic sketches. Another volume entitled *Letters from India*, edited by her niece, the Hon. Eleanor Eden, was published in 1872. For many years Miss Eden lived at Kensington, and her house was one of the most frequented centres of London intellectual and fashionable life. She afterwards removed to Richmond, and there died, August 5, 1869. Her eldest sister Eleanor attracted the warm affection of William Pitt, who, however, did not feel justified in making her an offer of marriage. This was, it is supposed, the only love-passage in Pitt's history. She afterwards married Lord Hobart, and died in 1851.

EDENTATA, an order of placental mammals characterized by the total absence of median incisor teeth. Such teeth as are found in edentate species are composed entirely of dentine and cement, without enamel; they likewise grow for an indefinite period, and are consequently without root; and so far as yet discovered there is no displacement of the first teeth by any second set except in a few of the armadilloes. This order contains the sloths, armadilloes, and ant-eaters.

EDESSA, the ancient capital of Macedonia, previously known as Ægæ, was situated 46 miles W. of Thessalonica on the banks of a beautiful stream in the very centre of the kingdom, and at the head of a defile commanding the approaches from the sea-coast to the interior of the country. It was the original residence of the Macedonian kings; and even after the seat of government was removed to the more accessible Pella, it continued to be the burial-place of the royal family. At the celebration of his daughter's marriage in the town, Philip II. was murdered by Pausanias in 336 B.C. His greater son Alexander was buried at Memphis through the contrivance of Ptolemy; but the bodies of his granddaughter Eurydice and her husband Arrhidæus were removed by Cassander to the ancestral sepulchre. On the occupation of the town by Pyrrhus the royal tombs were plundered by the Gallic mercenaries. The modern city of Vodena is built on the site of Edessa, and preserves a few unimportant remains of ancient buildings. The names Ægæ and Edessa were both probably given in allusion to the full-flowing streams that form one of the principal features of the situation; and Vodena is certainly derived from the Slavonic *voda*, water. Full details in regard to the position of the city may be found in Tozer, *The Highlands of Turkey*, vol. i.

EDESSA, or, as it is now called, Urfa or Orfa, a city of Northern Mesopotamia, on the Daisan, a left-hand tributary of the Euphrates, 75 miles W. of Diarbekir and 50 E. of Biredjik, in 37° 21′ N. lat. and 39° 6′ E. long. It is surrounded with walls and towers, well preserved on the northern side, has narrow but comfortable and cleanly streets, and displays in its bazaar not only the native woollen stuffs, pottery, and silver work, but also a considerable variety of European goods. In the principal square there is a large mosque dedicated to Abraham, who, according to Mahometan legend, was slain in the city; and in its immediate vicinity is a pond shaded by fine pomegranate, plain, and cypress trees, and tenanted from time immemorial by sacred fish. The only ancient remains are those of a tower ascribed by tradition to Nimrod; but in the neighbourhood there exist extensive catacombs with numerous inscriptions of an early date. The prevailing language is Turkish, though more than three-fourths of the inhabitants are Christian. The population was estimated about 1796 by Olivier as from 20,000 to 24,000; by Buckingham at 50,000; and, in 1873, by Chernik at 40,000. There are two mission establishments, an American and a French, and in connection with the former a school with about 250 pupils. The outskirts are occupied by melon-gardens, vineyards, and mulberry plantations.

Nothing is known of the origin of Edessa. It has been suggested that probably the early inhabitants were Sabæans, and that the sacred fish originally belonged to the worship of Atergatis. According to the Targum of the pseudo-Jonathan, Jerome, and Ephraem Syrus, the city is to be identified with the Erech of Genesis x. 10, and the local tradition of the Arabs and Jews makes it the same as Ur of the Chaldees; but there is no historical basis for either identification, though the former has received the support of Michaelis, Buttmann, and Von Bohlen. The first authentic mention of the city connects it with Seleucus, who appears to have greatly increased its prosperity, and was probably the bestower of the name by which it is best known in history. This, according to Stephanus, was taken from the Macedonian Edessa, from the abundance of the water in both cities, but a modern etymologist recognizes the Syrian Haditha or New Town. Another designation, Callirhoe, found in the ancient writers, undoubtedly alludes to its fountain; and it is at least possible that this may be the derivation of its modern name—Urhoi among the Syrians, Er Roha among the Arabs, and Orfa among the Turks and Christians. In the time of Antiochus VII., about 135 B.C., the city became the seat or centre of the Osrhoenic kingdom, founded by Orhoi-Bar-Khevyo, and governed for centuries by a series of elective monarchs. Of these the eighth in succession, Abgar Bar-Abgar, fought against Lucullus, but afterwards sided with the Romans; the fifteenth Abgar Uchomo is famous for the legendary correspondence with Christ reported by Eusebius. The city was plundered by Trajan's general Lusius Quietus, and the kingdom became tributary in 116. Restored by Hadrian it was finally abolished by Caracalla in 217, and a Roman military colony was established with the title of Colonia Marcia Edessorum. Meanwhile Christianity had been taking fast root in the city, the first church having been built as early at least as 202. By the time of Julian, the wealth of the Christians was sufficient to attract his revengeful cupidity; and in the course of the following century, the number of monasteries alone is said to have exceeded 300. Great theological schools were established, and the city, in fact, became one of the chief seats of Oriental learning. Most famous of all was the *Schola Persica* or Persian School; but its professors having adopted the Nestorian heresy were expelled by Martyrus the bishop, and the building was destroyed in 489, and replaced by St Mary's Church. The prosperity of the city gradually disappeared during the next five centuries, as it passed successively into the hands of the Arabs and the Seljuks. From the latter it was captured in 1097 by Baldwin de Bouillon, and for the next fifty years it continued an independent Christian countship. Baldwin's successors were his cousin Baldwin II (1100–1118), Jocelin de Courtenay, surnamed the Great (1118–1131), and Jocelin II. (1131–1144). The negligence of this last count permitted the city to fall into the hands of Zengi of Mosul, and in 1466, the attempt of the inhabitants to recover their independence brought down the vengeance of Zengi's successor Nur-ed-din. The sultans of Egypt and Syria obtained possession in 1181, the Byzantines in 1234, the Mongolians under Tamurlane about 1393, the Turkomans and the Persians at a later date, and finally the Turks in 1637.

See Assemani *Biblioth. Orient.*, vol. I., where the "Chron. Edessenum" is reprinted; Th. L. Bayer, *Historia Osrhoëna et Edessena ex nummis illustrata*, St Petersburg, 1734.

EDFU, in Coptish Atbo, from the old Egyptian Tebu, a village of Upper Egypt, in the province of Said, situated about a third of a mile from the left bank of the Nile, 55 miles below the cataracts of Syene, in 24° 58′ 43″ N. lat. It is inhabited by about 2000 Arabs and Copts, engaged for the most part in the manufacture of earthenware, which finds ready sale all through Egypt, and is remarkable for the similarity it retains to the ancient pottery represented on the monuments. To the Egyptologist the spot is of extreme interest, as furnishing the most perfect specimen of an ancient Egyptian temple, full details in regard to which may be found in the article ARCHITECTURE, vol. ii. p. 389. By the Greeks and Romans the city to which this splendid building belonged was known as Apollinopolis Magna, the god to whom the temple was dedicated being identified with the Greek Apollo. Under the later empire it was the see of a bishop and the head-quarters of the Legio II. Trajana.

See Belzoni, *Narrative*, 3d ed., 1822; Wilkinson, *Egypt and Thebes*, 1848; Lepsius, *Ueber eine hieroglyphische Inschrift am Tempel von Edfu*, Berlin, 1855; Mariette, *Fouilles exécutées en Égypte, &c., d'après les ordres du viceroi*, 1867.

EDGEWORTH, MARIA (1767–1849), the creator of the novel of national manners and moral purpose, was the daughter, by his first wife, of Richard Lovell Edgeworth noticed below. She was born at Hare Hatch, Berkshire, in 1767, and did not see Ireland till she was twelve years old. She was educated by her father, who devoted himself with great enthusiasm to the intellectual advancement of his children. In most of her literary undertakings Miss Edgeworth had the advantage of her father's criticism, who also wrote introductions to her novels. "It is my business," he used to say, "to cut and correct: yours to write on." Many tales and essays were written by Maria for private pleasure before publication was thought of. *Practical Education* (1798) was a joint work by father and daughter. In 1800 appeared *Castle Rackrent*, which at once made for her a reputation as a national novelist. This was followed soon after by *Belinda*, and by the *Essay on Irish Bulls*, published in partnership with her father, and intended to familiarize the English public with Irish humour and pathos. The work is so thoroughly the joint-product of two minds, that Miss Edgeworth, in writing her father's life, cannot tell distinctly which parts are his, but says that passages in which classical allusions and quotations occur must be her father's, as she was "entirely ignorant of the learned languages" (*Memoirs*, second edition, ii. 315). In 1804 appeared *Popular Tales*; in 1806 *Leonora*; in 1809 the first instalment of *Fashionable Tales*, which were finished in 1812; in 1814 *Patronage*; and in 1817 *Harrington*, *Ormond*, and *Comic Dramas*, which failed on the stage. The death of her father, in that year, recalled her from novel writing to fulfil the sacred duty of completing his *Memoirs*, which were given to the world in 1820, and of which a second edition was called for in 1821. In 1822 appeared *Rosamond, a Sequel to Early Lessons*, a work published earlier with contributions from Mr Edgeworth's pen. In August 1823 Miss Edgeworth visited Sir Walter Scott at Abbotsford, where she remained a fortnight; and Scott repaid this visit at Edgeworthtown exactly two years afterwards. In 1825 Miss Edgeworth further continued her tales for the young by the publication of *Harry and Lucy*. In 1834 appeared *Helen, a Tale*, her last and one of her best novels; and she afterwards wrote *Orlandino*, a book for children. Her *Letters for Literary Ladies* were suggested by a correspondence between Thomas Day and her father as to the propriety of "female authorship," in which the former stoutly maintained the negative.

Miss Edgeworth died on the 21st of May 1849, after having lived to see her works take rank as English classics. Her influence was deep and lasting. Sir Walter Scott confesses that he was anxious to do for Scotland what Miss Edgeworth had done for Ireland; and it is said that O'Connell regretted deeply that one so powerful did not serve Ireland as an agitator. Her society was courted by the most distinguished of her contemporaries; and countless tourists, who visited her, returned home charmed by her lively conversation and by the domestic virtues which brightened the home of which she was the centre. With Scott she was on terms of the closest intimacy; Byron admired her works, in spite of his sarcastic reference to "Miss Edgeworth's novels stepping from their covers;" and Lord Macaulay was one of her most enthusiastic worshippers. "Among all the incidents," says Mr Trevelyan, "connected with the publication of his *History*, nothing pleased Macaulay so much as the gratification that he contrived to give to Maria Edgeworth, as a small return for the enjoyment which, during more than forty years, he had derived from her charming writings." Macaulay mentions Miss Edgeworth's name in a note, in which he describes her delineation of King Corny, in *Ormond*, as "that admirable portrait." Miss Edgeworth, in a letter to Dr Holland, speaks of the "self-satisfaction, vanity, pride, surprise, I had in finding my own name in a note."

Castle Rackrent, the first and one of the most characteristic of her novels, is lit up throughout with sunny Irish humour, Sir Condy complaining that he "was very ill used by the Government about a place that was promised him and never given, after his supporting them against his conscience very honourably" (1857 edition, p. 39). *Leonora* has a painful plot. It treats of the seduction of an attached husband by a professed friend of his wife. Leonora's forbearance, however, and her deep-seated love for her husband prove, in the end, too much for the hollow professions and vaunted "sensibility" of Olivia. The *Tales of Fashionable Life* include *Ennui*, *The Dun*, *Manœuvring*, *Almeria*, *Vivian*, *The Absentee*, *Madame de Fleury*, and *Émilie de Coulanges*. *Ennui* is a powerful story, and relates how the earl of Glenthorn was cured of the disease which gives its name to the book. There are several fine character studies, including the Earl; M'Leod, the cool, but faithful, Scotch agent; witty Lady Geraldine; Christy, the blacksmith; and Ellinor, the Irish foster nurse, who said, on one occasion, that "if it *plased* God, she would like to die on a Christmas day, of all days, *becaase* the gates of Heaven, they say, will be open all that day, and who knows but a body might slip in *unknownst?*" (1857 edition, p. 231). *The Dun* portrays, with a realism almost too painful, the dreadful privations undergone by the poor who are unable to get in the money justly their due. *Manœuvring* depicts the efforts of Mrs Beaumont, a clever, scheming, deceitful woman, to marry her son and daughter contrary to their inclinations. For a while all seems to go well with Mrs Beaumont, until she is herself entangled in her net of white lies, and finally thoroughly outwitted. Her character, and that of Mr Palmer, a wealthy merchant from Jamaica, are worthy of the author's high reputation. *Almeria* traces the rise of the worldly spirit in the breast of a young girl, and the debasing consequences of a passionate pursuit of fashion for its own sake, unredeemed by any ennobling feature. *Vivian* is an admirably told story, and illustrates the terrible evils which sometimes arise from indecision of character. Vivian, the undecided, brilliant, young noble; Russell, the faithful tutor; Wharton, the unscrupulous politician and voluptuary; self-willed Lord Glistonbury; prim Lady Glistonbury; and vivacious Lady Julia seem to start from the canvas. *The Absentee*, considered by many as Miss Edgeworth's masterpiece, is written to expose the misery entailed on the tenantry by the Irish gentry, who deserted their native country for London, and abandoned their affairs to be managed by unscrupulous agents. The characters are among the most life-like in the annals of fiction. Lady Clonbrony makes herself exquisitely ridiculous in her vain endeavours to act the fine English lady; Lord Colambre, the hero of the novel, travels, under an assumed name, among his father's tenants in Ireland, finds out how rudely they have been oppressed, and champions their cause so skilfully as to win over even Lady Clonbrony; Lady Dashfort and her daughter are wonderfully real representations of heartless women of fashion; the sufferings of the Irish peasantry are drawn with a loving and masterly pencil; and the general sadness of the work is relieved by such humorous sketches as Colonel Heathcock, Sir Terence O'Fay, and Larry Brady, whose inimitable letter closes the book. Macaulay considered the scene in which Lord Colambre discovers himself to his father's tenantry the best passage of the kind since the beginning of the 22d book of the *Odyssey*. This is very high praise, especially when we remember that Macaulay seems to have read almost every novel—so much was he fascinated by narrative composition. *Madame de Fleury* is the story of a French lady who set up a school in Paris for neglected girls. The school came to grief at the great Revolution; and its benevolent founder had to fly to England, where she was supported mainly by donations from the girls, who were instigated by Victoire, the heroine of the book. Ultimately her return to France was secured by Basile, Victoire's lover, who had obtained influence with his general through his valuable engineering knowledge. *Émilie de Coulanges* describes the mortifications two French refugees had to undergo in living with Mrs Somers, an excessively ill-tempered English lady, who was generous enough with her money, but neglectful of kindness of a more delicate order. Mrs Somers's incessant outbursts of temper and reconciliations with Emilie, to be followed inevitably by fresh quarrels, are somewhat wearisome reading. *The Modern Griselda*, a story treating of the attempts of a wife to bring her husband to abject submission, manifests fine satiric power, and great liveliness—the dialogue being particularly animated. *Patronage*, which is in the same vein as the *Tales of Fashionable Life*, rather disappointed the critics, who concluded that Mr Edgeworth had written considerable parts of it. This, however, is expressly denied by Miss Edgeworth (*Memoirs*, ii. 323). *Ormond* is an Irish tale, and ranks among the best of Miss Edgeworth's works. It shows how a youth, whose education had been neglected, and whose temper was naturally impetuous, managed to reach true nobility of character. King Corny, Ormond, Sir Ulick O'Shane, Moriarty Carroll, Dora, and Mademoiselle O'Faley are masterly creations. There is a true Irish ring about the book, although it is composed in the purest English. *Helen* is a novel of thrilling interest, and displays greater passion and a finer insight into the more subtle moods of the human mind than any of Miss Edgeworth's previous works. The moral is that falsehood and deceit almost invariably bring misery in their train. Although on a more elaborate scale than her other books, *Helen* surpasses them all in grace, charm, and lightness of touch. Such powerfully conceived characters as Lady Davenant, Helen, Cecilia, Beauclerc, Churchill, and the Clarendons, leave an indelible impression on the memory.

Miss Edgeworth's novels are distinguished by good sense, humour, and an easy flowing style. As the construction of a plot is not her strong point, she is generally more successful in tales than in lengthy novels. The vivacity of her dialogues is extraordinary, and in them her characters reveal themselves in the most natural way possible. Her books are character-studies, rather than intensely interesting narratives. Sobriety of judgment is seen throughout; and passion, romance, and poetry rarely, if ever, shed their lustre on her pages. Three of her aims were to paint national manners, to enforce morality, and to teach fashionable society by satirizing the lives of the idle and worldly. She expressly calls some of her stories "Moral Tales"; but they all fall under this category. The two poles of thought in regard to the moral tendency of Miss Edgeworth's works are well represented by Robert Hall, the eminent Baptist preacher, and Monsieur Taine

Miss Edgeworth "does not," says Hall, "attack religion or inveigh against it, but makes it appear unnecessary by exhibiting perfect virtue without it. No books ever produced so bad an effect on my own mind as hers. I did not expect any irreligion there: I was off my guard; their moral character beguiled me: I read volume after volume with eagerness; and the evil effects of them I experienced for weeks" (Hall's *Works*, vol. i. Bohn's edition, 1846, appendix, note A). Monsieur Taine, again, says that "this regular presence of a moral intention spoils the novel as well as the novelist. It must be confessed a volume of Thackeray has the cruel misfortune of recalling the novels of Miss Edgeworth" (*English Literature*, Criticism on Thackeray). To Robert Hall's criticism it is to be objected that a novel is scarcely the place to explain and inculcate the systematic theology of the evangelical school; while we must concede to Taine and the French critics that to burden a novel with a moral, or other special purpose, is artistically a blemish, especially when it is professedly made an aim as in Miss Edgeworth's case. She remarks very beautifully of Sir Walter Scott, that "his morality is not in purple patches, ostentatiously obtrusive, but woven in through the very texture of the stuff" (*Helen*, 1833 edition, 123)—a statement which scarcely holds true of herself. Still, strong national tendencies must be allowed to assert themselves in fiction, and there can be no doubt that the didactic or moralizing tendency is deeply seated in the English-speaking peoples.

No writer teaches a more admirable practical philosophy than Miss Edgeworth; and she reaches her object by making her characters natural, and capable, as well as worthy, of imitation. She plainly belongs to the realistic school of fiction; and it is interesting to remember that her Tales are expressly founded on a carefully thought out philosophy of education. She thus gives no countenance to the popular fallacy that teaching is a mere trick or knack, rather than a science resting on well-ascertained mental phenomena. Few novelists display less extravagance than Miss Edgeworth. We feel that her minor characters especially are genuine flesh and blood. Sometimes the hero or heroine of the story is liable to the charge of being the incarnation of a single quality, rather than a man or woman. However, in the case of one who writes with a didactic purpose, this is almost inevitable. Miss Edgeworth has drawn attention to the less brilliant faculties of humanity, and always prefers to be useful, where others would have endeavoured to be striking. In her pages the heroic virtues give place to prudence, industry, kindness, and sweetness of temper. There are few instances of overwhelming emotions or tumultuous passions in her works; and it is remarkable how little the love of nature appears. She never uses material which does not yield some direct moral lesson. All this is the natural consequence of Miss Edgeworth's method and utilitarian aim. But, working under such self-imposed conditions, she has done wonders. Her representations of the humour, pathos, and generous character of the Irish peasantry are an imperishable monument of her genius. Nor is it fair to depreciate the English novels in comparison, *Helen* being quite equal to any of her distinctively national tales. The freshness of her stories, her insight into character, lively dialogues, originality of invention, and delightfully clear style render it quite possible to read her works in succession without any sense of weariness. As a painter of national life and manners, and an illustrator of the homelier graces of human character, Miss Edgeworth is surpassed by Sir Walter Scott alone; while as a direct moral teacher she has no peer among novelists. Among the many sweet memories her unsullied pages have bequeathed to the world, not the least precious is her own noble character, which ever responded to all that is best and most enduring in human nature.

In 1832 a collected edition of Miss Edgeworth's novels was published in London in 18 volumes:—*I. Castle Rackrent; Essay on Irish Bulls; Essay on Self-Justification. II. Forester; the Prussian Vase; the Good Aunt. III. Angelina; the Good French Governess; Mademoiselle Panache; the Knapsack. IV. Lame Jervas; the Will; the Limerick Gloves; Out of Debt, Out of Danger; the Lottery; Rosanna. V. Murad the Unlucky; the Manufacturers; the Contrast; the Grateful Negro; To-morrow. VI. Ennui; the Dun. VII. Manœuvring; Almeria. VIII. Vivian. IX. The Absentee. X. Absentee (concluded); Madame de Fleury; Émilie de Coulanges; the Modern Griselda. XI. and XII. Belinda. XIII. Leonora; Letters. XIV. and XV. Patronage. XVI. Comic Dramas. XVII. Harrington; Thoughts on Bores. XVIII. Ormond.* To this list are to be added *Essays on Practical Education*, written in conjunction with Mr Edgeworth (1798), *Helen* (1834), and numerous stories and books for children. In 1848 a new collected edition of Miss Edgeworth's works appeared in London in nine volumes; and, after her death, an edition was published in ten volumes, with steel engravings. (T. Gl.)

EDGEWORTH, RICHARD LOVELL (1744–1817), father of the subject of the foregoing notice, and her associate in many literary undertakings, was born at Bath in 1744. The greater part of his life, however, was spent at Edgeworthtown, or Edgeworthstown, in the county of Longford, Ireland, where the Edgeworth family had been settled for upwards of 150 years. He was of gentle blood—his father being the son of Colonel Francis Edgeworth, and his mother, Jane Lovell, being the daughter of Samuel Lovell, a Welsh judge. Richard's mother taught him to read at a very early age; his young imagination was nurtured on the beautiful stories in the book of Genesis and on Shakespeare's characters of Coriolanus and Julius Cæsar; and, when he was only seven years old, a Mr Deane explained to him the uses and structure of several pieces of machinery, a circumstance to which he ever afterwards traced his strong love for mechanical science. The Rev. Patrick Hughes initiated him in Lilly's *Latin Grammar*—an office he also performed for Goldsmith, who was born on the property of the Edgeworths—and his public education began, in August 1752, in a school at Warwick. He subsequently attended Drogheda school, then reputed the best in Ireland; and, after spending two years at a school in Longford, entered Trinity College, Dublin, in April 1761, from which he was transferred to Corpus Christi College, Oxford, in October of the same year. While still at college, he made a runaway match, marrying at Gretna Green one of the daughters of Mr Paul Elers, an old friend of his father, by whom he had a son, who was born before Edgeworth reached his twentieth birth-day, and his daughter Maria. Shortly after the birth of his son, he and his wife went to Edgeworthtown, where he met a severe trial in the death of his mother. Her dying advice to him, to "learn how to say no," was the germ of *Vivian*, one of Miss Edgeworth's best novels. For some time after this Edgeworth devoted himself to scientific reading and experiments; and he claims to be the reviver of telegraphic communication in modern times (*Memoirs*, second edition, i. 144). His home was now at Hare Hatch, in Berkshire, where he endeavoured to educate his son according to the method explained in Rousseau's *Émile*. In later life, however, he saw reason to doubt many of Rousseau's views (*Memoirs*, ii. 374). At the same time he went on keeping terms at the Temple, and formed the greatest friendship of his life with Thomas Day—an able man, of noble character, excessively eccentric, and known to all boys as the author of *Sandford and Merton*, which was written at Edgeworth's suggestion. In 1769, on the death of his father, he gave up the idea of being a barrister; but, instead of immediately settling on his Irish estate, he spent a considerable time in England and France, mainly in Day's company. In Lyons, where he resided for about two years, he took an active part in the management of public works intended to turn the course of the Rhone. He was summoned to England by the death of his wife, with whom his autobiography tells us plainly he was not happy. Edgeworth hurried to Lichfield, to Dr Erasmus Darwin's, one of his greatest friends, and at once declared his passion for Miss Honora Sneyd, which had been the cause of his flight to France two years before. They were married (1773) in the cathedral, and after residing at Edgeworthtown for three years, settled at Northchurch, in Hertfordshire. When six years of great domestic happiness had elapsed, Mrs Honora Edgeworth died, after recommending her husband to marry her sister Elizabeth—which he did, on Christmas Day 1780. In 1782 Edgeworth returned to Ireland, determined to improve his estate, educate his seven children, and ameliorate the condition of the tenants. Up to this point Edgeworth has told his own story. The rest of his life is written by his daughter, and opens with an account of the improvements he effected, and a lengthy panegyric on Mr Edgeworth as a model landlord (*Memoirs*, ii. 12–36). In 1785 he was associated with others in founding the Royal Irish Academy; and, during the two succeeding years, mechanics and agriculture occupied most of his time. In October 1789 his friend Day was killed by a fall from his horse, and this trial was soon followed by the loss of a daughter, who had just reached her fifteenth year. The first thing that broke the monotony of his grief was the arrival of Dr Darwin's poem, the *Botanic Garden*, about which the author says, "It was your early approbation that contributed to encourage me to go on with the poem" (*Memoirs*, ii. 113). In 1792 the health of one of Edgeworth's sons took him to Clifton, where he remained with his family for about two years, returning in 1794 to Edgeworthtown. Ireland was, at that time, harassed by internal disturbances, and threats of a French invasion, and Edgeworth offered to establish telegraphic communication of his own invention throughout the country. This offer was declined. A full account of the matter is given in Edgeworth's *Letter to Lord Charlemont on the Telegraph;* and his apparatus is explained in an "Essay on the Art of Conveying Swift and Secret Intelligence," published in the sixth volume of the *Transactions of the Royal Irish Academy.* In the autumn of 1797 Mrs Edgeworth fell a victim to decline. *Practical Education*, a work which embodied the experience of the authors in dealing with children, was published in 1798. "So commenced," says Miss Edgeworth, "that literary partnership which, for so many years, was the pride and joy of my life" (*Memoirs*, ii. 170). In the same year Edgeworth married Miss Beaufort, and was elected M.P. for the borough of St John's Town, Longford. The same year, too, saw a hostile landing of the French and a formidable rebellion; and for a short time the Edgeworths took refuge in Longford. The spring of 1802 brought the depressing announcement of Dr Darwin's death; and the winter of that year was spent by the Edgeworths in Paris, where, among many friends, they particularly valued M. Dumont. On his return home he was gratified by Government accepting of his telegraphic apparatus, which worked admirably. In 1802 appeared the *Essay on Irish Bulls* by Mr and Miss Edgeworth; and in 1806 Edgeworth was elected a member of the Board of Commissioners to inquire into Irish education. From 1807 till 1809 much of his time was spent on mechanical experiments and in writing the story of his life. In 1808 appeared *Professional Education*, and in 1813 his *Essay on the Construction of Roads and Carriages.* He died on the 13th of June 1817, and was buried in the family vault in Edgeworthtown churchyard.

Many of Edgeworth's works were suggested by his zeal for the education of his own children. Such were *Poetry Explained for Young People*, *Readings on Poetry*, *A Rational Primer*, and the parts of *Early Lessons* contributed by him. His speeches in the Irish Parliament have also been published; and numerous essays, mostly on scientific subjects, have appeared in the *Philosophical Transactions*, the *Transactions of the Royal Irish Academy*, the *Monthly Magazine*, and *Nicholson's Journal*. The story of his early life, told by himself, is fully as entertaining as the continuation by Maria, as it contains less dissertation and more incident. (T. Gl.)

EDINBURGH, COUNTY OF, or MID-LOTHIAN, one of the lowland counties of Scotland, is situated between 55° 39′ 30″ and 50° 59′ 20″ N. lat., and between 2° 52′ and 3° 45′ 10″ W. long. It is bounded on the N. by the Firth of Forth, on the N.W. by Linlithgowshire or West-Lothian, on the S.W. by Lanarkshire, on the S. by Peebles and Selkirk, and on the E. by Roxburgh, Berwick, and Haddington or East-Lothian. The area comprises 362 square miles, or 231,724 acres.

The surface of the county presents a great variety of scenery. The Pentland Hills advance boldly from the south-west to within five miles of the sea, rising to a relative height of from 1000 to 1300 feet. The loftiest summits are Scald Law (1898 feet), Carnethie (1890), West and East Cairn Hill (1844 and 1839), and West Kip (1806). They generally present a rounded appearance, and are covered with heath or grass. The south-eastern corner of the county is occupied by the Moorfoot Hills, which form a continuation of the Lammermuirs, and attain in Blackhope Scar a height of 2136 feet. Of more or less isolated eminences throughout the county it is enough to mention the Braid Hills and Blackford Hill to the S. of the city, Arthur's Seat towards the E., Corstorphine Hill about two miles to the W., and Dalmahoy Crags about seven miles to the S.W.

With the exception of the Gala, which rises on the south-east side of the Moorfoot Hills and flows south to join the Tweed, and the partial exception of the Tyne, which after a course of about seven miles passes into Haddingtonshire, all the streams, we cannot say the rivers, find their way to the Firth of Forth. The Esk (the largest) drains the district between the Pentlands and the Moorfoot Hills, and falls into the sea at Musselburgh. The southern branch has its sources near Blackhope Scar, receives the Redside and Middleton Burns, and flows past Newbattle Abbey; the northern rises in the Pentlands, and proceeds through much picturesque scenery, past Penicuik, Roslin, Lasswade, and Eskbank; and the union of the two streams takes place a short distance below Dalkeith, within the grounds of Dalkeith Palace. The Braid Burn from Capelaw Hill passes between the Braid Hills and Blackford Hill, and reaches the sea at Portobello. The Water of Leith, with its head streams on the western slope of the Pentlands, flows past Balerno, Currie, Juniper Green, Colinton, Edinburgh, and Leith. The Almond, which has its origin in Lanarkshire, and its right-hand tributary the Breich Water, form the boundary between Mid-Lothian and Linlithgowshire. Most of these streams, and especially the Esk and the Water of Leith, afford a large amount of water-power, well-preserved by means of artificial dams and embankments. The deep ravines which in some places they have formed in the Carboniferous strata through which they flow conceal spots of romantic beauty, in striking contrast to the immediately contiguous scenery. The only lake is that at Duddingston, near Edinburgh; but there are several extensive reservoirs connected with the water supply of the city, viz.—Threipmuir, Loganlee, Harelaw, Clubbiedean, and Torduff in the Pentlands, and Gladsmuir and Rosebery on the South Esk. The Cobbinshaw reservoir, situated at the head of the Bog Burn, a tributary of the Almond, is used for the supply of the Union Canal.

The geology of Mid-Lothian is of interest, not only from its intrinsic characteristics, but also as the subject of investigation of many of the most famous among Scottish geologists—Hutton, Hall, Jamieson, Cunningham, Hugh Miller, Fleming, and others. The Lammermuir and Moorfoot Hills are a continuation of the Silurian table-land of the south of Scotland, and consist mainly of strata of greywacke, grit, and shale, greatly contorted, broken, and altered in position. Sandstones, grits, shales, and mud-stones of the Upper Silurian occur in three very limited areas in the Pentland Hills, in the midst of Lower Old Red Sandstone formations. They are abundantly fossiliferous, especially on the North Esk,—*Chondrites verisimilis*, *Amphispongia oblonga*, *Protaster Sedgwickii*, *Pterygotus acuminatus*, various *Strophomenas*, and *Euomphalus funatus* being among the characteristic forms. The Lower Old Red Sandstone formations just mentioned are a massive series of grits, conglomerates, and volcanic rocks, resting unconformably on the Upper Silurian series; the Upper Old Red Sandstone is found only in a few small patches in the hollows of the Lower Silurian. All the four series into which it is usual to divide the Carboniferous system are well represented. The Calciferous Sandstone series breaks up into two groups:—the former consisting of reddish sandstones, and forming the south-western eminences of the Pentland Hills and nearly the whole site of the city of Edinburgh; while the latter comprises white and grey sandstones, shales, limestone, and coal, and furnishes a good portion of the lth of the county. The Carboniferous Lime- consists of strata of white and grey sandstones, lays, coal, and encrinal limestone,—one section n as the "Edge coals" from the almost vertical t of the beds. The strata of the Millstone Grit extensive—only appearing in a narrow band entral part of the Dalkeith coal-field, and in a to the south of Penicuik. The history of rocks which are sporadically distributed through is still matter of dispute,—the main question ng whether the volcanic activity which has left took place exclusively in the Carboniferous roke out again later. The spot round which on has principally been maintained is Arthur's is the centre of the intrusive movement, nsiderable masses of intrusive basaltic rocks appearance in many other localities. Diorite is l rock of Corstorphine Hill, and occurs also to Ratho. Marks of glacial action may be observed hine, Granton, Arthur's Seat, and on the ills; and large beds of boulder-clay are present districts. Boulders of distant transport are but a few apparently from the Ochils or even ans may be discovered.[1]

vated condition of the county is incompatible d or remarkable fauna; but the botanist finds st of smaller plants. Arthur's Seat and the rk, in spite of their proximity to the city, nsiderable number of very rare specimens. be sought in Professor Balfour's *Flora of*

te naturally differs in different districts, according tion and distance from the sea. From obser- e at Inveresk, 90 feet above the sea-level, which en as fairly representative, the annual mean of er has only once fallen as low as 29·68 in ne years from 1855 to 1875, and usually ex- . The maximum cold ranged from zero in ° in 1872; the maximum heat from 73° in ° in 1868 and 1873; and the mean annual from 44° in 1855 to 48·2° in 1868. The perature of the six summer months beginning eached 55·8° in 1868, and sank to 51·6° in 1872. rainfall varied from 16·50 inches in 1870 to 62; and the number of fair days from 162 in in 1869. The greatest rainfall takes place in Edinburgh, Meadowfield, and Bonnington; but in the Pentlands. According to observations eresk over a period of 15 years, the wind blew . 31 days, N.E. 40, E. 22, S.E. 24, S. 51, S.W. and N.W. 24. The N.E. and E. winds prevail d April, and especially in the neighbourhood of remarkable for their cold and blighting character. n lies long except in the uplands; but night frosts as late as the beginning of June, severe enough the young shoots of the seedling trees in the unds.[2] On the shores of the Firth, along the l Esk, and in some of the richer flats the grain crops ripen early; two miles nearer the hills and 200 feet higher the harvest is ten days later; and at an elevation of 600 feet another week at least intervenes.

The total area in cereals in 1876 was 38,189 acres. The quantity of wheat grown is gradually diminishing, occupying in 1876 only 4456 acres in contrast to 10,123 in 1856. The average produce in the more fertile districts is 31 bushels per acre, in the poorer districts from 24 to 25 bushels. The roots of the plant are in some seasons attacked severely by the larvæ of the crane-fly (*Tipula oleracea*), and the ears sometimes suffer from the wheat-midge. Of other cereals there were in barley 10,123 acres in 1856, and 11,982 in 1876 (the return varying from 42 to 48 bushels); and in oats 23,121 in 1865, and 21,311 in 1876. Beans declined from 802 acres in 1856 to 467 in 1876. The area of sown grasses has greatly extended, being 26,907 acres in 1866, and in 1876, 31,869. The grass-seed is usually put in with the barley crops. Near the city sewage-farming has been carried on to a remarkable extent. The Craigentinny meadows between the city and the sea, comprising 200 acres, have been under sewage cultivation for upwards of 30 years. The produce, now consisting principally of natural grasses, is sold at from £16 to £28 per acre, and the whole realizes from £3000 to £4000 per annum. About 80 acres are under similar treatment at Lochend, 70 acres at Dalry, and 16 at the Grange. The total produce of the whole area under irrigation is estimated at £6000. The acreage of turnips in 1856 was 14,517, in 1876, 13,342. About 16 or 18 tons of swedes, or 22 or 23 tons of common turnips, is considered a good crop for first-rate land. Potatoes hold much the same position as in former years, though the demand for them is not so great. A considerable quantity is despatched to England for seed purposes, while the seed required in the county is obtained from Perth, Lanark, or the neighbouring counties. The number of cattle was in 1862, 13,013, in 1876, 18,661. In the neighbourhood of Edinburgh especially, dairying forms a very important industry: the number of milch cows in the county is probably 11,000 or 12,000, of which 1800 or 2000 are kept in the town or suburbs, and supply about half of the milk necessary for the local consumption. Sheep are returned as—113,479 in 1866, and 168,565 in 1876. Very few horses are bred in the county, but several of the studs are of excellent character. The Clydesdale blood predominates. Pigs form a very small item in the list of stock; and the poultry yard is of distinct importance only in the farms in the neighbourhood of the city. The crop rotations vary considerably in different districts. Oats, potatoes, wheat, turnips, barley, and hay or pasture is a common order; while a five-course shift of oats, potatoes and turnips, barley or wheat, hay, pasture, or a six-course shift (oats, beans, wheat, turnips, barley, grass), is used elsewhere. The average size of farms is 131 acres. According to the returns, out of a total of 1012 holdings 477 did not exceed 50 acres, 116 lay between 50 and 100, 294 were over 100 and under 300, 75 were from 300 to 500, and only 50 were more than 500. Leases of nineteen years are common; the change of proprietor is as frequent as that of the tenants, and in some cases the same tenant has continued to hold a farm under six or eight successive landlords. The average value of the arable land is calculated at from 40 to 55 shillings the acre; that of the upland pastures at from 10 to 15 shillings. The whole of the county has been drained more or less thoroughly, and some portions twice over. Tiles and small stones began to be laid about 1830, with a distance between the drains of about 36 feet; and since 1845 deeper drains, with pipes and collars, have been put into the intermediate furrows. Great improvements have been effected not only in the farm-houses and steadings since 1835, but also in the cottages for the labourers, which now for the most part contain a sitting-room and two or even three bedrooms. Steam thrashing-machines and grinding mills are not uncommon. The reaping-machine has been generally adopted within the last 20 years, except for very difficult ground, or where the crop has been laid by wind or rain. The assistance of the steam plough has hitherto been very partially obtained.

The nursery grounds of Mid-Lothian are more extensive than those of any other county of Scotland; and in the variety and quantity of their productions they are equal to any in Britain. To orchards proper there are devoted about 72 acres; and no less than 775 acres, mainly in the vicinity of the city, are devoted to market gardening. Further details on the whole subject of Mid-Lothian agriculture may be found in Thomas Farrall's paper in *Trans. of Highland and Agricultural Society*, 1877.

It appears from the Owners and Heritages Return, 1872-73, that the county, exclusive of Edinburgh and Leith, was divided among 3237 owners, holding land the yearly value of which amounted to £681,603. Of the owners 78½ per cent. possessed less than 1 acre, and the average value per acre over all was £2, 11s. 3d. There were 9 proprietors holding upwards of 5000 acres, viz., Earl of Rosebery (Dalmeny), 15,568; Sir G. D. Clerk (Penicuik), 12,696; Robert Dundas (Arniston), 10,184; the Stair family (Oxenfoord), 9609; Heirs of Alex. Mitchell (Stow), 9038; Earl

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ng's *Lithology of Edinburgh*; Hugh Miller, *Edinburgh ourhood*; Maclaren, *Sketch of the Geology of Fife and the* ch. Geikie, *The Geology of Edinburgh and its Neighbour-* Sheet No. 32 of the one-inch Geol. Survey Map, with ring memoir; and several other papers in the *Transac- dinburgh Geological Society*.

ness of the winter is well illustrated by the fact that Mr Royal Botanic Gardens reported 138 species of flowers New Year's Day 1874, of which 35 were winter or spring 03 summer or autumn flowers. The *Galanthus nivalis*, owdrop, blossoms, according to an average of 20 years, of January, the *Hepatica triloba* on the 31st, and the *nobleanum* on the 25th of February.

of Morton (Dalmahoy), 8344; G. R. E. Fairholm, 6200; Charles Cowan (Loganhouse), 5677; John Borthwick (Crookston), 5239. The duke of Buccleuch's property, though comprising only 3541 acres, is the highest on the valuation roll (£28,296), with the exception of that of the railway companies.

Minerals.—Though not a mining district *par excellence*, Mid-Lothian possesses a considerable amount of mineral wealth. There are 19 collieries, which in 1876 employed 2179 persons and raised 715,803 tons of coal. With the exception of 90,000 tons raised in the parish of West-Calder, this was all obtained in the valley of the Esk. In its general character the coal does not differ from ordinary Scotch coal; but a large quantity of the best cannel coal, used for making gas, is procured at Niddrie Colliery, and from the marquis of Lothian's mines at Newbattle and Dalkeith. The depth of the pits varies from 50 to 180 fathoms. On the east side of the Esk the strata lie at an angle of from 10° to 14°; those on the west side, at Niddrie and Gilmerton, at from 60° to 90°. Of blackband ironstone about 61,263 tons were raised in 1876, principally in the parishes of Lasswade and Penicuik; and 25,172 tons of fire-clay were obtained in the county. In the vicinity of West Calder there is a large amount of shale, containing from 20 to 30 gallons of oil per ton. The extraction of the oil by distillation in retorts was introduced about 1862. About 258,278 tons were raised in 1876. Limestone is of frequent occurrence:—at Esperton in the south; at Cousland, Crichton, Burdiehouse, and Gilmerton, near Edinburgh; at the Camps, in Kirknewton parish; and at Muircston and Levenseat, still further west. Freestone is quarried at Craigleith, Redhall, Hailes, and Craigmillar. From Craigleith was obtained the greater part of the stone for the new town of Edinburgh; Hailes furnishes an excellent material for pavements and stairs; and Craigmillar has been appropriated by the builders of the new docks at Leith. Ravelston Mount supplies large blocks of whinstone which have been exported to England for docks, and even to Russia, for fortifications; the causeway stones for the streets of Edinburgh are mainly procured from the quarries at Ratho; and a large number of smaller quarries [illegible] of road metal are scattered throughout the [illegible]

[illegible] owing its origin no doubt to the [illegible] and publishing in the metropolis, [illegible] in Mid-Lothian is paper- [illegible] in the county, most of [illegible] their aggregate [illegible] writing and printing, [illegible] wrapping paper. The most [illegible] from the beginning [illegible] on the North Esk between [illegible] writing and [illegible] at Newbattle [illegible] on the Water of Leith [illegible] near Mid-Calder, [illegible] An ancient [illegible] mill, called [illegible] at Cramond, producing hand-made [illegible] There is a carpet factory on the Esk [illegible] well-known establishment at Lasswade, [illegible] carpet was produced until [illegible] removed to [illegible] The [illegible] carried on at Roslin, the [illegible] formed by the [illegible] works have [illegible] exist at Dalkeith, [illegible] and the suburbs [illegible] at Portobello, Millerhill, [illegible] and candle works at Dalkeith and Loanhead. Leather also is manufactured at Dalkeith.

Besides the Scottish metropolis, the county contains the following towns and villages:—Leith and Granton, both flourishing seaports; Portobello, a watering-place about three miles to the east; Musselburgh, an agricultural and fishing town near the mouth of the Esk; Dalkeith, a market-town and borough of barony; Corstorphine, with a convalescent hospital and an ancient collegiate church containing several tombs of the Forrester family, who became possessors of the fee in 1371; Ratho, erected in 1404 into a principality for the eldest son of the Scottish king; Cramond, formerly a place of much more importance than now; Mid-Calder, with a church of considerable antiquity, adorned with the armorial bearings of the Sandilands family;[1] West-Calder, Balerno, Currie, Juniper Green, and Colinton, all manufacturing villages; Liberton, deriving its name from the lepers who once were its principal inhabitants; Gilmerton, mainly inhabited by coal-miners and carters; Lasswade, Loanhead, Roslin, and Penicuik.

The population of the entire county in 1871 was 328,379, of whom 153,892 were males and 174,487 females. Excluding the boroughs of Edinburgh, Leith, Portobello, and Musselburgh, the population of the county proper numbered in 1851, 57,843 persons, and in 1871, 74,126, indicating an increase of 28 per cent. within that period. This increase occurs principally in the parishes of West-Calder, Lasswade, Colinton, Dalkeith, and Kirknewton.

Antiquities.—It is believed that Cramond was once a Roman seaport; and various objects of Roman art have been discovered in the vicinity and upwards along the bank of the Almond. On several heights are remains of early military works—the most important being that on Dalmahoy Hill, Braidwood Castle in the parish of Penicuik, and the so-called Castle Greg on the Harburn estate in Mid-Calder parish. "Eirdehouses" have been discovered at Crichton Mains, at Borthwick Castle, near Middleton House, &c., the first being especially interesting from the fact that some of the stones bore the marks of Roman masonry. There are hut-circles and a hill fort on Kaimes Hill, near Ratho; a large tumulus, with three upright stones, at Old Liston; a smaller tumulus at Newbattle; a kistvaen at Carlowrie; and standing stones at Lochend, at Comiston (the Caiy stone), and several other places. The most remarkable of all perhaps is the "Cat Stane," on the Brigs farm near Kirkliston, which, according to an ingenious hypothesis of Sir James Young Simpson, marks the burial place of the grandfather of Hengist and Horsa. (See *Proceedings of the Antiquarian Society of Scotland*, 1855, 1873, 1875.)

The following are among the most interesting of the residential and ecclesiastical buildings in Mid-Lothian, not within the limits of the larger towns and villages. Roslin Chapel, founded by the St Clairs in 1446, is one of the most highly decorated specimens of Gothic architecture in Scotland, and presents a remarkable combination of peculiarities. Roslin Castle, the seat of the St Clairs, is a fine ruin, occupying a peninsular rock on the banks of the Esk, and must have been a very strong position before the days of cannon. Hawthornden, a little further down the stream, is interesting as the residence in the 17th century of Drummond the poet, as well as for the strange caves in the rock on which it is built. Dalhousie Castle, the seat of the earl of Dalhousie, is a modernized building of castellated style on the banks of the South Esk; and Newbattle Abbey, the seat of the marquis of Lothian, occupies the site of the ancient Cistercian monastery a few miles down the stream. Craigmillar Castle is a fine ruin on a knoll three miles to the south of Edinburgh, which formerly was the residence of the Preston family, and afforded shelter on various occasions to Queen Mary. Borthwick Castle, also a temporary residence of the unfortunate queen, is a double tower on Middleton Burn, still bearing the marks of Cromwell's cannon balls. Crichton Castle, a mile and a quarter to the east, was the residence of the well-known family which produced the celebrated Sir William Crichton, and its ruins show "the builders' various hand." Dalmahoy Castle, near Ratho, is the seat of the earl of Morton, and preserves, besides other valuable antiquities, the only extant copy of the Bible of the Scottish Parliament, and the original warrant for committing Queen Mary to Lochleven. Melville Castle, near Lasswade, the seat of the earl of Melville; Colinton House, the seat of Lord Dunfermline; Calder House, the seat of Lord Torphichen; Riccarton, belonging to Sir William Gibson Craig, Bart.; and Lauriston Castle, once occupied by John Law of Mississippi notoriety, may also be mentioned. Temple, on the South Esk, was at one time the chief seat of the Knights Templars in Scotland.

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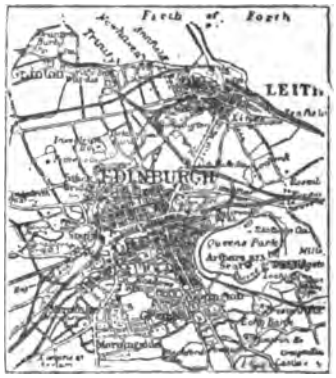
[1] [illegible] Scot. Antiq. Soc., 1862.

The history of the county is of little importance apart from that of the city of Edinburgh. Traces of early Celtic occupation still remain in such names as Inveresk, Almond, Leith, Dalry, Dalmahoy, Dalkeith, &c.; though by far the greater proportion of the villages, hamlets, and castles have received their present designation from Saxon possessors. The termination *ton* is very frequent. Within the county lie the battlefields of Boroughmuir, where the English were defeated by the earl of Murray in 1334; Pinkie, near Inveresk, where the duke of Somerset inflicted tremendous loss on the Scotch; and Rullion Green, on the eastern slopes of the Pentlands, where the Covenanters were routed by the royal troops under General Dalziel.

EDINBURGH, the ancient capital of Scotland, is situated in the county of Mid-Lothian or Edinburgh, to the south of the Firth of Forth. The Royal Observatory, which is built on the summit of the Calton Hill, in the north-eastern quarter of the city, is in 55° 57′ 23″ of N. lat., and 12^{m} 43^{s} 05^{x} of time W. long. of the meridian of Greenwich.

The site of Edinburgh is altogether remarkable as that of a large city, and is the chief source of its peculiar characteristics. It occupies a group of hills separated by deep ravines, and is the central feature of a landscape of rare beauty. The county of Mid-Lothian forms towards the south-east a wild hilly district, diversified with fertile cultivated tracts, but, over an extensive area, broken into a rough pastoral country, rising at various points to upwards of 2000 feet above the level of the sea. On the north it is bounded by the Firth of Forth, from the shores of which the ground slopes gradually towards the south till it merges in the range of the Pentland Hills, with its contour diversified by various undulations and abrupt heights. On this irregular ground, amid the outlying spurs of the Pentlands, a bold cliff of trap-rock, which rises through the sandstone strata of the district, appears to have early attracted attention from its capacity for defence. Maitland, the earliest historian of the city, says, "The situation of Edinburgh plainly shows that its origin is owing to the castle;" and from its standing in St Cuthbert's parish, which surrounds the castle rock, he assumes that the first settlement was in the low ground to the north-west. From this a road anciently led up past the Well-House Tower, along the northern slope of the Castle Hill. By this access Queen Mary and other royal visitants rode up to the castle on various public entries, and then returned through the town, by way of the High Street and Canongate, to Holyrood. Symeon of Durham, under the date 854 A.D., includes Edinburgh among the churches and towns of Northumbria within the bishopric of Lindisfarne, and this is supposed to refer to the church of St Cuthbert. But the first erection of the *Magh dun* fortress, or "Maiden Castle," on the summit of the rock, must have tempted the natives of the district to seek the protection of its defences. Hence at an early period a hamlet grew up along the ridge which slopes from the castle rock towards the valley at the base of Salisbury Crags, distinct from the Kirk-town of St Cuthbert.

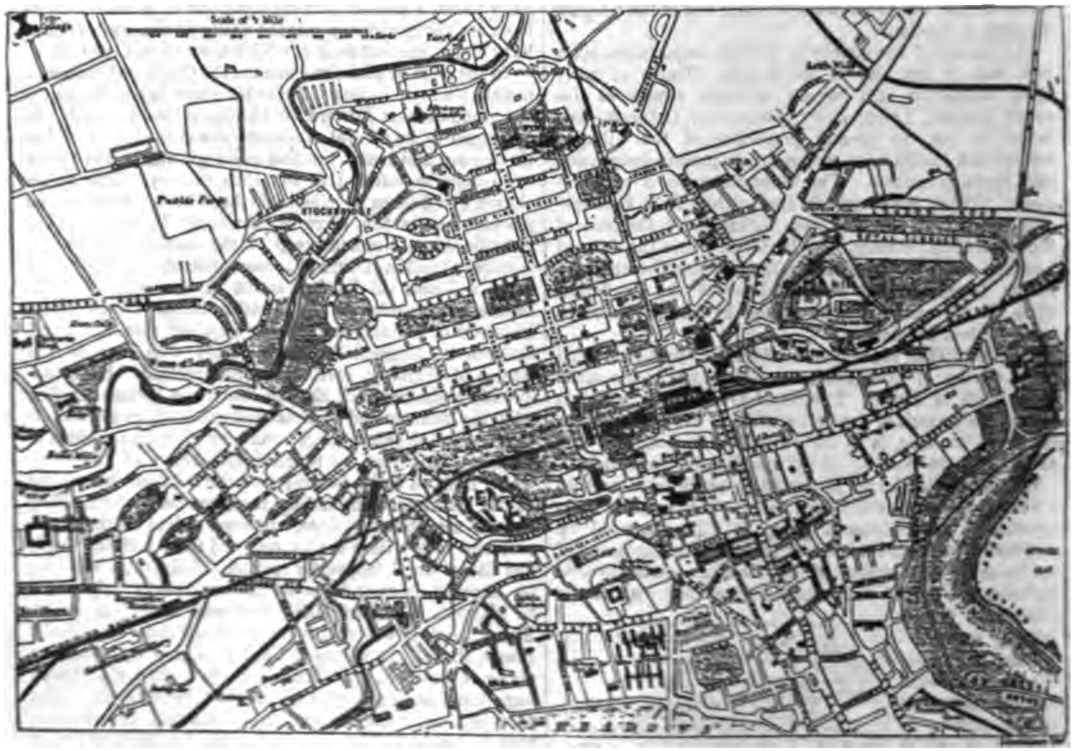


Environs of Edinburgh.

In the reign of Malcolm Canmore the Castle of Edinburgh included a royal palace. There his pious queen, Margaret, the grand-niece of Edward the Confessor, died in 1093. It continued to be a royal residence during the reigns of her three sons, and hence the first rapid growth of the upper town may be referred to the 12th century. The parish church of St Giles is believed to have been erected on its present site in the reign of Alexander I., about 1110, and the huge Norman keep of the castle, built by his younger brother, David I., continued to be known as David's Tower till its destruction in the siege of 1572. Before his accession to the Scottish throne, David I. had been earl of Huntingdon, having acquired that manor and earldom in England by his marriage with Matilda the heiress of Waltheof, earl of Northumberland. He consequently frequented the English court, and became familiar with the military and ecclesiastical architecture introduced by the Anglo-Norman kings; and soon after his accession to the Scottish throne he founded the Abbey of Holyrood, which from an early date received the Scottish court as its guests. But notwithstanding the attractions of the abbey and the neighbouring chase, the royal palace continued for centuries to be within the fortress, and there both the Celtic and Stuart kings frequently resided. Edinburgh was long an exposed frontier town within a territory only ceded to Malcolm II. about 1020; and even under the earlier Stuart kings it was still regarded as a border stronghold. Hence, though the village of Canongate grew up beside the abbey of David I., and Edinburgh was a place of sufficient importance to be reckoned one of the four principal burghs as a judicatory for all commercial matters, nevertheless, even so late as 1450, when it became for the first time a walled town, it did not extend beyond the upper part of the ridge which slopes eastward from the castle rock. But the mural defences of the town were an evidence of wealth and growing prosperity; and no sooner was it surrounded with protecting walls than its rapid increase led to the growth of an extensive suburb beyond their limits.

The other three royal burghs associated with Edinburgh were Stirling, Roxburgh, and Berwick; and their enactments form the earliest existing collected body of the laws of Scotland. But the determination of Edinburgh as the national capital, and as the most frequent scene of parliamentary assemblies, dates from the assassination of James I. in 1436. Of the thirteen Parliaments summoned by that sovereign, only one, the last of them, was held at Edinburgh. But his assassination that same year, in the Black-friars' monastery at Perth, led to the abrupt transfer of the court and capital from the Tay to the Forth. The coronation of James II. was celebrated in Holyrood Abbey instead of at Scone; and the widowed queen took up her residence, with the young king, in the Castle of Edinburgh. Of fourteen Parliaments summoned during this reign, only one was held at Perth, five met at Stirling, and all the others at Edinburgh; and, notwithstanding the favour shown for Stirling as a royal residence in the following reign, every one of the Parliaments of James III. was held at Edinburgh. James II. showed special favour to Edinburgh by conferring on it various privileges relating to the holding of fairs and markets, and the levying of customs; and by a royal charter of 1452 he gave it pre-eminence over the other burghs. Further immunities and privileges were conferred on it by James III.; and by a precept, known as the Golden Charter, of 1482, he conferred on the provost and magistrates the hereditary office of sheriff, with power to hold courts, to levy fines, and to impose duties on all merchandise landed at the port of Leith. Those privileges were renewed and extended by various sovereigns, and specially by a general charter granted to the city by James VI. in 1603, the year of his accession to the English throne.

James III. was a great builder; and, in the prosperous era which followed on his son's accession to the throne, the new town of the 15th century spread over the open valley to the south, with the Cowgate as its chief thoroughfare. But the death of James IV. in 1513, along with other disastrous results of the battle of Flodden, brought this era of prosperity to an abrupt close. The citizens hastened to construct a second line of wall, inclosing the Cowgate and the heights beyond, since occupied by the Greyfriars' Church and Heriot's Hospital, but still excluding the Canongate, as pertaining to the Abbey of Holyrood. The new wall long determined the limits of the town. For upwards of two centuries after its erection the requisite accommodation for the increasing population was secured by crowding buildings on every available spot within the protection of the walls, displacing the earlier structures by lofty piles of building within the straightened area, and projecting from them overhanging additions of timber. By those means the northern and southern slopes of the ridge along which the main street of the old town was formed were crowded with the picturesque alleys and closes which contributed so much to the peculiar aspect which the ancient city still retained when in 1808 Scott thus pictured it:—



Plan of Edinburgh.

> "Such dusky grandeur clothed the height,
> Where the huge castle holds its state,
> And all the steep slope down,
> Whose ridgy back heaves to the sky,
> Piled deep and massy, close and high,
> Mine own romantic town."

Within this ancient civic area stand the collegiate church of St Giles—for a time the cathedral of the diocese of Edinburgh,—the Parliament House and law courts, and the civic Council Chambers. Here also in earlier years of the present century stood the old Tolbooth, or Heart of Mid-Lothian, and other buildings of note, including mansions of the Scottish nobility, and even of royalty. But it forms a mere historic nucleus of the modern city, which for a century past has been extending over the neighbouring heights, northward towards the ancient seaport of Leith, and southward and westward to the lower slopes of the Pentland Hills. The area included within the parliamentary boundary extends to 4179 acres, or 6½ square miles; but, owing to its singularly irregular site, while the lower parts of the city stand little more than 100 feet above the level of the sea, the higher parts rise in some places to 250 feet, and the summit of the castle rock is 383 feet above the sea.[1] Within the same civic and entirely surrounded and in part encroached ' its streets, is the Calton Hill, occupied by the Astronomical Observatory, oor of which stands at a ; of 349 feet above the and beyond the narrow , in which the Canongate ne Palace of Holyrood lie, r's Seat and Salisbury Crags heir lofty cliffs in boldly esque outline, the highest it rising to the height of eet, and affording a magnificent prospect over land ea. Bridges connect the different ridges on which y is built, with crowded thoroughfares underneath. of the public buildings occupy lofty terraces, and y show to greater advantage than their architectural s would otherwise secure for them. The valley en the Old and the New Town, and the slopes of the rock, are laid out as public gardens; and the Calton nd Arthur's Seat furnish promenades and carriage of unequalled variety and beauty as the public of a large city. Fine white freestone abounds in amediate neighbourhood, and furnishes abundance of est building material; while the hard trap-rock, with the stratified sandstones of the coal formation have extensively broken up and overlaid, supplies good als for paving and roadmaking.

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[1] The extensive building operations engaged in by the corporation at the beginning of the century were the main cause of the insolvency of the city in 1833, when the property of the corporation was valued

Arms of Edinburgh.

is on a locality seemingly ill-adapted for the site of a city, there has gradually arisen one which compares vantage with the most picturesque and beautiful ; the capitals of Europe. Sir David Wilkie came to 1799 fresh from a Fifeshire manse, to begin the s in the Edinburgh school of design which ultimately d for him his high fame as an artist. When he ed to it in later years, familiar with all that European d to disclose, he thus gave utterance to his matured sions :—

> hat the tour of Europe was necessary to see elsewhere I now ngregated in this one city. Here are alike the beauties of and of Salzburg; here are the romantic sites of Orvietto roli; and here is all the magnificence of the admired bays of and Naples. Here, indeed, to the poetic fancy may be found l the Roman Capitol and the Grecian Acropolis."

name of Edinburgh is a memorial of the intrusion new people, when, in the beginning of the 7th y, the race of Ida reared the fortress of Edwin's-burgh rocky height, and thereby established the Anglian on the Forth. But this Teutonic invasion was not rst occupation of the site. Camden aimed at fying it with the Στρατόπεδον Πτερωτόν of Ptolemy; although this has been rejected by later Roman aries, the convergence of Roman roads towards the the traces of Roman art discovered from time to within the old civic area, and the evidence of two n seaports, at Inveresk and Cramond, both connected t by roads of Roman structure,—all tend to confirm ea that Edinburgh was one of the sites occupied by oman invaders. On their withdrawal it remained an tant stronghold on the southern frontier of the Pictish om. One learned Anglo-Saxon scholar, the Rev. D. aig, in his *Anglo-Saxon Conquest of Britain*, has fied it as the Hill of Agned, the scene of Arthur's y of Cat Bregion.

centuries after the founding of the Anglian kingdom rthumbria, the lowlands extending from the Forth to weed continued to be a debatable land held by ain tenure; it was to a large extent settled anew by Anglo-Saxon and Norman colonists under Malcolm Canmore and his sons. Edinburgh accordingly remained a frontier post beyond the Forth, until it became the capital of the Stuart kings. Then, for the first time, it rose into importance as a town. It shared in their triumphs, and bore the chief brunt in their repeated disasters; and, even after their forfeiture of the crown, some of its most picturesque associations are with the Stuart claimants for the throne of their ancestors. Nevertheless Edinburgh continued till near the close of the 18th century to be circumscribed within the narrow bounds of the ancient city and the burgh of Canongate, with the main street extending along the height of the slope from the Castle to Holyrood Palace, and the Cowgate as the only other thoroughfare admitting of the passage of wheeled carriages. Hence the vehicle in general use was the sedan chair, by means of which the Scottish nobility and gentry paid fashionable visits in the narrow wynds of their ancient capital, and proceeded in full dress to the assemblies and balls, which were conducted with the most aristocratic exclusiveness in an alley on the south side of the High Street, which still bears the name of the Assembly Close.

Beyond the walls of the ancient city lay the burghs of Calton, Easter and Wester Portsburgh, the villages of St Cuthbert's, Moutrie's Hill, Broughton, Canonmills, Silvermills, and Deanhaugh—all of which have been successively swallowed up in the extension of the modern city. The ancient seaport of Leith, though a distinct parliamentary burgh, governed by its own magistrates, and electing its own representative to Parliament, has already extended its buildings, at one point at least, so as to conjoin with those of the neighbouring city.

The progress of Edinburgh during the present century has been remarkable in many ways. In 1801 the population, including the Canongate and other extra-mural suburbs, but exclusive of Leith, was 66,544; in 1871 it had risen to 196,979. But the characteristics of the city and its population are peculiar. From an early date the special associations with the national literature have been identified with the ancient capital. Barbour, indeed, the contemporary of Chaucer, was archdeacon of Aberdeen; and the royal author of the *King's Quair* is chiefly associated with Perth; but in the following reign Edinburgh had become the favourite residence of the Scottish kings. One of the foremost charges against James III. was that he preferred the society of artists and musicians to that of the rough barons of his court. Under the patronage of his son, the printing press was first set up at Edinburgh in 1507. At the court of Holyrood, so long as James IV. reigned, the rivalry of rank and genius involved no conflict. Of the three great poets of the reign, Dunbar is believed to have been a grandson of the earl of March; Walter Kennedy was a younger son of the first Lord Kennedy; Gawin Douglas the third son of the earl of Angus; and Dunbar enumerates six or seven other literary contemporaries. In his *Remonstrance to the King*, he notes among the servitors of his royal master glazing-wrights, goldsmiths, lapidaries, apothecaries, painters, and printers; and some of his own poems appear to have been among the first works issued from the Edinburgh press by the Scottish Caxton, Walter Chepman. Gawin Douglas, the author of the *Palace of Honour*, and the translator of Virgil, was provost of the collegiate church of St Giles; and Roull, another literary contemporary named by Dunbar in his *Lament for the Makaris*, is believed to have been provost of the neighbouring collegiate church of Corstorphine. In the following reign Sir David Lindsay was the leader among the literary men of the Scottish capital; and in 1554 his famous *Satire of the Three Estates* was enacted in the presence of the court, at Greenside, a natural amphitheatre on the north.

,658 against a debt of £425,195, which was compounded for issue of 3 per cent. bonds of annuity—the loss to the creditors ounting to 25 per cent. of their claims.

west side of the Calton Hill, which appears to have been the favourite tilting ground, and general arena for public displays,—including even the burning of heretics and witches.

The names of Knox (died 1572), Buchanan (1582), Alexander Montgomery (1605), Drummond of Hawthornden (1649), Allan Ramsay (1757), Smollett (1771), Fergusson (1774), and Burns (1796), carry on the literary associations of the Scottish capital nearly to the close of the 18th century, when various causes combined to give them a new significance and value. In the later years of the 18th and the beginning of the 19th century the university of Edinburgh was distinguished by teachers who gave it a prominent rank among the European schools of science and letters; while members of the legal faculty disputed with them in friendly rivalry. Gregory (died 1701), the Monroes (the elder 1767, the second 1817), Cullen (1790), Black (1799), Playfair (1819), Dugald Stewart (1828), and Leslie (1832), all figure among the professors of the university; while David Hume (1776), Adam Smith (1790), Robertson the historian (1793), Henry Mackenzie (1831), and others of the same literary circle gave ample range to its intellectual triumphs. To this succeeded the era of *Marmion* and *The Lady of the Lake*, followed by the *Waverley Novels*, and *Blackwood's Magazine* and the *Edinburgh Review*, when Scott, Wilson, Brougham, Jeffrey, Cockburn, and Chalmers gave the character to the literary society of Edinburgh which won for it the name of Modern Athens. To this the actual correspondence of its site to that of Athens no doubt also contributed. Various travellers have noted the resemblance between the distant view of Athens from the Ægean sea, and that of Edinburgh from the Firth of Forth. The popular recognition of this unfortunately tempted the citizens to aim at a reproduction of the Parthenon of Athens on the summit of the Calton Hill, in commemoration of Wellington and his brothers in arms, by whom the victory of Waterloo was made the harbinger of peace to Europe. The abortive scheme, as an incompleted project, undesignedly reproduces the ruin of the ancient Acropolis.

Literary taste and culture still characterize Edinburgh society; but—apart from the exceptional influences of preeminent genius—the causes which largely contributed to give it so special a character no longer exist. In Scott's early days a journey to London was beset with difficulties, and even dangers; whereas railways have now brought it within a few hours' distance, and Scottish artists and literary men are tempted to forsake Edinburgh for the great centre of all national activities. Nevertheless, the influence of the past survives in many ways. Edinburgh is not a manufacturing city, but retains even now something of the character of the Scottish capital, as the resort of those whose means enable them to enjoy in ease and comfort its social amenities, without indulging in the costly gaieties which a London season involves. The supreme courts of law hold their sittings in Edinburgh, and still retain some of the most characteristic features impressed on them when remodelled by James V. in 1532. The Court of Session has the lord president as its head; and the High Court of Justiciary is presided over by the lord justice-general and the lord justice-clerk. The judges, as senators of the College of Justice, have also the title of lord, not infrequently coupled with that of their landed estate—as Fountainhall, Kaimes, Hailes, Monboddo, Woodhouselee, or Colonsay; and the advocates and writers to the signet—as the two leading branches of the Scottish legal profession are styled,—help to give a legal tone to the society of the Scottish capital.

The university, with the medical schools and other educational institutions, have long added to the attractions of Edinburgh. As a school of art it has also required a special character; and the names of Runciman, Nasmyth, Raeburn, Wilkie, Allan, M'Culloch, Watson Gordon, Harvey, and Drummond (without referring to living painters and sculptors) are all familiar, and some of them eminently distinguished in art. A school of design was established at Edinburgh in 1760 by the Honourable Board of Trustees for Manufactures, at which Raeburn, Wilkie, Allan, and other leading Scottish artists, along with many others of less note, obtained their preliminary training. With its aid the application of art to manufacturing design and decoration has received an important stimulus. Steel and wood engraving have also largely benefited by the same facilities; and this in its turn has aided in fostering the printing press as a special branch of trade for which Edinburgh has long been celebrated. In early days the names of Chepman, Millar, Bassandyne, Charteris, Hart, Watson, and Ruddiman figure among its celebrated typographers; and more recent enterprise has added to the reputation of the Edinburgh press.

But although a large unemployed population, in close proximity to a coal-field and to the fertile Lothians, and with the command of the chief seaport of the east of Scotland, gives a stimulus to important industries, the Scottish capital lays no claim to rivalry with Glasgow or Dundee as a manufacturing town. The unique beauty of its site and the abundance of fine building material, while they have fostered the desire for developing its architectural features have begot a disinclination to encourage such manufactures as would tend to interfere with the amenities of the city. The anxiety with which these are guarded commands the sympathy of all classes of the community. The distinctive contrast between the Old and the New Town is kept ever in view. The predominant character of the former is a seemingly lawless picturesqueness, resulting from the extreme irregularities of the sites occupied by its most prominent buildings on the abrupt slopes of the ridge which is crowned by the ancient fortress. The symmetrical formality of the New Town is all the more effective from the contrast which it thus presents to the older districts of the city. In most of the old historical cities of Europe the stranger recalls the contrast as he proceeds from modern to older districts; but in Edinburgh he can look down on the city from the castle, the Calton Hill, or Arthur Seat, and view the whole spread out like a map before him; or, as he traverses the beautiful terrace of Princes Street, adorned with statues, monuments, and public buildings, he looks across the fine pleasure grounds in the intervening valley to the quaint old town with its still older castle.

The improvements effected on the Old Town during the past forty years, while they have swept away many interesting historical remains, have on the whole resulted in a more effective development of its picturesque features. During the same period the New Town, and the still more recent extensions to the west and south, have been carried out with a careful eye to the general results; and alike in the Old and the New Town the advantageous sites of the chief public buildings largely contribute to their architectural effect.

The Castle.—The central feature of Edinburgh is the castle, which includes structures of very diverse dates. The oldest of its buildings, occupying the very summit of the rock, is St Margaret's Chapel, an interesting relic, belonging at latest to the reign of Queen Margaret's youngest son, David I., and by some good authorities believed to be the actual chapel in which the queen of Malcolm Canmore worshipped. Next in interest are the ancient hall and other remains of the royal palace, which form two sides of the quadrangle styled palace yard, and occupy the summit of the rock towards the south. These buildings include the apartments occupied by the regent, Mary de Guise, and her royal daughter, Queen Mary, and the room in which James VI. of Scotland and I. of England was born. Here also is the Crown Room, in which are deposited the Scottish regalia, or "The Honours of Scotland," as they are called, along with a beautiful sword of state presented to James IV. by Pope Julius II., and the jewels restored to Scotland on the death of Cardinal York, the last of the Stuarts. The arsenal, a modern building on the west side of the castle rock, is capable of storing 30,000 stand of arms. In the armoury a display of arms of various dates is made; and on the Argyll battery, immediately to the south of St Margaret's Chapel, stands a huge piece of ancient artillery, called Mons Meg, of which repeated mention is made in Scottish history.

Holyrood Palace, the venerable abode of Scottish royalty, was originally an abbey of canons regular of the rule of St Augustine, founded by David I. in 1128. The ruined nave of the abbey church still retains portions of the original structure. Conjoined to this is a part of the royal palace erected by James IV. and V., including the apartments occupied by Queen Mary, and the scene of the murder of Rizzio in 1566. The abbey suffered in repeated English invasions. It was sacked and burnt by the earl of Hertford in 1544, and again pillaged and left in ruin by the same invaders in 1547, almost immediately after the accession of Edward VI. to the English throne. In a map of 1544, preserved among the Cotton MSS. in the British Museum, the present north-west tower of the palace is shown standing apart, and only joined to the abbey by a low cloister. Beyond this is an irregular group of buildings, which were replaced at a later date by additions more in accordance with a royal residence. But the whole of this later structure was destroyed by fire, while in occupation by the soldiers of Cromwell, in 1650; and the more modern parts of the present building were commenced during the Protectorate, and completed in the reign of Charles II. by Robert Mylne, in accordance with a design of Sir William Bruce of Kinross. They include the picture gallery, 150 feet in length, famous for its fanciful array of 106 mythical portraits of Scottish kings, the reputed descendants of King Fergus I., but also adorned with a remarkable triptych, painted about 1484, containing portraits of James III. and his queen, Margaret of Denmark, and believed to have formed the altar-piece of the collegiate church of the Holy Trinity, founded by the widowed queen of James II. in 1462, and only demolished in 1848. The picture gallery is interestingly associated with festive scenes during the brief presence of Prince Charles Edward in Edinburgh in 1745; and in it the elections of representative peers for Scotland take place. The exiled Comte d'Artois, afterwards Charles X. of France, had apartments granted for the use of himself and the emigrant nobles of his suite, on their escape from the first French Revolution, and they continued to reside in the palace till August 1799. When driven from the French throne by the revolution of 1830, the same unfortunate prince once more found a home in the ancient palace of the Stuarts. In the interval between those two visits it was graced by the presence of George IV. in 1822; and it has been repeatedly occupied for brief periods by Queen Victoria and the Prince Consort. A beautiful fountain, the design of which is a restoration of the ruined fountain in the quadrangle of Linlithgow Palace, stands in the centre of the outer court of Holyrood, and forms a memorial of the interest evinced by Prince Albert in the ancient Scottish palace.

The Parliament House, in which the later assemblies of the Scottish estates took place, until the dissolution of the Parliament by the Act of Union of 1707, has ever since been set apart as the place of meeting of the supreme courts of law. The great hall, with its fine open-timbered oaken roof, under which the last Scottish Parliament assembled still stands, and forms the ante-room of the advocates and other practitioners, and of their clients, during the session of the supreme courts. But the surrounding buildings, including the court-rooms, the Advocates' and the Signet Libraries, are all modern additions. The Advocates' Library is the largest and the most valuable library in Scotland. It was founded in 1682, at the instance of Sir George Mackenzie, king's advocate under Charles II., and then dean of the faculty, and has been augmented by important gifts. It is regarded with just pride as the national library, and is one of the five libraries entitled by the Copyright Act to receive a copy of every work printed in Britain. The number of volumes now included in the collection is estimated to amount to 260,000. The Library of the Society of Writers to the Signet contains upwards of 50,000 volumes, and, although more private in its character, it has always been available for research by literary students.

The General Register House for Scotland, which stands at the east end of Princes Street, is an important adjunct to the supreme courts; and, in its ample provisions for the registry and safe-keeping of all deeds and judicial records, it compares favourably with the system in vogue in England. Not only is there adequate accommodation, in fire-proof chambers, for all Scottish title-deeds, entails, contracts, and mortgages, and for general statistics, including births, deaths, and marriages, but there also are deposited all the ancient national records, the full historical value of which is only now beginning to be generally appreciated. The general record department is in charge of the lord clerk register and keeper of the signet, assisted by a deputy clerk register, a deputy keeper of the records, a curator of the historical department, and other officials.

The Royal Institution, a fine structure of the Grecian Doric order, surmounted by a colossal statue of the Queen, executed in stone by Sir John Steell, furnishes official accommodation for the Board of Trustees for Manufactures, and the Board of Fishery, and also for the School of Art and Statue Gallery of the Royal Institution, the Museum of National Antiquities, and the libraries and public meetings of the Royal Society and the Society of Antiquaries of Scotland. This beautiful building is thus made the centre of varied intellectual activity, in artistic culture and design, scientific, historical, and archæological research, as well as in the practical application of the fine arts, and of the newest disclosures in science, to the manufacturing and trading interests of the whole nation.

Among those the National Museum of Antiquities claims special attention. The Society of Antiquaries of Scotland was founded in the year 1780 by a body of noblemen and gentlemen, who held their first meetings at the house of the earl of Buchan; and almost immediately after its foundation they devoted themselves to the formation of an Archæological Museum. The history of the early years of the society is a curious commentary on the manners of the Scottish capital a century ago. With the dukes of Montrose and Argyle, the earls of Buchan, Bute, Fife, and Kintore, and many of the leading Scottish gentry among its active members, a suitable hall secured for the meetings of the society in the Cowgate was successively exchanged for others in Webster's Close, and Gourlay's Close, Lawnmarket—the reason assigned for abandoning the latter being that the alley was too narrow to allow of the members reaching the society's hall in their sedan chairs. After passing through various vicissitudes, and occupying more than one hall in the New Town, it was found that the collections of the society had attained to a magnitude and value which rendered it no longer possible for a private society to do justice to them. Archæological investigations, moreover, have now come to occupy a no less important relation to the researches of science than to the study of history; and in many of the capitals of Europe similar collections are promoted as objects of national importance. Negotiations were accordingly entered into with the Government in 1849 and subsequent years, which resulted in the appropriation of the galleries in the Royal Institution, formerly devoted to the exhibitions of the Royal Scottish Academy, to the reception of the collections of the Society of Antiquaries of Scotland as a National Museum of Antiquities. The council of the society, with the addition of two members of the Board of Trustees as representatives of the Crown, continue to have the charge of the collections, which are open to the public, like the British museum and other national collections. The museum is specially rich in Scottish antiquities, illustrative alike of prehistoric archæology, of Roman, Celtic, and Teutonic remains, and of mediæval civil and ecclesiastical art; and its native and foreign collections of primitive antiquities are arranged with a view to illustrate modern archæological science, by the comparative classification of numerous examples of primitive flint, stone, and bronze relics, sepulchral pottery, implements and weapons, and of personal ornaments of gold, silver, and bronze. The society publishes its proceedings annually, and from time to time issues its transactions, embodying the more important historical and archæological treatises submitted to its meetings, in the quarto volumes of the *Archæologia Scotica*.

The Royal Society of Edinburgh was incorporated by royal charter in 1783, for the encouragement of philosophical inquiry and scientific research. Its extensive library and other collections are accommodated in the apartments occupied by it in the Royal Institution buildings; and its proceedings and transactions are now voluminous, and embody many important scientific papers.

The Royal Scottish Academy of Painting, Sculpture, and Architecture, was instituted in 1826, and incorporated by royal charter in 1838, on the model of the Royal Academy of London. Subsequent to the completion of the Royal Institution buildings the central range of galleries was appropriated to the annual exhibitions of the Academy; but in August 1850 Prince Albert laid the foundation-stone of the National Gallery, a building exclusively devoted to the promotion of the fine arts in various ways, including the accommodation of the Royal Scottish Academy, and which has also greatly contributed to the architectural beauty of the city. The low valley, or ravine, which separates the Old from the New Town, is not only spanned by the North and Waverley Bridges, but is also crossed midway by a huge earthen viaduct, formed by depositing the materials excavated for the foundation of the houses erected on the neighbouring terrace of Princes Street. This, which long formed an unsightly blemish, was at length utilized for the improvement of the city, as the site of the Royal Institution building. But there still remained in the rear a huge excrescence styled the Earthen Mound, cumbered with temporary buildings, and an eyesore to all who appreciated the amenities of the general view. The property of this as a building site was acquired by the Board of Trustees under an Act of Parliament, which vested it, and the buildings erected thereon, in the Board, subject to the Lords Commissioners of the Treasury; and in 1854 the new galleries were completed. The building is of the Greek Ionic order, thereby pleasantly contrasting with the more massive Doric of the Royal Institution building; and the view of the two, as seen from East Princes Street, grouping together with the Castle, the Free Church College, and the masses of the Old Town buildings rising behind, is singularly striking and effective. The National Gallery provides for the public display of a fine national collection of paintings and sculpture, acquired by purchase and bequest, for the annual exhibitions of the Royal Scottish Academy, and for the Life Academy and other schools specially designed for the advancement of the fine arts in Scotland.

The University of Edinburgh was founded in 1582, by a royal charter granted by King James VI., and its rights, immunities, and privileges have been remodelled, ratified, and extended at various subsequent periods. In 1621 an Act of the Scottish Parliament ratified to the university of Edinburgh all rights and privileges enjoyed by other universities in the kingdom, and those were renewed under fresh guarantees in the Treaty of Union between England and Scotland, and in the Act of Security. Important changes have since been made on the constitution of the university by an Act of the British Parliament passed in 1858. But while the college, as such, bears the name of the College of King James, or King's College, and James VI. is spoken of as its founder, it originated in the liberality of the citizens of Edinburgh. William Little of Craigmillar, and his brother Clement Little, advocate, along with James Lawson, the colleague and successor of Knox, may justly be regarded as the true founders of the college. In 1580 Clement Little gave all his books, amounting to 300 volumes, for the beginning of a library, and this was augmented by other valuable benefactions, one of the most interesting of which was the library of Drummond of Hawthornden, the friend of Ben Jonson—a collection rich in choice specimens of our rarer early literature. The University Library now contains about 139,000 printed volumes, and above 700 volumes of MSS., many of which are of great interest and value.

The buildings of the university occupy the site of the ancient collegiate church of St Mary in the Field, or the Kirk of Field, as it was familiarly termed. The present structure is a classical building, inclosing an extensive quadrangle. The older parts of it, including the east front, are from the design of Mr Robert Adam; but his plans were revised and modified with great taste by Mr W. H. Playfair, with a view to the completion of the building; and the whole is now finished, with the exception of a cupola designed to surmount the east front, for which the requisite funds have been bequeathed to the university. This edifice affords accommodation for the lecture rooms in the four faculties of arts, law, medicine, and theology, and for the museums and library. But although entirely reconstructed on a greatly enlarged scale during the present century, they have already proved to be inadequate for the requirements of this celebrated school of science and letters; and extensive new buildings are now in progress at Teviot Row, designed to accommodate the departments of science and medicine, and to leave the older building exclusively for the departments of arts, law, and theology. The new buildings will accordingly include a university convocation hall, class-rooms, laboratories, dissecting rooms, and museums.

In connection with this, the *Royal Infirmary* is also in progress of completion, on a new site, and on a greatly enlarged scale, with operating theatre and other requirements in connection with the medical school, and with all the most modern improvements in the arrangement and construction of hospitals. For this a site nearly adjoining to that of the new college buildings, previously occupied by George Watson's Hospital, has been selected. It embraces a large area between the Heriot's Hospital grounds and the Meadows, and separated by the fine avenue of the Meadow Walk from the new medical schools. By this means the important requisites of free air and the immediate vicinity of extensive pleasure grounds are secured; and thus the primary object of the infirmary as a benevolent institution for ministering to the wants of those afflicted with disease or suffering from injuries, is efficiently combined with its indispensable uses as a school for clinical instruction and practical training in the healing art.

The Royal Botanical Garden is another important adjunct to the university as a school of science. The professor of botany is regius keeper of the garden; but its special requirements necessitate its removal from the crowded centre of the city. It has accordingly undergone four successive changes of site since its foundation in 1670 by Sir Andrew Balfour and Sir Robert Sibbald. It now occupies a fine area of 27 acres on the north side of the city, in Inverleith Row. This is carefully laid out with a special view to botanical instruction. It includes a herbarium and palm houses, with an extensive range of hot-houses, a museum of economic botany, a lecture room, and other requisites for the students of botany who attend here the lectures of the professor during the summer term.

The Royal Observatory, which has already been referred to as one of the architectural adornments of the Calton Hill, also constitutes an important adjunct to the university. The astronomer royal for Scotland holds along with that office the professorship of practical astronomy.

Museum of Science and Art.—One other important institution of practical instruction, in intimate connection with the university, is the Museum of Science and Art, situated immediately to the west of the university building, and in direct communication with it. The first keeper of the museum, Dr George Wilson, was also professor of technology in the university, but the chair has not been filled since his death, though his successor in the charge of the museum delivers lectures from time to time in the large lecture room in the east wing of the building, which is capable of accommodating about 800 sitters. The Museum of Science and Art embraces not only the objects of science included in the departments of geology, mineralogy, palæontology, and natural history, as well as other allied sciences, but also of industrial art, and of the raw productions of commerce, illustrative of nearly all the chief manufactures of Great Britain, and of many foreign countries.

Royal College of Surgeons.—The museum and lecture rooms of the Royal College of Surgeons are accommodated in a handsome classical building in Nicolson Street, in the immediate vicinity of the university buildings. The College of Surgeons is an ancient corporate body, with a charter of the year 1505, and exercises the powers of instructing in surgery and of giving degrees. Its graduates also give lectures on the various branches of medicine and science requisite for the degree of doctor of medicine, and those extra-academical courses are recognized, under certain restrictions, by the university court, as qualifying for the degree. The museum contains a valuable collection of anatomical and surgical preparations adapted to the advancement of the study of surgical science.

Royal College of Physicians.—The Royal College of Physicians is another learned corporate body, organized as such, with special privileges by a charter of incorporation granted to them by Charles II. in 1681. The meetings of the body take place in their hall, a handsome building on the terrace overlooking the Queen Street Gardens, where they have a valuable library and a museum of materia medica. But the college as a body takes no part in the educational work of the university.

The three older Scottish universities of St Andrews, Glasgow, and Aberdeen were all founded in the 15th century, by the authority of papal bulls, and derived their original endowments chiefly from the liberality of influential ecclesiastics, who had large revenues and church property at their disposal. They originated a part of that grand conception of the 15th century, which aimed at organizing the learning of the age into local branches of one university system, embracing the whole scholarship of Christendom, and recognizing the graduates of all universities as members of one corporate brotherhood, co-extensive with the Christian world. The Scottish universities still differ from those of Oxford and Cambridge in perpetuating some curious relics of this cosmopolitan university system.

The first conception of the University of Edinburgh is also due to a learned Scottish ecclesiastic, Robert Reid, bishop of Orkney, a favourite councillor of James V., who died at Dieppe in 1558,—as was believed from poison,—when on his way home, after fulfilling his duties as one of the commissioners for the marriage of the Queen of Scots to the Dauphin of France. He left a bequest of 8000 merks towards the founding of a college at Edinburgh, and is stated by the historian of the family of Sutherland to have destined a much larger sum for the same purpose, but it was diverted by the earl of Morton to his own use. The above-named bequest was only recovered after long delay, when, in 1581, it was appropriated to the purchase, from the provost of the Kirk of Field, of the grounds now occupied by the university buildings. The circumstances attendant on the death of this first benefactor of the University remind us of the ecclesiastical changes already in progress in the 16th century. The actual foundation of the University of Edinburgh dated subsequent to the Reformation; and it is honourably distinguished among the national universities of Great Britain as the creation of the citizens themselves.

The Royal Charter granted by James VI. in 1582 contemplates a university on a wide basis, with the conditions necessary for liberal study, and arrangements suited to the progress of modern science; and it is wonderful how much has been accomplished in spite of the meagreness of the whole endowment. By the Universities (Scotland) Act of 1858, provision is made for the better government and discipline of the Scottish universities, and that of Edinburgh was materially affected by its operations. The civic origin of the university had placed the patronage of the chairs, and the supreme control of the university, to a very considerable extent in the hands of the city corporation. The administration of the responsible duties thus devolving on the town council reflects, on the whole, great credit on the city; and its exercise of the patronage of university chairs was abundantly justified by the high rank attained by the university under the distinguished professors selected by it. But the university had long outgrown the healthful operation of such anomalous relations; and by the new Act, it has been remodelled as a corporation, consisting of a chancellor, vice-chancellor, rector, principal, professors, registered graduates and alumni, and matriculated students. The chancellor is elected for life by the general council, of which he is head; and the rights of the city as the original founder of the university have been recognized by giving to the town council the election of four of the seven curators, with whom rests the appointment of the principal, the sole patronage of seventeen of the chairs, and a share in other appointments. For further details see UNIVERSITIES.

New College.—One of the proceedings consequent on the disruption of the Church of Scotland in 1843, and the formation of the Free Church, was the establishment of New College at Edinburgh, in connection with that church. As originally projected, it was designed to include scientific and literary as well as theological chairs. Since then, however, this and the other colleges of the Free Church of Scotland, established at Aberdeen and Glasgow, have assumed the more limited character of purely theological colleges—though in that of Edinburgh a chair of natural science is still retained. New College Buildings, designed in the pointed style of the 16th century, are erected on the site of the palace of Mary de Guise, and include a hall for the general assembly, or supreme court of the church. They occupy a prominent site at the head of the Mound, immediately in the rear of the National Gallery; and the two central towers, with a lower one in the same style, attached to the church at the north-east angle, contribute to give elevation to the facade which has been aptly designed to harmonize with the lofty surrounding buildings of the Old Town.

The United Presbyterian Church has also its theological hall for the training of its ministers. The building hitherto occupied for the accommodation of the students, and also for the meetings of its church courts, is situated in Queen Street; but in September 1877 the New Edinburgh Theatre, in Castle Terrace, was purchased with the view of being converted to those uses.

Literary Institutions.—Next door to the United Presbyterian premises in Queen Street is the Philosophical

Mr Thomas Carlyle is president. The
is institution is extensive and valuable,
ter courses of lectures are of a high
mmand great popular interest. The
ry Institute, formed on a nearly similar
uilding in South Clerk Street, in the
the city.

e public seminaries of Edinburgh, including
and other charitable foundations chiefly
e training and education of youth, are upon
l scale. The High School of the burgh dates
from an early period in the 16th century. The
ord, under date March 12, 1554, contains an
the building of the grammar school on the east
he Kirk of Field Wynd. At a later date, and
the present century, it occupied the site of the
ars' monastery founded by Alexander II. in 1230.
the year 1825 the foundation stone was laid of the
ful classical building which now occupies a prominent
on the southern slope of the Calton Hill. It was
nally, and till a comparatively recent date, a purely
sical school; but it now furnishes systematic instruction
all the departments of a liberal and commercial educa-
on, including the ancient and modern languages, the
atural sciences, mathematics, &c.

The Edinburgh Academy, which was established in 1824, and incorporated by royal charter of George IV., is a proprietary school under the superintendence of a board of directors elected by the subscribers. It is arranged into two divisions, the classical and the modern school, for the senior classes. It has established a high character for its classical training, and has already taken an honourable rank among the public schools of Great Britain, by the distinctions achieved by its pupils both at the English and Scottish universities.

Charitable Foundations.—Foremost among the charitable foundations for the education and training of youth is George Heriot's Hospital, founded by the jeweller of James VI. of Scotland and I. of England, who at his death in 1624 left his estate in trust to the magistrates and ministers of Edinburgh for the maintenance and education of poor fatherless sons of freemen of the city. The building erected for the purposes of the charity is a noble quadrangular edifice, enriched with the elaborate details of the transitional style of domestic architecture of the earlier Stuart kings of England. It occupies a commanding site on the summit of a ridge known of old as the High Riggs, lying between the Grassmarket and the Meadows, and forms a striking feature in the view of the city from various points. 180 boys are maintained on the foundation, 120 resident, and 60 non-resident. Those among them who give proof of diligence and ability are afterwards maintained during a full course of four years at the university; and those who are apprenticed to trades are also provided with funds for five years, amounting in all to £50 sterling, with an additional £5 on proof of good behaviour at the close.

The popular character of Heriot's Hospital, and the effective architecture of its building, have largely influenced the disposition of later charitable bequests in Edinburgh, somewhat to the detriment of the university. Following the example of the jeweller of King James, successive benefactors have founded George Watson's Hospital, the Merchant Maiden Hospital, the Trades' Maiden Hospital, the Orphans', John Watson's, Donaldson's, and Stewart's hospitals—all more or less modelled on the original founda-
tion. Several of their buildings are also possessed of con-
ctural beauty, foremost among which is
founder of which amassed a large
athed nearly the whole of
ent of a hospital for

the maintenance of poor boys and girls. The
taken advantage of the liberty of choice per
such terms to select one-half of the children admitted to
the hospital from the class of the deaf and dumb. The
building has accommodation for 300 children. In 1877
it contained 214, of whom 120 were boys and 94 girls.
Of those 70 of the former and 45 of the latter were deaf
and dumb. Experience has thus far tended to show that
the constant intercourse between the deaf mutes and their
more fortunate companions exercises a beneficial influence
on both.

George Watson's Hospital, founded by the bequest of another
citizen in 1738, and the Merchant Maiden Hospital, founded as
early as 1605, were designed to extend to the sons and daughters
of merchants of Edinburgh similar advantages to those which the
Heriot's Hospital secured for burgesses' sons. The Trades Maiden
Hospital provided for burgesses' daughters, and John Watson's
Daniel Stewart's, and other similar institutions provided in like
manner for the maintenance and education of poor children of
various classes. But the multiplication of such charities through
to outgrow the legitimate wants of the community, and tended
to withdraw many children from the healthful influences of h
training. Hence a growing feeling of the abuses of the sys
at the very time when the revenues of Heriot's Hospital
greatly increased in consequence of the extension of the New
over its lands, at length led to an application to Parliam
power to modify the disposition of the surplus revenue.
Act thus obtained the governors of that institution were e
to expend such surplus funds in erecting and maint
mentary schools for the free education of poor children
burgesses and freemen, and generally of the child
citizens of Edinburgh. There are now eighteen of
foundation schools, in differept parts of the city, di
two classes of juvenile and infant schools, giving
and, in certain cases of extreme poverty, also a su
lieu of maintenance, to 4400 boys and girls.

The example thus set has been followed by the
of other similar institutions. The Merchant Com
of the George Watson's, Merchant Maiden, Gillesp
charities, taking advantage of powers given by th
tions (Scotland) Act, obtained power to convert
Hospital into a school; and since then, they h
and grounds to the corporation of the Royal In
Infirmary is now in progress on the site. The
Company's Schools now include the George W
in which ample provision is made for fur
tion for boys, qualifying them for commer
for the civil service, and for entering the u
also offered for competition, which secur
entire course of studies to the successful
the sum of £25 annually, for four years
A similar institution provides correspo
and the Edinburgh Educational Instit
like manner furnishes a high-class e
modern languages, mathematics, th
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the antique tower of Napier, famous as the inventor of logarithms, and the Watt Institution and School of Arts, all merit notice among the more important educational institutions; and under the Edinburgh School Board efficient schools are now in operation in various districts of the city, mostly lying beyond the range of the Heriot's schools.

Charities.—Among the public charities of the city the Trinity Hospital, no longer maintained as a hospital with resident pensioners, now expends its income in pensions of from £10 to £20, to 172 poor burgesses, their wives, or children, not under the age of fifty years. The benevolent branch of the Gillespie's Hospital endowment is similarly administered. The Chalmers' Hospital, founded by George Chalmers in 1836, destined for the reception of the sick and hurt, stands on the southern slope of Lauriston, overlooking the Meadows, and at no great distance from the New Royal Infirmary, to which it is a useful adjunct. In addition to those, it may suffice to name the Convalescent House—where, in a pleasant country home near Corstorphine, the convalescents of the Infirmary are transferred from the surgical or fever wards of that hospital to healthful fresh air,—the Royal Hospital for Sick Children, the Home for Crippled Children, the Hospital for Incurables, the Royal Maternity Hospital, along with other kindred institutions. The Royal Asylum for the Insane is at Morningside, on the southern outskirts of the city; and the Royal Blind Asylum, and the Deaf and Dumb Benevolent Society, each provide for the special classes indicated by their names.

Prisons.—The different city prisons are grouped together on the southern terrace of the Calton Hill, styled of old the Dow Craig, so as to form a very striking feature in the general view of the city from various points. They are constructed in a semi-castellated style; and the house of the governor of the jail, built on the summit of a rock overlooking the whole, and on the very edge of a bold perpendicular cliff, looks not unlike one of the old castles familiar to the voyager on the Rhine.

The General Post-Office is the central office for Scotland, alike for postal and telegraphic service, and the building devoted to those purposes is a large and effective structure in the Italian style of architecture, at the east end of Princes Street, directly opposite to the Register Office.

General Assembly of the Church of Scotland.—During the establishment of Episcopacy in Scotland, Edinburgh was the seat of a bishop, and the ancient collegiate church of St Giles rose to the dignity of a cathedral. The annual meeting of the General Assembly of the Church of Scotland at Edinburgh is now the grand public manifestation of the predominance of Presbyterianism as the national church. Annually in the month of May a nobleman, commissioned to act as the representative of the Queen, takes up his abode at the Palace of Holyrood, and proceeds from thence in state to the High Church, and thence to the Assembly Hall on the Castle Hill, as the lord high commissioner to the General Assembly of the national church. The lord provost and magistrates loyally offer to him the keys of the city. Levees, receptions, and state dinners revive in some degree the ancient glories of Holyrood; and, as the General Assembly of the Free Church and the Synod of the United Presbyterian Church are usually held at the same time, the streets of Edinburgh present a singular aspect to a stranger.

Places of Worship.—The buildings set apart as places of worship by the various denominations include 30 belonging to the Church of Scotland, 29 to the Free Church, 23 to the United Presbyterian Church, 14 to the Episcopal Church, and about 30 others to different religious denominations, including a Jewish synagogue.

St Giles's Church.—Among the buildings dedicated to the worship of the different denominations, the ancient collegiate church of St Giles is the most important, alike in its architecture and its historical associations. The Regent Murray, the marquis of Montrose, and Napier of Merchiston are distinguished among the eminent men interred in the ancient church, by monuments marking their tombs. The choir, which has recently been cleared of encumbering galleries, and tastefully fitted up with oaken stalls, and a fine carved pulpit of Caen-stone, is a beautiful example of the ecclesiastical architecture of the 15th century; and the fine Gothic crown which surmounts the central tower forms one of the most characteristic features in every view of the city. The domes, towers, and spires of the various churches add to the general effect of the city, and in some cases they even present an imposing aspect from their elevated and commanding sites. But none of them is of sufficient importance to invite notice for any special architectural beauty, though several are works of merit. By the bequest of Miss Walker of Coates and Drumsheugh, who died in 1871, funds have been set apart for the erection of a cathedral for the use of the Scottish Episcopal Church. The plans have been prepared by Sir G. Gilbert Scott, in the Early Pointed style of the 14th century, and include a nave, choir, transepts, and chapter-house. If completed according to the approved design, it will be the largest and finest church erected in Scotland, if not in Britain, since the Reformation.

Monuments.—The monuments and statues which adorn the city are of a peculiar character, and contribute to the singular aspect which Edinburgh presents to the eye of a stranger. The fame of Sir George Mackenzie, David Hume, Dugald Stewart, Playfair, Burns, and Scott is commemorated in the case of each by an effective monumental structure dedicated to his memory. Of these the most remarkable is the monument erected by public subscription in memory of Sir Walter Scott, which stands in the eastern division of the Princes Street Gardens. The design, which was furnished by a young architect, Mr G. W. Kemp, is that of a spiral Gothic cross, of great elegance both in outline and in details. A marble statue of Scott, by Sir John Steell, is placed under the central canopy; and the principal niches are occupied by figures of characters in Scott's writings. The Nelson monument, a lofty castellated turret which crowns the highest cliff of the Calton Hill, though of questionable architectural taste, is a striking feature in the general view of the city; and the Melville monument, a graceful and well-proportioned column 136 feet in height, surmounted by a colossal statue of Viscount Melville, first lord of the admiralty under Pitt, rises from the centre of St Andrew Square, and terminates the eastern vista of George Street, with a reproduction, in its proportions and general outline, of the celebrated Trajan column at Rome. Distant half a mile from this, at the west end of George Street, Charlotte Square furnishes a corresponding site for the monument of Prince Albert, from the design of Sir John Steell. A central pedestal, which sustains the equestrian statue of the Prince Consort, has at each of the four angles at its base a group of figures representing different classes of the community paying honour to him; and bas-reliefs, executed, like the statues, in bronze, illustrate characteristic incidents in the Prince's career. George Street is further adorned at the intersection of two of the intermediate streets between St Andrew and Charlotte Squares, with colossal bronze statues by Chantrey of George IV. and Pitt. The beautiful garden terrace of Princes Street, on which the Scott monument stands, also affords appropriate sites for the statues of Allan Ramsay, John Wilson, and other distinguished Scotchmen; at other prominent points in the Old and New Towns are equestrian statues of Charles II., the duke of Wellington, and John, fourth earl of Hopetoun; and also statues of the duke of York, Lord Melville, &c. The monument to the poet Burns, erected on a prominent site on the southern terrace of the Calton Hill, is in the style of a Greek peripteral temple inclosing a cella designed to form the shrine of a fine marble statue of the poet executed by Flaxman. But it proved to be too confined to afford a satisfactory view of the statue. This has accordingly been replaced by a bust from the chisel of Brodie; and the statue, after being placed for a time in the university library, now forms a prominent feature among the works of sculpture in the National Gallery.

Manufactures.—The principal manufactures may be classed under the following respective heads:—(1) Printing, lithographing, engraving, bookbinding, and typefounding; (2) brewing, distilling, coopering, and manufacture of aerated water; (3) furniture work, paperhanging, and coach-building; (4) india-rubber work; (5) machinery and brassfounding; (6) tanning; (7) glass work; (8) confectionery.

The city is supplied with water from various extensive reservoirs formed in the valleys of the Logan Water, the Bavelaw Burn, and the North Esk, in the Pentland Hills, lying to the south of the city. A bold project was started in 1872 for securing an inexhaustible supply by bringing in the water from St Mary's Loch, a beautiful lake about three miles in length, at the head of the Vale of the Yarrow, in Selkirkshire; but the plan met with considerable opposition, and was abandoned for a less comprehensive measure, sanctioned by Parliament in 1874, whereby additional reservoirs have been constructed in the neighbouring valleys, and an adequate supply of water secured for the growing requirements of the city.

The population of the parliamentary borough of Edinburgh amounted in 1831 to 136,294, in 1851 to 160,302, and in 1871 to 196,979 (89,245 males and 107,734 females). In 1877 the population was estimated at 218,729; and the annual value of real property was £1,538,738. The city returns 2 members to parliament, and its corporation consists of a lord provost, 6 bailies, a convener of the trades, a dean of guild, and 32 councillors.

Reference may be made to W. Maitland's *History of Edinburgh* (1753), Arnot's *History of Edinburgh* (1789), R. Chambers's *Traditions of Edinburgh* (1824), and D. Wilson's *Memorials of Edinburgh in the Olden Time* (1846-48). (D. W.)

EDMUND, St (*c.* 1190-1240). Edmund Rich, archbishop of Canterbury, was born about the close of the 12th century, at Abingdon, then the seat of a great Benedictine convent. He was one of six children. His father was a rich trader and man of the world, his mother a pious woman, who carried out remorselessly the ascetic conception of a religious life. She fasted much and slept little, wore a hair chemise and iron stays, and made her household so uncomfortable by her arrangements that her husband, with her consent, retired to a monastery at Eynesham, as likely to be a more enjoyable home. The story of Edmund's birth and early years is strewn with marvel and miracle. Trained by his mother, he caught her ascetic spirit, and became a willing imitator of her self-tormenting ways. At the age of twelve he was sent to a school at Oxford, where he studied diligently, but continued his ascetic exercises. Naturally susceptible in a high degree to the charm of beauty, he nevertheless vowed a vow of celibacy, and espoused himself to the Blessed Virgin Mary. At Oxford he was prostrated by a brain fever; his mother attended him, and by her desire he received the clerical tonsure. Shortly after, his father apparently being dead, he was sent to Paris to study at the university. He was called home to attend his mother on her death-bed; and during the next twelve months he lived in retirement in the convent of Merton, in Surrey. He then returned to Oxford, and at once took an honourable place among the teachers of the university, which he retained for some years. He is distinguished as one of the scholars who introduced the study of Aristotle; and he heartily co-operated with those who were striving to recover for Oxford the popularity and prosperity as a place of study which it had recently lost, in consequence of a disturbance (1209) between town and gown, and the migration of students and masters in very large numbers. Edmund ultimately resolved to devote himself to theology, was ordained priest, and took his degree in divinity. "He is the first of our archbishops," says Dean Hook, "to whose name we find the title of S.T.P. attached—the first doctor of divinity." About 1222 he was appointed treasurer of Salisbury Cathedral, and in this office, which he held about eleven years, and to which the prebend of Calne was attached, he endeared himself alike to rich and poor. In 1227 Dr Edmund was one of the preachers of the sixth crusade. In 1233 he was elected to the vacant primacy. Three elections had previously been made by the chapter, which the Pope for various reasons had refused to confirm; and this, the fourth, was made by the Pope's suggestion, as a compromise acceptable to "Pope, king, and monks," says Fuller, "three cords seldom twisted in the same cable." The *pallium* was sent to England without waiting for the decision of the chapter. The position of the primate was at that time one of peculiar difficulty, and it was with unfeigned reluctance that Edmund accepted it,—feeling, says Lingard, "that the timidity of his conscience would not suffer him to acquiesce in the disorders of the age, and that the gentleness of his temper did not fit him for the stern office of a reformer." The new archbishop attached himself and steadfastly adhered to the national party, whose great object was to insure the independence of the kingdom, the maintenance of the Great Charter, and the exclusion of foreigners from civil and ecclesiastical offices. Early in 1234, before his consecration, he convened a council at Westminster, by which a remonstrance was addressed to the king, requiring him, on pain of the censures of the church, to dismiss his foreign councillors, especially Peter des Roches, bishop of Winchester, through whose influence the strongholds of the kingdom were then in the hands of foreign mercenaries. The consecration of the archbishop was celebrated at Canterbury on the 2d April 1234, and the king was present with all his court. One week later the primate held a second council, and was commissioned by it to threaten the king with excommunication if he did not comply with the terms of the former council. This measure was effectual. The archbishop was then sent into Wales to negotiate a peace with the Prince Llewelyn. In May he held a council at Gloucester, and here was accomplished a temporary reconciliation between the king and the people. In January 1236 the primate had the costly privilege of a royal visit, Henry III. going to Canterbury to await the coming of his bride-elect, Eleanor of Provence; and on the 14th the marriage ceremony was performed by the archbishop. A few days later he officiated at the coronation of the queen. But the hopeless divergence of aims between the king and the archbishop, and the inflexible courage and decision of the latter, induced Henry to apply secretly to the Pope, Gregory IX., to send a legate to reside in England, whose authority might nullify that of the archbishop. Meanwhile, the latter issued, in 1236, his constitutions, which are of no little interest on account of the indications they furnish of the state of the church and of general society. The picture is not a flattering one. In 1237 arrived the legate, Cardinal Otho, who at once was

ıto the royal favour. In November he held a
St Paul's, but failed to carry his main points
ıe opposition of the clergy. He stood high,
rith the king, and used or abused his prerogatives
ıg his own purposes. Archbishop Edmund now
self in opposition to both the king and the Pope;
sition was rendered still more difficult by his ex-
ıtion of Simon de Montfort and his bride Eleanor,
he king, whose marriage after having taken a
rpetual widowhood he felt bound to condemn.
with a view to obtaining the support of the Pope
ject of monastic reform, Edmund went to Rome.
s mission he failed. Not only was his purpose
but he was treated with marked insult by
and he returned to England sad at heart and
with pecuniary difficulties. He soon found that
duced to a cipher; he saw the Papal exactions
y growing—"vexed," says Fuller, "at the poll-
eeling of the English people"—and saw that the
eat object was to crush him. In 1240, therefore,
gland, and took up his abode at the abbey of
in France, where Thomas Becket and Stephen
ıad previously found an asylum. At his landing
t by the queen of France, who brought her sons,
ın (St) Louis, to receive his blessing. His health
roken down, and he "sighed out the remainder
" in quiet retirement, broken only by occasional
Becoming weaker and weaker, he removed,
ke of a better climate, to the priory of Soissy, and
ied, November 16, 1240. His tomb, within a
n to be famous for miracles; and in 1246, after
stance on the part of the Pope, the archbishop,
h foe of Papal extortions, was canonized. He left
titled *Speculum Ecclesiæ*, which he appears to have
at Pontigny.

emporary biographies of St Edmund are extant, one by
Robert Rich, the other by Bertrand, prior of Pontigny,
ıdmixture of miraculous and incredible details being
eir accounts. (W. L. R. C.)

ND, or Eadmund (840–870), the last of the
East Anglia, was born in 840. He was chosen
his successor when that king resigned and retired
tent to Rome. "The just and holy man"—so
rham describes Edmund—began his reign over
Angles in 855, and ruled peacefully and unevent-
ıis kingdom was invaded by the Danes in 870,
battle with Ingvar he was defeated and taken
The Anglo-Saxon Chronicle says: "The same
ng Edmund fought against them, and the Danes
ictory and slew the king, and subdued all the
destroyed all the minsters which they came to."
leury, who writes a life of Edmund, relates the
is death on the authority of Dunstan, who heard
ıe lips of Edmund's sword-bearer. The Danes
ngers to Edmund, who was dwelling at Hagilsdun
present Hoxne), upon the river Waveney, offer-
w him to reign under them on condition that he
s religion and divided with them his treasures.
efused these conditions, and being taken prisoner,
l to a tree, and, after being scourged with whips
ed with arrows, was finally beheaded. The
his death raised him to a place in the roll
s and saints; and on the spot where his head
have been miraculously discovered a church
d, which was succeeded by one of the richest
s of England, that of Bury St Edmunds. Here
ıs of Edmund are said to have been interred.

ND, or Eadmund I. (Atheling), (922–946), king
cians and West Saxons, was the son of Edward
and succeeded his brother Athelstan in 941, being then, it is said, only eighteen years of age, but having already gained the esteem of the people by his courage shown three years before at the battle of Brunanburh. When he succeeded his famous brother, the Northumbrians, judging the opportunity favourable, brought over Anlaf from Ireland, and set him up as their king. The Danes of the kingdom joined them, and the result of the campaign was that Edmund was compelled to make a treaty, by which he ceded a large portion of his territory to his enemy. Two years afterwards, however, on the death of Anlaf, he not only freed his kingdom, but also subdued the Britons of Cumbria or Cumberland, and bestowed their lands on Malcolm I. of Scotland, on condition of his co-operating with him in military service. On the 26th May 946 an outlaw named Leof had slipped into the banqueting-hall of Edmund, who was celebrating the festival of St Augustine at Pucklechurch in Gloucester, and the king in sudden anger, or because he suspected his designs, endeavoured to remove him, whereupon the outlaw plunged a dagger into his bosom and killed him.

EDMUND, or Eadmund II., (989–1016), son of Ethelred, and the last of the line of West Saxon kings, called on account of his boldness and great strength Ironside, was, on the death of Ethelred the Unready, in April 1016, proclaimed king by the citizens of London and such of the Witan as were in the city. At that very time Canute the Dane was preparing an expedition against London, and he was proclaimed king by the Witan of England, which met at Southampton. In command of a magnificent fleet he anchored before London, and by cutting a ditch round that part of the city not washed by the Thames, completely surrounded it; but the citizens, fighting with great valour, repulsed all his attacks. Meanwhile Edmund was acknowledged by the West Saxons, who flocked from every quarter to his standard; and determining to make a diversion in favour of London, he met and defeated the enemy at Pen, near Gillingham, in Dorsetshire. Canute was forced to raise the siege of London, and encountering Edmund at Scoorstan, in Wilts, would have been signally defeated, had not the traitor ealderman Edric raised the head of a fallen thane which resembled that of the king, and called to the Saxons to flee, for their king was dead. Edmund, who was on the top of a hill, saved his subjects from flight by taking off his visor and showing his countenance; but from the disorder into which they had been thrown by the untoward incident they were unable to follow up their victory. Canute retained possession of the field of battle, but stole away during the night and resumed the siege of London. Afterwards the Danes were defeated at Brentford on the Thames, and at Otford in Kent, and fled to the Isle of Sheppey; but being recruited, they met Edmund at Assandun (Ashdown, in Essex), where a battle was fought which virtually decided the fate of the West Saxon kings. Through a second act of treachery on the part of Edric, who fled at the decisive moment of the battle, with the portion of the army that he commanded, the Saxons were signally defeated, and their chief nobles left dead on the field. Edmund, undaunted by his great losses, wished still to continue the struggle, but Edric and the Witan persuaded him to be reconciled to Canute, and to consent to a division of the kingdom. Edmund retained London and all England south of the Thames, together with East Anglia and Essex, Canute taking possession of the other and larger portion. Edmund died on the 30th November of the same year, some affirm by the hand of Edric. He was buried in the great minster of Glastonbury, and on his death Canute became sole king of England.

EDOM. See Idumæa.

EDRISI, Idrisi, or Aldrisi, the most eminent of the Arabian geographers, flourished in the 12th century. The various parts of his life afford subjects of controversy rather than of precise information. The place and even the country in which he was born is the first subject of dispute. A Nubian and an Egyptian origin have both been assigned to him on the basis of a doubtful reading in his work, which speaks of "the Nile of Egypt which cuts *our* land." In 1663 Bochart stated that he had found in a manuscript of Leo Africanus that Edrisi was born at Mazara, in Sicily, in 1098. Next year, however, the manuscript was edited by Hottinger, in an appendix to his *Bibliothecarius Quadripartitus*, and it then appeared that the person supposed to be Edrisi was there named Esseriff Essachalli. Esseriff, or Scheriff, is indeed a usual appellation of Edrisi, but as it is only an honorary title and not a proper name, it does not help the identification. The most positive assertion on the subject is that of Casiri, who says (*Bibliotheca Arabico-Hispanica*, ii. 9), that if Edrisi, as appeared probable, were the person designated by the Mahometan writers as Abu-Abdallah Mohamad Ben Mohamad Ben Abdallah Ben Edris, he was born at Septa, or Ceuta, on the coast of Morocco, in 493 A.H. (1099 A.D.) Casiri not only qualifies his statement, but he does not mention the authorities from which it is derived; so that its acceptance rests only upon the confidence reposed in his learning and accuracy. Edrisi was long a mighty name in Northern Africa, but in 919 the dynasty was subverted by Mahedi Abdallah, and the proscribed wrecks of the family, according to D'Herbelot, afterwards sought refuge in Sicily. If we may trust the information of Casiri, Edrisi pursued his studies at Cordova, and from the accurate description he has given of Spain, it is probable that he had travelled through a great part of that country. Various circumstances prove that he removed to Sicily, and began to compose his great work under the patronage, and indeed at the express desire, of Roger II., king of that island. It was completed about 548 A.H. (1153 A.D.)

His work has appeared under various titles. The first and fullest seems to have been, *The going out of a Curious Man to explore the Regions of the Globe, its Provinces, Islands, Cities, and their Dimensions and Situation.* This is sometimes abbreviated. Sionita published it under the name of *Relaxation of the Curious Mind*; but the alternative title of *Nubian Geography*, which he and his companion imposed, is altogether arbitrary. It contains a full description of the whole world, as far as it was known to the author, who is said to have received reports from a number of learned explorers despatched expressly to collect information for his use. The world is divided into seven *climates*, commencing at the equinoctial line, and extending northwards to the limit at which the earth was supposed to be rendered uninhabitable by cold. Each climate is then divided by perpendicular lines into eleven equal parts, beginning with the western coast of Africa and ending with the eastern coast of Asia. The whole world is thus formed into 77 equal square compartments. The geographer begins with the first part of the first climate, including the western part of Central Africa, and proceeds eastward through the different divisions of this climate till he finds its termination in the Sea of China. He then returns to the first part of the second climate, and so proceeds till he reaches the eleventh part of the seventh climate, which terminates in the north-eastern extremity of Asia. The inconveniences of the arrangement are obvious; but the author appears to have been writing an illustrative treatise to accompany an actual representation of the world which he had engraved on a silver disk or possibly a silver globe.

Two valuable manuscripts of Edrisi exist in the Bibliothèque Nationale at Paris, and other two in the Bodleian Library. The first of the English MSS., which was brought over from Egypt by Greaves, is written in the Arabic character peculiar to Northern Africa. It is illustrated by a map of the known world, and by 33 other maps, containing each part of a climate, so that there are maps only for the first three climates. The second manuscript, brought by Pococke from Syria, is written in the Arabic character used in that country, and bears the date of 906 A.H., or 1500 A.D. It consists of 320 leaves, and is illustrated by one general and 77 particular maps, the latter consequently including all the parts of every climate. The general map was published by Dr Vincent in his *Periplus of the Erythræan Sea*. A copy of Edrisi's work in the Escorial was destroyed by the great fire of 1671.

The geography of Edrisi, in the original Arabic, was printed at Rome in 1592, at the Medicean press, from a manuscript preserved in the grand-ducal library at Florence. Both the paper and printing are exceedingly neat, but the volume swarms with typographical errors and forms only a clumsy epitome of the original work. The description of Mecca, which is unaccountably omitted, has been supplied by Pococke from his manuscript. In most bibliographical works this impression has been characterised as one of the rarest of books; but Adler, in a visit to Florence, found in the palace there 1129 copies, which were exposed to sale at a moderate rate. In 1619, two Oriental scholars, Gabriel Sionita and Joannes Hesronita, published at Paris a Latin translation of Edrisi's work, bearing the title of *Geographia Nubiensis*; but it is far from accurate, particularly in the proper names. George Hieronymus Velschius, a German scholar, had prepared a copy of the Arabic original, with a Latin translation, which he purposed to have illustrated with notes; but death prevented the execution of his design, and his manuscript remains deposited in the university library of Jena. Casiri (*Bib. Ar. Hisp.*, ii. 13) mentions that he had determined to re-edit this work, but he appears never to have executed his intention. The part relating to Africa, pre-eminent certainly in point of importance, was very ably edited in 1796 by Hartmann, who collected together all the notices relating to each particular country, and annexed the statements of the countrymen and contemporaries of Edrisi, so that his work forms nearly a complete body of Arabian geography, as far as relates to Africa. He afterwards published *Hispania*, 3 vols., Marburg, 1801-1818.

A translation into French of the entire work, based on one of the MSS. of the Bibliothèque Nationale, was published by M. Jaubert in 1840, and forms volumes v. and vi. of the *Recueil de Voyages* issued by the Société de Géographie; but a good edition of the original text is still a *desideratum*. A number of Oriental scholars at Leyden determined in 1861 to undertake the task: Spain and Western Europe were assigned to *Professor* Dozy; Eastern Europe and Western Asia to Doctor Engelmann; Central and Eastern Asia to Defrémery; and Africa to Professor Goeje. The first portion of the work appeared in 1866, under the title of *Description de l'Afrique et de l'Espagne par Edrisi, texte arabe publié par R. Dozy et M. J. de Goeje*; but the other collaborators have hitherto found it impossible to furnish their quota.

EDUCATION. This article is mainly concerned with the history of educational theories in the chief crises of their development. It has not been the object of the writer to give a history of the practical working of these theories, and still less to sketch the outlines of the science of teaching, which may be more conveniently dealt with under another head. The earliest education is that of the family. The child must be trained not to interfere with its parents' convenience, and to acquire those little arts which will help in maintaining the economy of the household. It was long before any attempt was made to improve generations as they succeeded each other. The earliest schools were those of the priests. As soon as an educated priesthood had taken the place of the diviners and jugglers who abused the credulity of the earliest races, schools of the prophets became a necessity. The training required for ceremonials, the common life apart from the family, the accomplishments of reading and singing, afforded a nucleus for the organization of culture and an opportunity for the efforts of a philosopher in advance of his age. Convenience and gratitude confirmed the monopoly of the clergy. The schools of Judæa and Egypt were ecclesiastical. The Jews had but little effect on the progress of science, but our obligations to the priests of the Nile valley are great indeed. Much of their learning is obscure to us, but we have reason to conclude that there is no branch of science in which they did not progress at least so far as observation and careful registration of facts could carry them. They e a source of enlightenment to surrounding nations. t only the great lawgiver of the Jews, but those who re most active in stimulating the nascent energies of llas were careful to train themselves in the wisdom the Egyptians. Greece, in giving an undying name to literature of Alexandria, was only repaying the debt ich she had incurred centuries before. Education became ular in countries where the priesthood did not exist as a parate body. At Rome, until Greece took her conqueror ptive, a child was trained for the duties of life in the forum d the senate house. The Greeks were the first to develop cience of education distinct from ecclesiastical training. ey divided their subjects of study into music and gymnas- a, the one comprising all mental, the other all physical ining. Music was at first little more than the study of art of expression. But the range of intellectual educa- n which had been developed by distinguished musical chers was further widened by the Sophists, until it eived a new stimulus and direction from the work of crates. Who can forget the picture left us by Plato of Athenian palæstra, in which Socrates was sure to find most ready listeners and his most ardent disciples! In intervals of running, wrestling, or the bath, the young edrus or Theætetus discoursed with the philosophers o had come to watch them on the good, the beautiful, d the true. The lowest efforts of their teachers were to fit em to maintain any view they might adopt with acuteness, gance, readiness, and good taste. Their highest efforts re to stimulate a craving for the knowledge of the knowable, to rouse a dissatisfaction with received inions, and to excite a curiosity which grew stronger with e revelation of each successive mystery. Plato is the thor of the first systematic treatise on education. He als with the subject in his earlier dialogues, he enters into with great fulness of detail in the *Republic*, and it occu- es an important position in the *Laws*. The views thus pressed differ considerably in particulars, and it is there- re difficult to give concisely the precepts drawn up by him r our obedience. But the same spirit underlies his whole aching. He never forgets that the beautiful is undistin- uishable from the true, and that the mind is best fitted to lve difficult problems which has been trained by the thusiastic contemplation of art. Plato proposes to intrust ucation to the state. He lays great stress on the fluence of race and blood. Strong and worthy children e likely to spring from strong and worthy parents. Music d gymnastics are to develop the emotions of young men ring their earliest years,—the one to strengthen their aracter for the contest of life, the other to excite in them rying feelings of resentment or tenderness. Reverence, e ornament of youth, is to be called forth by well-chosen tions; a long and rigid training in science is to precede cussion on more important subjects. At length the goal reached, and the ripest wisdom is ready to be applied to most important practice.

The great work of Quintilian, although mainly a treatise oratory, also contains incidentally a complete sketch of heoretical education. His object is to show us how to m the man of practice. But what a high conception of ctice is his. He wrote for a race of rulers. He incul- es much which has been attributed to the wisdom of a er age. He urges the importance of studying individual positions, and of tenderness in discipline and punishment. e Romans understood no systematic training except in tory. In their eyes every citizen was a born commander, l they knew of no science of government and political nomy. Cicero speaks slightingly even of jurisprudence. y one, he says, can make himself a jurisconsult in a ek, but an orator is the production of a lifetime. No tement can be less true than that a perfect orator is a perfect man. But wisdom and philanthropy broke even through that barrier, and the training which Quintilian expounds to us as intended only for the public speaker would, in the language of Milton, fit a man to perform justly, wisely, and magnanimously all the offices, both public and private, of peace and war.

Such are the ideas which the old world has left us. On one side man beautiful, active, clever, receptive, emotional, quick to feel, to show his feeling, to argue, to refine; greedy of the pleasures of the world, perhaps a little neglectful of its duties, fearing restraint as an unjust stinting of the bounty of nature, inquiring eagerly into every secret, strongly attached to the things of this life, but elevated by an unabated striving after the highest ideal; setting no value but upon faultless abstractions, and seeing reality only in heaven, on earth mere shadows, phantoms, and copies of the unseen. On the other side man practical, energetic, eloquent, tinged but not imbued with philosophy, trained to spare neither himself nor others, reading and thinking only with an apology; best engaged in defending a political principle, in maintaining with gravity and solemnity the conservation of ancient freedom, in leading armies through unexplored deserts, establishing roads, fortresses, settlements, the results of conquest, or in ordering and superintending the slow, certain, and utter annihilation of some enemy of Rome. Has the modern world ever surpassed their type? Can we in the present day produce anything by education except by combining, blending, and modifying the self-culture of the Greek or the self-sacrifice of the Roman?

Christianity.

Middle Ages.

The literary education of the earliest generation of Christians was obtained in the pagan schools, in those great imperial academies which existed even down to the 5th century, which flourished in Europe, Asia, and Africa, and attained perhaps their highest development and efficiency in Gaul. The first attempt to provide a special education for Christians was made at Alexandria, and is illustrated by the names of Clement and Origen. The later Latin fathers took a bolder stand, and rejected the suspicious aid of heathenism. Tertullian, Cyprian, and Jerome wished the antagonism between Christianity and Paganism to be recognized from the earliest years, and even Augustine condemned with harshness the culture to which he owed so much of his influence. The education of the Middle Ages was either that of the cloister or the castle. They stood in sharp contrast to each other. The object of the one was to form the young monk, of the other the young knight. We should indeed be ungrateful if we forgot the services of those illustrious monasteries, Monte Cassino, Fulda, or Tours, which kept alive the torch of learning throughout the dark ages, but it would be equally mistaken to attach an exaggerated importance to the teaching which they provided. Long hours were spent in the duties of the church, and in learning to take a part in elaborate and useless ceremonies. A most important part of the monastery was the writing room, where missals, psalters, and breviaries were copied and illuminated, and too often a masterpiece of classic literature was effaced to make room for a treatise of one of the fathers or the sermon of an abbot. The discipline was hard; the rod ruled all with indiscriminating and impartial severity. How many generations have had to suffer for the floggings of those times! Hatred of learning, antagonism between the teacher and the taught, the belief that no training can be effectual which is not repulsive and distasteful, that no subject is proper for instruction which is acquired with ease and pleasure,—all these idols of false education have their root and origin in monkish cruelty. The joy of human life would have been in danger of being stamped out if it had not been for the warmth and colour of a young knight's boyhood. He was equally well broken in to obedience and hardship, but the obedience was the willing service of a mistress whom he loved, and the hardship the permission to share the dangers of a leader whom he emulated. The seven arts of monkish training were Grammar, Dialectica, Rhetoric, Music, Arithmetic, Geometry, Astronomy, which together formed the *trivium* and *quadrivium*, the seven years' course, the divisions of which have profoundly affected our modern training. One of the earliest treatises based on this method was that of Martianus Capella, who in 470 published his *Satyra*, in nine books. The first two were devoted to the marriage between Philology and Mercury, the last seven were each devoted to the consideration of one of these liberal arts. Cassiodorus, who wrote *De Septem Disciplinis* about 500, was also largely used as a text book in the schools. Astronomy was taught by the Cisio-Janus, a collection of doggrel hexameters like the *Propria quæ maribus*, which contained the chief festivals in each month, with a *memoria technica* for recollecting when they occurred. The seven knightly accomplishments, as historians tell us, were to ride, to swim, to shoot with the bow, to box, to hawk, to play chess, and to make verses. The verses thus made were not in Latin, bald imitations of Ovid or Horace, whose pagan beauties were wrested into the service of religion, but sonnets, ballads, and canzonets in soft Provençal or melodious Italian. In nothing, perhaps, is the difference between these two forms of education more clearly shown than in their relations to women. A young monk was brought up to regard a woman as the worst among the many temptations of St Antony. His life knew no domestic tenderness or affection. He was surrounded and cared for by celibates, to be himself a celibate. A page was trained to receive his best reward and worst punishment from the smile or frown of the lady of the castle, and as he grew to manhood to cherish an absorbing passion as the strongest stimulus to a noble life, and the contemplation of female virtue, as embodied in an Isolde or a Beatrice, as the truest earnest of future immortality.

Both these forms of education disappeared before the Renaissance and the Reformation. But we must not suppose that no efforts were made to improve upon the narrowness of the schoolmen or the idleness of chivalry. The schools of Charles the Great have lately been investigated by Mr Mullinger, but we do not find that they materially advanced the science of education. Vincent of Beauvais has left us a very complete treatise on education, written about the year 1245. He was the friend and counsellor of St Louis, and we may discern his influence in the instructions which were left by that sainted king for the guidance of his son and daughter through life. The end of this period was marked by the rise of universities. Bologna devoted itself to law, and numbered 12,000 students at the end of the 12th century. Salerno adopted as its special province the study of medicine, and Paris was thronged with students from all parts of Europe, who were anxious to devote themselves to a theology which passed by indefinite gradations into philosophy. The 14th and 15th centuries witnessed the rise of universities and academies in almost every portion of Europe. Perhaps the most interesting among these precursors of a higher culture were the Brethren of the Common Life, who were domiciled in the rich meadows of the Yssel, in the Northern Netherlands. The metropolis of their organization was Deventer, the best known name among them that of Gerhard Groote. They devoted themselves with all humility and self-sacrifice to the education of children. Their schools were crowded. Bois-le-duc numbered 1200 pupils, Zwolle 1500. For a hundred years no part of Europe shone with a brighter lustre. As the divine comedy of Dante represents for us the learning and piety of the Middle Ages in Italy, so the *Imitation* of Thomas a Kempis keeps alive for us the memory of the purity and sweetness of the Dutch community. But they had not sufficient strength to preserve their supremacy among the necessary developments of the age. They could not support the glare of the new Italian learning; they obtained, and it may be feared deserved, the title of obscurantists. The *Epistolæ Obscurorum Virorum*, the wittiest squib of the Middle Ages, which was so true and so subtle in its satire that it was hailed as a blow struck in defence of the ancient learning, consists in great part of the lamentations of the brethren of Deventer over the new age, which they could not either comprehend or withstand. The education of the Renaissance is best represented by the name of Erasmus, that of the Reformation by the names of Luther and Melanchthon. We have no space to give an account of that marvellous resurrection of the mind and spirit of Europe when touched by the dead hand of an extinct civilization. The history of the revival of letters belongs rather to the general history of literature than to that of education. But there are two names whom we ought not to pass over. Vittorino da Feltre was summoned by the Gonzagas to Mantua in 1424; he was lodged in a spacious palace, with galleries, halls, and colonnades decorated with frescoes of playing children. In person he was small, quick, and lively—a born schoolmaster, whose whole time was spent in devotion to his pupils. We are told of the children of his patron, how Prince Gonzaga recited 200 verses of his own composition at the age of fourteen, and how Princess Cecilia wrote elegant Greek at the age of ten. Vittorino died in 1477. He seems to have reached the highest point of excellence as a practical schoolmaster of the Italian Renaissance. Castiglione, on the other hand, has left us in his *Cortigiano* the sketch of a cultivated nobleman in those most cultivated days. He shows by what precepts and practice the golden youths of Verona and Venice were formed, who live for us in the plays of Shakespeare as models of knightly excellence. For our instruction, it is better to have recourse to the pages of Erasmus. He has written the most minute account of his method of teaching. The child is to be formed into a good Greek and Latin scholar and a pious man. He fully grasps the truth that improvement must be natural and gradual. Letters are to be taught playing. The rules of grammar are to be few and short. Every means of arousing interest in the work is to be fully employed. Erasmus is no Ciceronian. Latin is to be taught so as to be of use—a living language adapted to modern wants. Children should learn an art—painting, sculpture, or architecture. Idleness is above all things to be avoided. The education of girls is as necessary and important as that of boys. Much depends upon home influence; obedience must be strict, but not too severe. We must take account of individual peculiarities, and not force children into cloisters against their will. We shall obtain the best result by following nature. It is easy to see what a contrast this scheme presented to the monkish training,—to the routine of useless technicalities enforced amidst the shouts of teachers and the lamentations of the taught.

Still this culture was but for the few. Luther brought the schoolmaster into the cottage, and laid the foundation of the system which is the chief honour and strength of modern Germany, a system by which the child of the humblest peasant, by slow but certain gradations, receives the best education [illegible] country can afford. The precepts of Luther found [illegible] way into the hearts of his countryman in short, [illegible] ness, like the sayings of poor Richard. The [illegible] and widening of education went hand in hand w[illegible] [illegible] fication of religion, and these claims to [illegible] are [illegible] inseparably united in the minds of his coun[illegible] chthon, from his edition school books and his practical labours in education, earned ɜ title of Præceptor Germaniæ. Aristotle had been throned from his pre-eminence in the schools, and elanchthon attempted to supply his place. He appreciated ɜ importance of Greek, the terror of the obscurantists, d is the author of a Greek grammar. He wrote elementary oks on each department of the *trivium*—grammar, alectic, and rhetoric. He made some way with the studies the *quadrivium*, and wrote *Initia doctrinæ Physicæ*, a imer of physical science. He lectured at the university Wittenberg, and for ten years, from 1519 to 1529, kept *schola privata* in his own house. Horace was his vourite classic. His pupils were taught to learn the iole of it by heart, ten lines at a time. The tender ined lines of his well-known portraits show clearly the aracter of the painful, accurate scholar, and contrast th the burly powerful form of the genial Luther. He ed in 1560, racked with anxiety for the church which he d helped to found. If he did not carry Protestantism to the heart of the peasant, he at least made it acceptable the intellect of the man of letters.

We now come to the names of three theoretical and actical teachers who have exercised and are still exercisg a profound effect over education. The so-called Latin hool, the parent of the gymnasium and the lycée, had read all over Europe, and was especially flourishing in ermany. The programmes and time tables in use in these tablishments have come down to us, and we possess notices the lives and labours of many of the earliest teachers. is not difficult to trace a picture of the education which e Reformation offered to the middle classes of Europe. mple materials exist in German histories of educan. We must confine ourselves to those moments which are of vital influence in the development of the science. ne school stands pre-eminently before the rest, situated that border city on the debatable land between France d Germany, which has known how to combine and concile the peculiarities of French and German culture. rasburg, besides a school of theology which unites the pth of Germany to the clearness and vivacity of France, ucated the gilded youth of the 16th century under urm, as it trained the statesmen and diplomatists of e 18th under Koch. John Sturm of Strasburg was the iend of Ascham, the author of the *Scholemaster*, and the tor of Queen Elizabeth. It was Ascham who found Lady ne Grey alone in her room at Bradgate bending her neck er the page of Plato when all the rest of her family were llowing the chase. Sturm was the first great head master, e progenitor of Busbys if not of Arnolds. He lived and orked till the age of eighty-two. He was a friend of all e most distinguished men of his age, the chosen repreentative of the Protestant cause in Europe, the ambassador foreign powers. He was believed to be better informed an any man of his time of the complications of foreign olitics. Rarely did an envoy pass from France to Germany ithout turning aside to profit by his experience. But the ief energies of his life were devoted to teaching. He rew his scholars from the whole of Europe; Portugal, oland, England sent their contingent to his halls. In 578 his school numbered several thousand students; he pplied at once the place of the cloister and the castle. hat he most insisted upon was the teaching of Latin, not e conversational *lingua franca* of Erasmus, but pure, egant Ciceronian Latinity. He may be called the introcer of scholarship into the schools, a scholarship which yet took little account of Greek. His pupils would rite elegant letters, deliver elegant Latin speeches, be miliar, if not with the thoughts, at least with the language the ancients, would be scholars in order that they ight be gentlemen. Our space will not permit us to trace the whole course of his influence, but he is in all probability as much answerable as any one for the euphuistic refinement which overspread Europe in the 16th century, and which went far to ruin and corrupt its literatures. Nowhere perhaps had he more effect than in England. Our older public schools, on breaking with the ancient faith, looked to Sturm as their model of Protestant education. His name and example became familiar to us by the exertions of his friend Ascham. Westminster, under the long reign of Busby, received a form which was generally accepted as the type of a gentleman's education. The Public School Commission of 1862 found that the lines laid down by the great citizen of Strasburg, and copied by his admirers, had remained unchanged until within the memory of the present generation.

Ratke.

Wolfgang Ratke or Ratichius was born in Holstein in 1571. He anticipated some of the best improvements in the method of teaching which have been made in modern times. He was like many of those who have tried to improve existing methods in advance of his age, and he was rewarded for his labours at Augsburg, Weimar, and Köthen by persecution and imprisonment. Can we wonder that education has improved so slowly when so much pains has been taken to silence and extinguish those who have devoted themselves to its improvement? His chief rules were as follows. 1. Begin everything with prayer. 2. Do everything in order, following the course of nature. 3. One thing at a time. 4. Often repeat the same thing. 5. Teach everything first in the mother tongue. 6. Proceed from the mother tongue to other languages. 7. Teach without compulsion. Do not beat children to make them learn. Pupils must love their masters, not hate them. Nothing should be learnt by heart. Sufficient time should be given to play and recreation. Learn one thing before going on to another. Do not teach for two hours consecutively. 8. Uniformity in teaching, also in school books, especially grammars, which may with advantage be made comparative. 9. Teach a thing first, and then the reason of it. Give no rules before you have given the examples. Teach no language out of the grammar, but out of authors. 10. Let everything be taught by induction and experiment. Most of these precepts are accepted by all good teachers in the present day; all of them are full of wisdom. Unfortunately their author saw the faults of the teaching of his time more clearly than the means to remove them, and he was more successful in forming precepts than in carrying them out. Notwithstanding these drawbacks, he deserves an honourable place among the forerunners of a rational education.

Comenius, 1592-1671.

John Amos Comenius was the antithesis to Sturm, and a greater man than Ratke. Born a Moravian, he passed a wandering life, among the troubles of the Thirty Years' War, in poverty and obscurity. But his ideas were accepted by the most advanced thinkers of the age, notably in many respects by our own Milton, and by Oxenstiern the chancellor of Sweden. His school books were spread throughout Europe. The *Janua Linguarum Reserata* was translated into twelve European and several Asiatic languages. His works, especially the *Didascalia magna*, an encyclopædia of the science of education, are constantly reprinted at the present day; and the system which he sketched will be found to foreshadow the education of the future. He was repelled and disgusted by the long delays and pedantries of the schools. His ardent mind conceived that if teachers would but follow nature instead of forcing it against its bent, take full advantage of the innate desire for activity and growth, all men might be able to learn all things. Languages should be taught as the mother tongue is taught, by conversations on ordinary topics; pictures, object lessons, should be freely used; teaching should go hand in hand with a cheerful, elegant, and happy life. Comenius included in his course the teaching of the mother tongue, singing, economy, and politics, the history of the world, physical geography, and a knowledge of arts and handicrafts. But the principle on which he most insisted, which forms the special point of his teaching, and in which he is followed by Milton, is that the teaching of words and things must go together hand in hand. When we consider how much time is spent over new languages, what waste of energy is lavished on mere preparation, how it takes so long to lay a foundation that there is no time to rear a building upon it, we must conclude that it is in the acceptance and development of this principle that the improvement of education will in the future consist. Any one who attempts to inculcate this great reform will find that its first principles are contained in the writings of Comenius. But this is not the whole of his claim upon our gratitude. He was one of the first advocates of the teaching of science in schools. His kindness, gentleness, and sympathy make him the forerunner of Pestalozzi. His general principles of education would not sound strange in the treatise of Herbert Spencer.

The Protestant schools were now the best in Europe, and the monkish institutions were left to decay. Catholics would have remained behind in the race if it had not been for the Jesuits. Ignatius Loyola gave this direction to the order which he founded, and the programme of studies, which dates from the end of the 16th century, is in use, with certain modifications, in English Jesuit schools at the present day. In 1550 the first Jesuit school was opened in Germany; in 1700 the order possessed 612 colleges, 157 normal schools, 59 novitiates, 340 residences, 200 missions, 29 professed homes, and 24 universities. The college of Clermont had 3000 students in 1695. Every Jesuit college was divided into two parts, the one for higher the other for lower education,—the *studia superiora*, and the *studia inferiora*. The *studia inferiora*, answering to the modern gymnasium, was divided into five classes. The first three were classes of grammar (rudiments), grammar (accidence), and syntax, the last two humanity and rhetoric. The motto of the schools was *lege, scribe, loquere*,—you must learn not only to read and write a dead language, but to talk. Purism was even more exaggerated than by Sturm. No word might be used which did not rest upon a special authority. The composition of Latin verses was strongly encouraged, and the performance of Latin plays. Greek was studied to some extent; mathematics, geography, music, and the mother tongues were neglected. The *studia superiora* began with a philosophical course of two or three years. In the first year logic was taught, in the second the books of Aristotle *de cœlo*, the first book *de generatione*, and the *Meteorologica*. In the third year the second book *de generatione*, the books *de anima*, and the *Metaphysics*. After the completion of the philosophical course the pupil studied theology for four years. The Jesuits used to the full the great engine of emulation. Their classes were divided into two parts, Romans and Carthaginians; swords, shields, and lances hung on the walls, and were carried off in triumph as either party claimed the victory by a fortunate answer. It would be unfair to deny the merits of the education of the Jesuits. Bacon speaks of them in more than one passage as the revivers of this most important art. *Quum talis sis utinam noster esses.* Descartes approved of their system; Chateaubriand regarded their suppression as a calamity to civilization and enlightenment. They were probably the first to bring the teacher into close connection with the taught. According to their ideal the teacher was neither inclosed in a cloister, secluded from his pupils, nor did he keep order by stamping, raving, and flogging. He was encouraged to apply his mind and soul to the mind and soul of his pupil; to study the nature, the disposition, the parents of his scholars; to follow nature as far as possible, or rather to lie in wait for it and discover its weak points, and where it could be most easily attacked. Doubtless the Jesuits have shown a love, devotion, and self-sacrifice in education, which is worthy of the highest praise; no teacher who would compete with them can dare do less. On the other hand, they are open to grave accusation. Their watchful care degenerated into surveillance, which lay-schools have borrowed from them; their study of nature has led them to confession and direction. They have tracked out the soul to its recesses, that they might slay it there, and generate another in its place; they educated each mind according to its powers, that it might be a more subservient tool to their own purposes. They taught the accomplishments which the world loves, but their chief object was to amuse the mind and stifle inquiry; they encouraged Latin verses, because they were a convenient plaything on which powers might be exercised which could have been better employed in understanding and discussing higher subjects; they were the patrons of school plays, of public prizes, declamations, examinations, and other exhibitions, in which the parents were more considered than the boys; they regarded the claims of education, not as a desire to be encouraged, but as a demand to be played with and propitiated; they gave the best education of their time in order to acquire confidence, but they became the chief obstacle to the improvement of education; they did not care for enlightenment, but only for the influence which they could derive from a supposed regard for enlightenment. Whatever may have been the service of Jesuits in past times, we have little to hope for them in the improvement of education at present. Governments have, on the whole, acted wisely by checking and suppressing their colleges. The *ratio studiorum* is antiquated and difficult to reform. In 1831 it was brought more into accordance with modern ideas by Roothaan, the general of the order. Beckx his successor has, if anything, pursued a policy of retrogression. The Italian Government, in taking possession of Rome, found that the pupils of the Collegio Romano were far below the level of modern requirements.

It may be imagined that, by this organization both Catholics and Protestants were apt to degenerate into pedantry, both in name and purpose. The schoolmaster had a great deal too much the best of it. The Latin school was tabulated and organized until every half hour of a boy's time was occupied; the Jesuit school took possession of the pupil body and soul. It was, therefore, to be expected that a stand should be made for common sense in the direction of practice rather than theory, of wisdom instead of learning. Montaigne has left us the most delightful utterances about education. He says that the faults of the education of his day consist in over-estimating the intellect and rejecting morality, in exaggerating memory and depreciating useful knowledge. He recommends a tutor who should draw out the pupil's own power and originality, to teach how to live well and to die well, to enforce a lesson by practice, to put the mother tongue before foreign tongues, to teach all manly exercises, to educate the perfect man. Away with force and compulsion, with severity and the rod. John Locke, more than a hundred years afterwards, made a more powerful and systematic attack upon useless knowledge. His theory of the origin of ideas led him to assign great importance to education, while his knowledge of the operations of the human mind lends a special value to his advice. His treatise has received in England more attention than it deserves, partly because we have so few books written upon the subject on which he treats. Part of his advice is useless at the present day; part it would be well to follow, or at any rate to consider seriously, especially his condemnaf repetition by heart as a means of strengthening the ry, and of Latin verses and themes. He sets before lf the production of the man, a sound mind in a sound

His knowledge of medicine gives great value to his e on the earliest education, although he probably erates the benefits of enforced hardships. He recom- s home education without harshness or severity of line. Emulation is to be the chief spring of action; ledge is far less valuable than a well-trained mind. rizes that knowledge most which fits a man for the s of the world, speaking languages, accounts, history, ogic, rhetoric, natural philosophy. He inculcates the tance of drawing, dancing, riding, fencing, and trades. art of his advice which made most impression upon contemporaries was the teaching of reading and netic by well-considered games, the discouragement undue compulsion and punishment, and the teaching guage without the drudgery of grammar. In these cts he has undoubtedly anticipated modern discoveries. a strong advocate for home education under a private and his bitterness against public schools is as vehe- as that of Cowper.

r more important in the literature of this subject than eatise of Locke is the *Tractate of Education* by Milton, few observations," as he tells us, "which flowered nd are, as it were, the burnishings of many studious ontemplative years spent in the search for civil and ous knowledge." This essay is addressed to Samuel ib, a great friend of Comenius, and probably refers to ject of establishing a university in London. "I will you out," Milton says, "the right path of a virtuous oble education,—laborious, indeed, at first ascent, but o smooth and green and full of goodly prospects and lious sounds on every side, that the harp of Orpheus more charming. This is to be done between twelve one-and-twenty, in an academy containing about a red and thirty scholars, which shall be at once school niversity,—not needing a remove to any other house olarship except it be some peculiar college of law and cs, where they mean to be practitioners." The rtant truth enunciated is quite in the spirit of nius that the learning of things and words is to go in hand. The curriculum is very large. Latin, k, arithmetic, geometry, agriculture, geography, ology, physics, trigonometry, fortification, architecture, eering, navigation, anatomy, medicine, poetry, Italian, both Roman and English, Hebrew with Chaldee and c, history, oratory, poetics. But the scholars are not to ok-worms. They are to be trained for war, both on nd on horseback, to be practised "in all the locks and s of wrestling," they are to "recreate and compose travailed spirits with the divine harmonies of music l or learnt." "In those vernal seasons of the year the air is calm and pleasant, it were an injury and a ness against nature not to go out and see her riches, partake in her rejoicing with heaven and earth. I d not then be a persuader to them of studying much after two or three years that they have well laid their ds, but to ride out in companies with prudent and guides to all the quarters of the land." The whole se is full of wisdom, and deserves to be studied again gain. Visionary as it may appear to some at first if translated into the language of our own day, it will und to abound with sound practical advice. "Only," n says in conclusion, "I believe that this is not a bow ery man to shoot who counts himself a teacher, but equire sinews almost equal to those which Homer Ulysses; yet I am persuaded that it may prove much easy in the essay than it now seems at a distance, nuch more illustrious if God have so decided and this age have spirit and capacity enough to apprehend." Almost while Milton was writing this treatise, he might have seen an attempt to realize something of his ideal in Port Royal. What a charm does this name awaken! Yet how few of us have made a pilgrimage to that secluded valley! Here we find, for the first time in the modern world, the highest gifts of the greatest men of a country applied to the business of education. Arnauld, Lancelot, Nicole did not commence by being educational philosophers. They began with a small school, and developed their method as they proceeded. Their success has seldom been surpassed. But a more lasting memorial than their pupils are the books which they sent out, which bear the name of their cloister. The *Port Royal Logic*, *General Grammar*, *Greek*, *Latin*, *Italian*, and *Spanish Grammars*, the *Garden of Greek Roots* which taught Greek to Gibbon, the *Port Royal Geometry*, and their translations of the classics held the first place among school books for more than a century. The success of the Jansenists was too much for the jealousy of the Jesuits. Neither piety, nor wit, nor virtue could save them. A light was quenched which would have given an entirely different direction to the education of France and of Europe. No one can visit without emotion that retired nook which lies hidden among the forests of Versailles, where the old brick dove-cot, the pillars of the church, the trees of the desert alone remain to speak to us of Pascal, Racine, and the Mère Angélique. The principles of Port Royal found some supporters in a later time, in the better days of French education before monarchism and militarism had crushed the life out of the nation. Rollin is never mentioned without the epithet *bon*, a testimony to his wisdom, virtue, and simplicity. Fénelon may be reckoned as belonging to the same school, but he was more fitted to mix and grapple with mankind.

Port-Royal.

Francke.

No history of education would be complete without the name of August Hermann Francke, the founder of the school of Pietists, and of a number of institutions which now form almost a suburb in the town of Halle to which his labours were devoted. The first scenes of his activity were Leipzig and Dresden; but in 1692, at the age of 29, he was made pastor of Glaucha near Halle, and professor in the newly established university. Three years later he commenced his poor school with a capital of seven guelders which he found in the poor box of his house. At his death in 1727 he left behind him the following institutions:—a pædagogium, or training college, with 82 scholars and 70 teachers receiving education, and attendants; the Latin school of the orphan asylum, with 3 inspectors, 32 teachers, 400 scholars, and 10 servants; the German town schools, with 4 inspectors, 98 teachers, 8 female teachers, and 1725 boys and girls. The establishment for orphan children contained 100 boys, 34 girls, and 10 attendants. A cheap public dining table was attended by 255 students and 360 poor scholars, and besides this there was an apothecary's and a bookseller's shop. Francke's principles of education were strictly religious. Hebrew was included in his curriculum, but the heathen classics were treated with slight respect. The *Homilies* of Macarius were read in the place of Thucydides. As might be expected, the rules laid down for discipline and moral training breathed a spirit of deep affection and sympathy. Francke's great merit, however, is to have left us a model of institutions by which children of all ranks may receive an education to fit them for any position in life. The Franckesche Stiftungen are still, next to the university, the centre of the intellectual life of Halle, and the different schools which they contain give instruction to 3500 children.

Rousseau.

We now come to the book which has had more influence than any other on the education of later times. The *Émile* of Rousseau was published in 1762. It produced an astounding effect throughout Europe. Those were days when the whole cultivated world vibrated to any touch of new philosophy. French had superseded Latin as the general medium of thought: French learning stood in the same relation to the rest of Europe as German learning does now; and any discovery of D'Alembert, Rousseau, or Maupertuis travelled with inconceivable speed from Versailles to Schönbrunn, from the Spree to the Neva. Kant in his distant home of Königsberg broke for one day through his habits, more regular than the town clock, and stayed at home to study the new revelation. The burthen of Rousseau's message was nature, such a nature as never did and never will exist, but still a name for an ideal worthy of our struggles. He revolted against the false civilization which he saw around him; he was penetrated with sorrow at the shams of government and society, at the misery of the poor existing side by side with the heartlessness of the rich. The child should be the pupil of nature. He lays great stress on the earliest education. The first year of life is in every respect the most important. Nature must be closely followed. The child's tears are petitions which should be granted. The naughtiness of children comes from weakness; make the child strong and he will be good. Children's destructiveness is a form of activity. Do not be too anxious to make children talk; be satisfied with a small vocabulary. Lay aside all padded caps and baby jumpers. Let children learn to walk by learning that it hurts them to fall. Do not insist too much on the duty of obedience as on the necessity of submission to natural laws. Do not argue too much with children; educate the heart to wish for right actions; before all things study nature. The chief moral principle is *do no one harm*. Émile is to be taught by the real things of life, by observation and experience. At twelve years old he is scarcely to know what a book is; to be able to read and write at fifteen is quite enough. We must first make him a man, and that chiefly by athletic exercises. Educate his sight to measure, count, and weigh accurately; teach him to draw; tune his ear to time and harmony; give him simple food, but let him eat as much as he likes. Thus at twelve years old Émile is a real child of nature. His carriage and bearing are fair and confident, his nature open and candid, his speech simple and to the point; his ideas are few but clear; he knows nothing by learning, much by experience. He has read deeply in the book of nature. His mind is not on his tongue but in his head. He speaks only one language, but knows what he is saying, and can do what he cannot describe. Routine and custom are unknown to him; authority and example affect him not; he does what he thinks right. He understands nothing of duty and obedience, but he will do what you ask him, and will expect a similar service of you in return. His strength and body are fully developed; he is first-rate at running, jumping, and judging distances. Should he die at this age he will so far have lived his life. From twelve to fifteen Émile's practical education is to continue. He is still to avoid books which teach not learning itself but to appear learned. He is to be taught and to practice some handicraft. Half the value of education is to waste time wisely, to tide over dangerous years with safety, until the character is better able to stand temptation. At fifteen a new epoch commences. The passions are awakened; the care of the teacher should now redouble; he should never leave the helm. Émile having gradually acquired the love of himself and of those immediately about him, will begin to love his kind. Now is the time to teach him history, and the machinery of society, the world as it is and as it might be. Still an encumbrance of useless and burdensome knowledge is to be avoided. Between this age and manhood Émile learns all that it is necessary for him to know. It is, perhaps, strange that a book in many respects so wild and fantastic should have produced so great a practical effect. In pursuance of its precepts, children went about naked, were not allowed to read, and when they grew up wore the simplest clothes, and cared for little learning except the study of nature and Plutarch. The catastrophe of the French Revolution has made the importance of Emile less apparent to us. Much of the heroism of that time is doubtless due to the exaltation produced by the sweeping away of abuses, and the approach of a brighter age. But we must not forget that the first generation of Émile was just thirty years old in 1792; that many of the Girondins, the Marseillais, the soldiers and generals of Carnot and Napoleon had been bred in that hardy school. There is no more interesting chapter in the history of education than the tracing back of epochs of special activity to the obscure source from which they arose. Thus the Whigs of the Reform Bill sprang from the wits of Edinburgh, the heroes of the Rebellion from the divines who translated the Bible, the martyrs of the Revolution from the philosophers of the Encyclopædia.

The teaching of Rousseau found its practical expression in the *philanthropin* of Dessau, a school founded by Basedow, the friend of Goethe and Lavater, one of the two prophets between whom the world-child sat bodkin in that memorable post-chaise journey of which Goethe has left us an account. The principles of the teaching given in this establishment were very much those of Comenius, the combination of words and things. An amusing account of the instruction given in this school, which at this time consisted of only thirteen pupils, has come down to us, a translation of which is given in the excellent work of Mr Quick on educational reformers. The little ones have gone through the oddest performances. They play at "word of command." Eight or ten stand in a line like soldiers, and Herr Wolke is officer. He gives the word in Latin, and they must do whatever he says. For instance when he says "claudite oculos," they all shut their eyes; when he says "circumspicite," they look about them; "imitamini sutorem," they draw the waxed thread like cobblers. Herr Wolke gives a thousand different commands in the drollest fashion. Another game, "the hiding game," may also be described. Some one writes a name and hides it from the children, the name of some part of the body, or of a plant or animal, or metal, and the children guess what it is. Whoever guesses right gets an apple or a piece of cake; one of the visitors wrote "intestina," and told the children it was part of the body. Then the guessing began, one guessed caput, another nasus, another os, another manus, pes, digiti, pectus, and so forth for a long time, but one of them hits it at last. Next Herr Wolke wrote the name of a beast or quadruped, then came the guesses, leo, ursus, camelus, elephas, and so on, till one guessed right it was mus. Then a town was written, and they guessed Lisbon, Madrid, Paris, London, till a child came with St Petersburg. They had another game which was this. Herr Wolke gave the command in Latin, and they imitated the noises of different animals, and made the visitors laugh till they were tired. They roared like lions, crowed like cocks, mewed like cats, just as they were bid. Yet Kant found a great deal to praise in this school, and spoke of its influence as one of the best hopes of the future, and as "the only school where the teachers had liberty to act according to their own methods and schemes, and where they were in free communication both among themselves and with all learned men throughout Germany."

A more successful labourer in the same school was Salzmann, who bought the property of Schnepfenthal near Gotha in 1784, and established a school there, which still exists as a flourishing institution. He gave full scope to the doctrines of the philanthropists; the limits of learning were enlarged; study became a pleasure instead of a pain; scope was given for healthy exercise; the school became light, airy, and cheerful. A charge of superficiality and weakness was brought against this method of instruction; but the gratitude which our generation of teachers owes to the unbounded love and faith of these devoted men cannot be denied or refused. The end of the 18th century saw a great development given to classical studies. The names of Cellarius, Gesner, Ernesti, and Heyne are perhaps more celebrated as scholars than as schoolmasters. To them we owe the great importance attached to the study of the classics, both on the Continent and in England. They brought into the schools the philology which F. A. Wolf had organized for the universities. Pestalozzi, on the other hand, was completely and entirely devoted to education. His greatest merit is that he set an example of absolute self-abnegation, that he lived with his pupils, played, starved, and suffered with them, and clung to their minds and hearts with an affectionate sympathy which revealed to him every minute difference of character and disposition. Pestalozzi was born at Zurich in 1746. His father died when he was young, and he was brought up by his mother. His earliest years were spent in schemes for improving the condition of the people. The death of his friend Bluntschli turned him from political schemes, and induced him to devote himself to education. He married at 23, and bought a piece of waste land in Aargau, where he attempted the cultivation of madder. Pestalozzi knew nothing of business, and the plan failed. Before this he had opened his farm-house as a school; but in 1780 he had to give this up also. His first book published at this time was *The Evening Hours of a Hermit*, a series of aphorisms and reflections. This was followed by his masterpiece, *Leonard and Gertrude*, an account of the gradual reformation, first of a household, and then of a whole village, by the efforts of a good and devoted woman. It was read with avidity in Germany, and the name of Pestalozzi was rescued from obscurity. His attempts to follow up this first literary success were failures. The French invasion of Switzerland in 1798 brought into relief his truly heroic character. A number of children were left in Canton Unterwalden on the shores of the Lake of Lucerne, without parents, home, food, or shelter. Pestalozzi collected a number of them into a deserted convent, and spent his energies in reclaiming them. "I was," he says, "from morning till evening, almost alone in their midst. Everything which was done for their body or soul proceeded from my hand. Every assistance, every help in time of need, every teaching which they received came immediately from me. My hand lay in their hand, my eye rested on their eye, my tears flowed with theirs, and my laughter accompanied theirs. They were out of the world, they were out of Stanz; they were with me, and I was with them. Their soup was mine, their drink was mine. I had nothing, I had no housekeeping, no friend, no servants around me; I had them alone. Were they well I stood in their midst; were they ill, I was at their side. I slept in the middle of them. I was the last who went to bed at night, the first who rose in the morning. Even in bed I prayed and taught with them until they were asleep,—they wished it to be so." Thus he passed the winter, but in June 1799 the building was required by the French for a hospital, and the children were dispersed. We have dwelt especially on this episode of Pestalozzi's life, because in this devotion lay his strength. In 1801 he gave an exposition of his ideas on education in the book *How Gertrude teaches her Children*. His method is to proceed from the easier to the more difficult. To begin with observation, to pass from observation to consciousness, from consciousness to speech. Then come measuring, drawing, writing, numbers, and so reckoning. In 1799 he had been enabled to establish a school at Burgdorf, where he remained till 1804. In 1802, he went as deputy to Paris, and did his best to interest Napoleon in a scheme of national education; but the great conqueror said that he could not trouble himself about the alphabet. In 1805 he removed to Yverdun on the Lake of Neufchatel, and for twenty years worked steadily at his task. He was visited by all who took interest in education,—Talleyrand, Capo d'Istria, and Madame de Staël. He was praised by Wilhelm von Humboldt and by Fichte. His pupils included Ramsauer, Delbrück, Blochmann, Carl Ritter, Fröbel, and Zeller. About 1815 dissensions broke out among the teachers of the school, and Pestalozzi's last ten years were chequered by weariness and sorrow. In 1825 he retired to Neuhof, the home of his youth; and after writing the adventures of his life, and his last work, the *Swan's Song*, he died in 1827. As he said himself, the real work of his life did not lie in Burgdorf or in Yverdun, the products rather of his weakness than of his strength. It lay in the principles of education which he practised, the development of his observation, the training of the whole man, the sympathetic application of the teacher to the taught, of which he left an example in his six months' labours at Stanz. He shewed what truth there was in the principles of Comenius and Rousseau, in the union of training with information, and the submissive following of nature; he has had the deepest effect on all branches of education since his time, and his influence is far from being exhausted.

Pædagogics.

The *Émile* of Rousseau was the point of departure for an awakened interest in educational theories which has continued unto the present day. Few thinkers of eminence during the last hundred years have failed to offer their contributions more or less directly on this subject. Poets like Richter, Herder, and Goethe, philosophers such as Kant, Fichte, Hegel, Schleiermacher, and Schopenhauer, psychologists such as Herbart and Beneke, have left directions for our guidance. Indeed, during this time the science of education or pædagogics, as the Germans call it, may have been said to have come into existence. It has attracted but little attention in England; but it is an important subject of study at all German universities, and we may hope that the example given by the establishment of chairs of education in the Scotch universities may soon be followed by the other great centres of instruction in Great Britain. Jean Paul called his book *Levana*, after the Roman goddess to whom the father dedicated his new-born child, in token that he intended to rear it to manhood. He lays great stress on the preservation of individuality of character, a merit which he possessed himself in so high a degree. The second part of *Wilhelm Meister* is in the main a treatise upon education. The essays of Carlyle have made us familiar with the mysteries of the pædagogic province, the solemn gestures of the three reverences, the long cloisters which contain the history of God's dealings with the human race. The most characteristic passage is that which describes the father's return to the country of education after a year's absence. As he is riding alone, wondering in what guise he will meet his son, a multitude of horses rush by at full gallop. "The monstrous hurly-burly whirls past the wanderer; a fair boy among the keepers looks at him with surprise, pulls in, leaps down, and embraces his father." He then learns that an agricultural life had not suited his son, that the superiors had discovered that he was fond of animals, and had set him to that occupation for which nature had destined him.

Richter.

Goethe.

Jacotot.

The system of Jacotot has aroused great interest in this country. Its author was born at Dijon in 1770. In 1815 he retired to Louvain and became professor there, and director of the Belgian military school. He died in 1840. His method of teaching is based on three principles :—

1. All men have an equal intelligence,

2. Every man has received from God the faculty of being able to instruct himself;

3. Every thing is in every thing.

The first of these principles is certainly wrong; although Jacotot tried to explain it by asserting that, although men had the same intelligence, they differed widely in the will to make use of it. Still it is important to assert that nearly all men are capable of receiving some intellectual education, provided the studies to which they are directed are wide enough to engage their faculties, and the means taken to interest them are sufficiently ingenious. The second principle lays down that it is more necessary to stimulate the pupil to learn for himself, than to teach him didactically. The third principle explains the process which Jacotot adopted. To one learning a language for the first time he would give a short passage of a few lines, and encourage the pupil to study first the words, then the letters, then the grammar, then the full meaning of the expressions, until by iteration and accretion a single paragraph took the place of an entire literature. Much may be effected by this method in the hands of a skilful teacher, but a charlatan might make it an excuse for ignorance and neglect.

Among those who have improved the methods of teaching, we must mention Bell and Lancaster, the joint-discoverers of the method of mutual instruction, which, if it has not effected everything which its founders expected of it, has produced the system of pupil-teachers which is common in our schools. Froebel also deserves an honourable place as the founder of the Kindergarten, a means of teaching young children by playing and amusement. His plans, which have a far wider significance than this limited development of them, are likely to be fruitful of results to future workers.

Herbert Spencer. The last English writers on education are Mr Herbert Spencer and Mr Alexander Bain, the study of whose writings will land us in those regions of pædagogics which have been most recently explored. We need not follow Mr Spencer into his defence of science as the worthiest object of study, or in his rules for moral and physical training, except to say that they are sound and practical. In writing of intellectual education, he insists that we shall attain the best results by closely studying the development of the mind, and availing ourselves of the whole amount of force which nature puts at our disposal. The mind of every being is naturally active and vigorous, indeed it is never at rest. But for its healthy growth it must have something to work upon, and, therefore, the teacher must watch its movements with the most sympathetic care, in order to supply exactly that food which it requires at any particular time. In this way a much larger cycle of attainments can be compassed than by the adoption of any programme or curriculum, however carefully drawn up. It is no good to teach what is not remembered; the strength of memory depends on attention, and attention depends upon interest. To teach without interest is to work like Sisyphus and the Danaides. Arouse interest if you can, rather by high means than by low means. But it is a saving of power to make use of interest which you have already existing, and which, unless dried up or distorted by injudicious violence, will naturally lead the mind into all the knowledge which it is capable of receiving. Therefore, never from the first force a child's attention; leave off a study the moment it becomes wearisome, never let a child do what it does not like, only take care that when its liking is in activity a choice of good as well as evil shall be given to it.

Mr Bain's writings on education, which are contained in some articles in the *Fortnightly Review*, and in two articles in *Mind* (Nos. v. and vii.) are extremely valuable. Perhaps the most interesting part of them consists in his showing how what may be called the "correlation of forces in man" helps us to a right education. From this we learn that emotion may be transformed into intellect, that sensation may exhaust the brain as much as thought, and we may infer that the chief duty of a schoolmaster is to stimulate the powers of each brain under his charge to the fullest activity, and to apportion them in that ratio which will best conduce to the most complete and harmonious development of the individual.

It seems to follow from this sketch of the history of education that, in spite of the great advances which have been made of late years, the science of education is still far in advance of the art. Schoolmasters are still spending their best energies in teaching subjects which have been universally condemned by educational reformers for the last two hundred years. The education of every public school is a farrago of rules, principles, and customs derived from every age of teaching, from the most modern to the most remote. It is plain that the science and art of teaching will never be established on a firm basis until it is organized on the model of the sister art of medicine. We must pursue the patient methods of induction by which other sciences have reached the stature of maturity; we must discover some means of registering and tabulating results; we must invent a phraseology and nomenclature which will enable results to be accurately recorded; we must place education in its proper position among the sciences of observation. A philosopher who should succeed in doing this would be venerated by future ages as the creator of the art of teaching.

It only remains now to give some account of the very large literature of the subject.

The history of education was not investigated till the beginning of the present century, and since then little original research has been made except by Germans. Whilst acknowledging our great obligations to the German historians, we cannot but regret that all the investigations have belonged to the same nation. For instance, one of the best treatises on education written in the 16th century is Mulcaster's *Positions*, which has never been reprinted, and is now a literary curiosity.

Mangelsdorf and Ruhkopf attempted histories of education at the end of the last century, but the first work of note was F. H. Ch. Schwarz's *Geschichte d. Erziehung* (1813). A. H. Niemeyer, a very influential writer, was one of the first to insist on the importance of making use of all that has been handed down to us, and with this practical object in view he has given us an *Ueberblick der allgemeinen Geschichte der Erziehung*. Other writers followed; but from the time of its appearance till within the last few years, by far the most readable and the most read work on the history of education was that of Karl von Raumer. Raumer, however, is too chatty and too religious to pass for "wissenschaftlich," and the standard history is now that of Karl Schmidt. The Roman Catholics have not been content to adopt the works of Protestants, but have histories of their own. These are the very pleasing sketches of L. Kellner and the somewhat larger history by Stoeckl. When we come to writers who have produced sketches or shorter histories, we find the list in Germany a very long one. Among the best books of this kind are Fried. Dittes's *Geschichte* and [illegible] *Pädagogische Characterbilder*. An account of this literature will be found in J. Chr. G. Schumann's paper among the *Pädagogische Studien*, edited by Dr Rein. For biographies the pædagogic cyclo[illegible] consulted, of which the first is the *E*[illegible] *Erziehungswesens* of K. A. Schm[illegible] in 11 or 12 vols. not yet completed, alt[illegible] edition of the early vols.

is already announced. The Roman Catholics have also begun a large encyclopædia edited by Rolfus and Pfister. No similar work has been published in France, but a *Cyclopædia of Education* in one volume has lately been issued at New York (Steiger,—the editors are Kiddle and Scherr), and in this there are articles by English as well as American writers. In French the *Esquisse d'un système complet d' Education*, by Th. Fritz (Strasburg, 1841), has a sketch of the history, which as a sketch is worth notice. Jules Paroz has written a useful little *Histoire* which would have been more valuable if it had been longer.

In English, though we have no investigators of the history of education we have a fairly large literature on the subject, but it belongs almost exclusively to the United States. The great work of Henry Barnard, the *American Journal of Education*, in 25 vols., has valuable papers on almost every part of our subject, many of them translated from the German, but there are also original papers on our old English educational writers and extracts from their works. This is by far the most valuable work in our language on the history of education. The small volumes published in America with the title of "History of Education" do not deserve notice. In England may be mentioned the article on education by Mr James Mill, published in the early editions of the *Encyclopædia Britannica*, and Mr R. H. Quick's most excellent *Essays on Educational Reformers*, published in 1868. Since then Mr Leitch of Glasgow has issued a volume called *Practical Educationists*, which deals with English and Scotch reformers, as well as with Comenius and Pestalozzi. Now that professorships of education have been established we may hope for some original research. The first professor appointed was the late Joseph Payne, a name well known to those among us who have studied the theory of education. The professorship was started by the College of Preceptors. At Edinburgh and at St Andrews professors have since been elected by the Bell Trustees.

Valuable reports as to the state of education in the various countries that possess a national system were presented to the English Schools Inquiry Commission in 1867 and 1868, by inspectors specially appointed to investigate the subject. The reports on the Common School System of the United States and Canada by the Rev. James Fraser, on the Burgh Schools in Scotland by D. R. Fearon, and on Secondary Education in France, Germany, Switzerland and Italy, by Matthew Arnold, are included in Parliamentary Papers [3857], 1867, and [3966 v.], 1868.

The following is a list of some useful books on education generally:—Herbart, *Allgemeine Pädogogik*, Göttingen, 1806; Schwarz, *Erziehungslehre*, 2 Auf. 1829; Diesterweg, *Wegweise für Deutsche Lehrer*, 1873; Niemeyer, *Grundsätze der Erziehung und des Unterrichts*, Halle, 1836; Beneke, *Erziehungs und Unterrichtslehre*, 1832; Graefe, *Allgemeine Pädagogik*, 1845; Waitz, *Allgem. Pædagogik*, 1852; Herbert Spencer, *Education—Intellectual, Moral, and Physical*. On special points on the history of education:—Grasberger, *Erziehung und Unterricht in Classischen Alterthum*; A. Kapp, *Platon's Erziehungslehre*, Minden and Leipsic, 1833; *Die Bruderschaft des gemeinsamen Lebens*, by Delprat, translated into German, Leipsic, 1840; Heppe, *Das Schulwesen des Mittelalters*, Marburg, 1860; *The Schools of Charles the Great*, by Mullinger, 1877; Rosmini, *Vittorino da Feltre*, 1801; Weicker, *Das Schulwesen der Jesuiten*, Halle, 1863. The works of Comenius and other educationists are most easily accessible in the *Pædagogische Bibliothek*, edited by Karl Richter, Leipsic (now in course of publication); J. Ramsauer, *Kurze Skizze meines Pädagogischen Lebens*, Oldenburg, 1838; H. Blockmann, *Heinrich Pestalozzi*, Leipsic, 1846; Krieger, *Jacotot's Lehrmethode*, Zweibrücken, 1830.

To these may be added:—M. Bréal, *Quelques mots sur l'instruction publique*, 1874; Dr James Donaldson's *Lectures on Education*, 1874; A. Dröze's *Charakterbilder*, 4th ed., 1872; Dittes, *Gesch. de Erziehung*, 3d ed., 1873; M. and R. L. Edgeworth's *Practical Educator*, 1st ed., 1778; Marenholz-Bülow's *Erinnerungen an F. Fröbel*, translated by Mrs Horace Mann, Boston, U.S.; R. de Guimp's *Histoire de Pestalozzi*, 1874; Isaac Taylor *Home Education*; F. H. Kohle's *Grundzüge der evangelischen Volksschulerziehung*, Breslau, 1878; L. Kellner's *Erziehungsgeschichte*; H. Lantoine, *Histoire de l'Enseignement secondaire en France*, 1874; J. S. Mill, *Inaugural Address at St Andrews*; Pillans's *Contributions to Education*; J. Paroz, *Histoire universelle de la pédagogie*; Rollin, *Traité des Études*; Krüsi, *Life of Pestalozzi*; Dr Arnold, *Miscellaneous Works*; Dr Stow, *Training System*, 11th ed., 1859; A. Stöckl's *Lehrbuch der Geschichte der Pädagogik*, Mainz, 1876; T. Tate, *Philosophy of Education*; Abbot's *Teacher*; F. A. Wolf, *Ueber Erziehung*, edited by Körte, 1835; L. Wiese, *German Letters on English Education*, 1877; Bohn, *Kurzgefasste Geschichte der Pädagogik*. (O. B.)

Law Relating to Education.

To the foregoing historical statement may be added some account of the different systems of education administered by statute in the United Kingdom:—

England.—Until quite recently there was no public provision for education in England, and even now it is only the elementary education of the people that can be said to be regulated by the law. Parliament has indeed taken cognizance of the institutions founded for the higher education. The universities and the endowed schools have been enabled by various statutes to adapt themselves more completely to the wants of the times; but they still retain their character of local, and one might almost say private, corporations. Their administration is subject to the control of no state authority, and in districts where such institutions do not exist there is no public provision for supplementing the deficiency. Elementary education, until the Act of 1870, was in the same way dependent on voluntary enterprise or casual endowment.

The first approach to a public system of education was by means of grants in aid of private schools, administered by a committee of the Privy Council. This system is not superseded by the Education Act of 1870, but means are taken to ensure the existence in every school district of a "sufficient amount of accommodation in public elementary schools." The school district is the borough or parish, except in the case of London and Oxford. When the amount of school accommodation in a district is insufficient, and the deficiency is not supplied as required by the Act, a school board shall be formed and shall supply such deficiency. Every elementary school is a public school in the sense of the Act if it is conducted according to the regulations in section 7, which in substance are:—

1. It shall not be required, as a condition of any child being admitted into, or continuing in the school, that he shall attend or abstain from attending any Sunday school, or any place of religious worship, or that he shall attend any religious observance or any instruction in religious subjects, in the school or elsewhere, from which observance or instruction he may be withdrawn by his parents, or that he shall, if withdrawn by his parents, attend the school on any day set apart for religious observance by the religious body to which his parent belongs.

2. Time for religious observance or instruction in the school must be at the beginning or end of school meeting, and must be shewn in a time table conspicuously posted in the school.

3. School must be open to inspection, except that the inspector is not to inquire into religious knowledge.

4. School must be conducted in accordance with the conditions required to obtain a parliamentary grant.

When the Education Department are satisfied after inquiry that the supply of public elementary schools as thus defined is in any district insufficient, they may cause a school board to be formed, as they may also (1) when application is made to them to that effect by the persons who would be the electors if there were a school board (in a borough by council), and (2) when they are satisfied that the managers of an elementary school are unwilling or unable to maintain it, and by its discontinuance the supply for the district will become insufficient. The body of the Act describes the constitution, powers, duties, and revenues of school boards, as in the following brief summary:—

1. *Constitution.*—The school board is a corporation with perpetual succession and common seal, and power to hold land without licence in mortmain. It is elected by the burgesses in a borough, and by

the ratepayers in a parish, each voter having a number of votes equal to the number of vacancies, having the right to give all or any number of such votes to any one candidate, and to distribute them as he pleases. The number of members varies from 5 to 15 as may be determined. The London school board is elected under special regulations.

2. *Powers and Duties.*—Every school board, for the purpose of providing sufficient public school accommodation for their district, may provide or improve schoolhouses and supply school apparatus &c., and purchase or take on lease any land or any right over land. Sect. 20 contains regulations under which the compulsory purchase of sites may be made. The schools provided by the board must comply with the following conditions:—(1) They must be public elementary schools, in the sense defined above; (2) No religious catechism or religious formulary, which is distinctive of any particular denomination, shall be taught in the schools. The board may delegate their powers (except that of raising money) to managers. Any breach of these regulations may subject the board to being declared in default by the Education Department, who will thereupon nominate a new board. The fees of children attending board schools are to be fixed by the board, with the consent of the Department, but the board may remit fees on account of poverty for a renewable period not exceeding six months, and it is expressly declared that "such remission shall not be deemed to be parochial relief" given to the parent. Further, free schools may be established where the Education Department are satisfied that the poverty of the inhabitants is such as to render them necessary. Section 25 enables the board to pay the fees of poor children attending any public elementary school, but "no such payment shall be made or refused on condition of the child attending any public elementary school other than such as may be selected by the parent (*sic*), and such payment shall not be deemed to be parochial relief." This clause, which excited a vast amount of opposition in Parliament, was repealed by 39 and 40 Vict. c. 59 (see *infra*).

3. *Revenues.*—The expenses of the board are to be paid from a fund called the school fund, constituted primarily by the fees of the children, moneys provided by Parliament, or raised by loan, or received in any other way, and supplemented by the rates, to be levied by the rating authority. In providing buildings, &c., the board may borrow money so as to spread the payment over several years, not exceeding fifty. (See, as to this power, Elementary Education Act 1873, § 10.)

School boards may by a bye-law require the parents of all children between five and thirteen to send them to school, and it is a reasonable excuse (1) that the child is receiving efficient instruction in some other manner, or (2) is prevented by sickness, or (3) that that there is no public elementary school within such distance not exceeding three miles as the bye-laws may prescribe. Breaches of any such bye-law may be recovered in a summary manner, but the penalty shall not exceed five shillings including costs.

Finally, it is provided that in future no parliamentary grant shall be made to any school which does not come within the definition of "public elementary school in the Act."[1] Such grant shall not be made in respect of religious instruction, and shall not exceed in any case the income of the school from other sources. No connexion with a religious denomination is necessary, and no preference is to be given to a school on account of its being or not being a board school. Otherwise the minutes of the Committee of Council govern the administration of the grant, such minutes to lie one month on the table of both Houses of Parliament before coming into force.

The Elementary Education Act, 1873, amends the Act of 1870 in several particulars not necessary to be specified here.

The Elementary Education Act, 1876, which came into operation on the 1st January 1877, declares that it shall be the duty of the parent of every child (meaning thereby a child between the ages of five and fourteen) to cause such child to receive efficient elementary instruction in reading, writing, and arithmetic,—the duty to be enforced by the orders and penalties specified in the Act. The employment of children under the age of ten, or over that age without a certificate of proficiency or of previous due attendance at a certified efficient school, is prohibited unless the child is attending school in accordance with the Factory Acts, or by bye-law under the Education Acts. Section 10 substitutes for section 25 of the Act of 1872 the following:—

"The parent, not being a pauper, of any child, who is unable by reason of poverty to pay the ordinary fee for such child at a public elementary school, or any part of such fee, may apply to the guardians having jurisdiction in the parish in which he resides; and it shall be the duty of such guardians, if satisfied of such inability, to pay the said fee, not exceeding threepence per week, or such part thereof as he is, in the opinion of the guardians, so unable to pay."

This payment subjects the parent to no disqualification or disability, and he is entitled to select the school. The following new regulations are made as to the parliamentary grant. A child obtaining before the age of eleven a certificate of proficiency and of due attendance, as in the Act mentioned, may have his school fees for the next three years paid for him by the Education Department—such school fees to be calculated as school-pence. The grant is no longer to be reduced by its excess above the income of the school, unless it exceeds 17s. 6d. per child in average attendance, but shall not exceed that amount except by the same sum by which the income of the school, other than the grant, exceeds it. Special grants may be made to places in which the population is small. Other clauses relate to industrial schools, administrative provisions, &c.

Scotland.—Previous to the Education (Scotland) Act of 1872, the public elementary education rested on the old parochial system, supplemented in more recent times by the parliamentary grants from the Committee of Council on Education. Under the old law the heritors in every parish were bound to provide a schoolhouse, and to contribute the schoolmaster's salary, half of which, however, was legally chargeable on tenants.[2]

The Education Act of 1872 establishes for a limited number of years a Board of Education for Scotland, to be responsible to the Scotch Education Department of the Privy Council, on which its functions are ultimately to devolve. The board makes an annual report to the department.

A school board must be elected in every parish and burgh as defined in the Act. The number of members (between five and fifteen) is fixed by the Board of Education, and no teacher in a public school is eligible. The election is by cumulative vote, and disputed elections are to be settled by the sheriff. The school board is a body corporate. Existing parish, burgh, and other schools, established under former Acts, are to be handed over to the school board.

The school board, acting under the Board of Education, shall provide a sufficient supply of school accommodation, and in determining what additional amount is necessary, existing efficient schools are to be taken into account, whether public or not. Provision is made for the transference of existing schools to the school board.

The clauses as to the school fund, and the power of the board to impose rates and to borrow money, are similar to those in the English Acts, and it is declared that such funds for behoof of burgh or parish schools shall be administered by the board, and that the board shall be at liberty to receive any property or funds to be employed in promoting education. Schoolmasters in office at the passing of the Act are not to be prejudiced in any of their rights, but all future appointments shall be during the pleasure of the board, who shall assign such salaries and emoluments as they think fit.

Sections 56–59 relate to the qualifications of teachers. A principal teacher in a public school must possess a certificate of competency or an equivalent as defined in the Act.

Section 62 contains provisions for the maintenance by the school board of higher class public schools in burghs, which are as far as practicable to be released from the necessity of giving elementary instruction, so that the funds may be applied more exclusively to the instruction on the higher branches. And when by reason of an endowment or otherwise a parish school is in a condition to give instruction in the higher branches, it may be deemed to be a higher class school and managed accordingly.

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[1] "Elementary school" is defined to be one in which elementary education is the principal part of the education there given, and at which the fees do not exceed ninepence per week.

[2] The following are the Acts relating to education in Scotland recited in the Education Act of 1872:—Act of Scots Parliament, 1696 (1st of King William); 43 Geo. III. c. 54; 1 and 2 Vict. c. 87, and 24 and 25 Vict. c. 107.

Parliamentary grants are to be made (1) to school boards, (2) to the managers of any school which is efficiently contributing to secular education. No grant shall be made in respect of (1) religious instruction, (2) new schools, not being public schools, unless it appears that they are required, regard being had to the religious belief of the parents of the children for whom they are intended, or other special circumstances of the locality. Section 68 is the conscience clause, and it may be mentioned that the preamble of the Act states that it is expedient that managers of public schools should be at liberty to continue the custom of giving "instruction in religion to children whose parents did not object, with liberty to parents, without forfeiting any of the other advantages of the schools, to elect that their children should not receive such instruction." Section 69 imposes on parents the duty of providing elementary instruction for children between five and thirteen, and the parochial board shall pay the fee for poor parents. Defaulters may be prosecuted; and persons receiving children into their houses or workshops shall be deemed to have undertaken the duties of parents with reference to the education of children. A certificate of the child's proficiency by an inspector protects the parent or employer from proceedings under the Act. Other clauses relate to the non-educational duties imposed by various Acts on schoolmasters (now transferred to registrars), and to the "Schoolmasters' Widows' Fund," to which new masters are not required to contribute.

The Education Board, continued by Order in Council to 6th August 1877, has been further continued by statute to 6th August 1878.

Ireland.—The public elementary school system depends on grants made to the lord-lieutenant, to be expended under the direction of commissioners nominated by the Crown, and named "The Commissioners of National Education." The commissioners were incorporated by this name in 1845, with power to hold land to the yearly value of £40,000. The following statement, taken from the rules and regulations of the commissioners appended to their report for 1873, exhibits the leading points of the system as contrasted with that now established in England and Scotland.

> "The object of the system of national education is to afford combined literary and moral and separate religious instruction to children of all persuasions, as far as possible in the same school, upon the fundamental principle that no attempt shall be made to interfere with the peculiar religious tenets of any description of Christian pupils. It is an earnest wish of Her Majesty's Government and of the commissioners that the clergy and laity of the different religious denominations should co-operate in conducting national schools."

The commissioners grant aid either to vested schools (*i.e.*, schools vested in themselves, or in local trustees to be maintained by them as national schools) or to non-vested (*i.e.*, private schools), and the grant may be towards payment of salary or supply of books, or, in the case of vested schools, towards providing buildings.

The local government of the national schools is vested in the local patrons or managers thereof, and the local patron is the person who applies in the first instance to place the school in connection with the board, unless otherwise specified. The patron may manage the school by himself or by a deputy. If the school is controlled by a committee or vested in trustees, they are the patrons. A patron may nominate his successor, and in case of death, his legal representative if he was a layman, and his successor in office if he was a clerical patron, will be recognized by the commissioners. The local patrons have the power of appointing and removing teachers, subject to a rule requiring three months' notice to the teacher. Every national school must be visited three times a year by inspectors.

In non-vested schools, the commissioners do not in general make any conditions as to the use of the building after school hours; but no national school house shall be employed at any time, even temporarily, as the stated place of divine worship of any religious community, and no grant will be made to a school held in a place of worship. In all national schools there must be secular instruction four hours a day upon five days in the week. Religious instruction must be so arranged that each school shall be open to the children of all communions, that due regard be had to parental right and authority, and that accordingly no child shall receive or be present at any religious instruction of which his parents or guardians disapprove. In non-vested schools it is for the patrons and local managers to determine whether any and what religious instruction shall be given. In all national schools, the patrons have the right to permit the Scriptures to be read; and in all vested schools they must afford opportunities for the same, if the parents or guardians require it. (E. R.)

EDWARD, or Eadward I., king of the Anglo-Saxons, was the eldest son of Alfred the Great, and succeeded his father, by the voice of the Witan, 26th October 901. He was then about thirty years of age, and had already in 893 distinguished himself by inflicting a disastrous defeat on the Danes at Farnham. His election to the throne was disputed by his cousin Ethelwold, who, leaguing himself with the Danes of Northumbria, waged with varying success a civil war of four years' duration. It was brought to a close in 906 by Ethelwold's death in battle, when Edward concluded a peace with the East Anglians and Northumbrians. The pacification was not, however, of a very satisfactory nature, and was not of long continuance, for in 910 Edward "sent out a force of West Saxons and Mercians, who greatly spoiled the army of the north," and in 911 the Danes, receiving large reinforcements from France, made repeated attacks on Wessex and Mercia. Against this common enemy Edward and his sister Ethelfleda, who became "lady of Mercia" in 912, formed conjoint measures. Ethelfleda drove the Danes from Mercia, and to secure her conquests erected the fortresses of Bridgenorth, Stafford, Tamworth, and Warwick; while Edward, by adopting the same methods in East Anglia and Essex, gradually accomplished the complete subjugation of the Danes. On the death of Ethelfleda in 922 he annexed Mercia to his own crown, and became king of all England south of the Humber. But this was not the whole result of his victories, for the Danes of Northumbria, the Welsh, the Scots, and the Britons of Strathclyde, either from dread of his power or from desire for his protection, voluntarily chose him to be their "father and lord." He died in 925. Inferior to his father in the higher moral and intellectual qualities, Edward manifested gifts superior to his as a legislator and warrior; and under him the Anglo-Saxon rule attained a fame and influence to which it had never before made a near approximation.

EDWARD, or Eadward II., surnamed the Martyr, an Anglo-Saxon king, succeeded his father Edgar in 975, at the age of about thirteen years. He was the elder son of Edgar, and is said to have been recommended by him as his successor; but the party in the state opposed to the monks supported nevertheless the claims of his younger brother Ethelred, son of Elfrida, and only seven years of age. The influence of Dunstan was, however, sufficiently great to overbear all opposition, and in a somewhat summary fashion he presented Edward to the Witan at Winchester, and consecrated him king. During his short reign the only circumstances worthy of notice are the quarrels between the two parties in the state, and the rapid decline of the authority of Dunstan and the monks. The death of Edward, which occurred in 978, was the result of a base act of treachery on the part of Elfrida. He was returning exhausted from the chase at Wareham when he was lured to her residence, and was stabbed in the back while partaking of hospitality before her palace gate.

EDWARD, or Eadward III., king of the Anglo-Saxons, surnamed, on account of his reputation for superior sanctity, the Confessor, was the son of Ethelred II. and Emma, daughter of Richard I. of Normandy, and was born at Islip, Oxfordshire, probably in 1004. On the election of Swend to the throne of England in 1013, Emma with her husband and family took refuge in Normandy; and Edward, notwithstanding the marriage of Emma to Canute in 1017, continued to reside at the Norman court, until he was recalled to England by Hardicanute in 1041. Hardicanute died in 1042, and "before the king was buried, all folk chose Edward to be king at London;" but partly from his own unwillingness to accept the crown, and partly from the opposition of the Danes who came into England with Canute, his coronation did not take place till April 1043. The chief agent in overcoming his scruples, and in quelling all murmurs of opposition against his election, was Godwin the West Saxon earl, whose influence was at that time paramount in England. The exact nature of the relations between Godwin and Edward has been the subject of considerable discussion; but the most probable view of the matter is that, until after the marriage of Edward to Edgitha, daughter of Godwin, in 1045, these were on the whole cordial and friendly, but that gradually the king's preference of Normans to Anglo-Saxons, his necessary friendship with Leofric of Mercia and Siward of Northumbria, and his growing dread of Godwin's ambitious character, led to misunderstanding and distrust. It was, probably, at the instigation of Godwin that Edward, on his accession to the throne, deprived his mother Emma of her possessions, and caused her to live in retirement at Winchester, and that he banished from the kingdom the chief Danish partisans who opposed his election. For the first eight years his reign was comparatively tranquil, the only circumstances worthy of mention being a threatened invasion by Norway, the ravages committed by pirates in Kent and Essex, and the outlawry of Sweyn, son of Godwin, for the seduction of the abbess of Leominster. In 1051, Eustace, count of Boulogne, in endeavouring to quarter his followers on the town of Dover, was resisted by the burghers, and a quarrel ensuing, several Normans were slain. The king, on hearing Eustace's account of the affair, without further inquiry, commanded Godwin to chastise the town by military execution. Godwin demanded a trial; but the king incited it is said by Robert, archbishop of Canterbury, summoned a meeting of the Witan at Gloucester, not for the purpose of inquiring into the affair at Dover, but to pass judgment on Godwin for his contumacy. Ultimately, Godwin thought it prudent to leave the country and take refuge in Flanders. It was during his absence that William, duke of Normandy, visited England; and if this prince did not then receive the promise of the crown from Edward, his ambition to possess it and his hopes of success were doubtless confirmed by his visit. There seems to have been general regret at Godwin's absence; and encouraged by the assurances he received from England, he gathered a fleet, and uniting with Harold, appeared before London. The king endeavoured to oppose him, but was obliged to yield to the wishes of his subjects, and Godwin and his sons were reinstated in their possessions. When her father left England, Edgitha had been deprived of her property and sent to the royal abbey of Wherwell, but on his return she was restored to her former position. Godwin died in 1053, and after his death Harold attained to great influence, and virtually ruled the kingdom in the name of Edward. Towards the end of 1065 Edward's health began rapidly to fail. He had rebuilt the ancient abbey of Westminster, and his only wish was to be present at its consecration, which was to take place on the 28th December, but over-exertion on some previous festival days was too much for his remaining strength. His share in the ceremony had to be performed by deputy, and he died 5th January 1066. It was his last wish that Harold should succeed him on the throne. The virtues of Edward, it has been said, were monastic rather than kingly. His aims were just and righteous, and he showed his interest in his subjects by the preparation of a digest of the laws of the kingdom, and by the repeal of the Danegeld, or war tax; but his weak character and his feeble interest in worldly matters caused the real government of the kingdom during his reign to be placed almost entirely in the hands of favourites.

See Palgrave's *History of the Anglo-Saxons*, Green's *History of the English People*, and especially Freeman's *Norman Conquest*, vol. ii.

EDWARD I. (1239–1307), king of England, was the son of Henry III. of England, and of Eleanor, daughter of the count of Provence, and was born at Westminster, June 16, 1239. In 1252 he was named governor of Gascony in room of Simon de Montfort, with whom Henry was dissatisfied; and in 1254, by his marriage with Eleanor, daughter of Alphonso X. of Castile, he secured to the English for a time undisputed possession of that province. At the battle of Lewes, 13th May 1264, Edward, by the impetuosity of his attack, at first defeated the barons with great slaughter, but by his too great rashness in pursuit failed to give the king proper support in another part of the field, and was thus the cause ultimately of the utter rout of the royal forces. He was taken prisoner, but escaping by a clever stratagem, he joined with the earl of Gloucester, and inflicted a disastrous defeat on De Montfort and his sons at Evesham, August 3, 1265. In 1269, at the request of the Pope, he undertook a crusade to the Holy Land. He reached it in 1270, and in 1271 he captured Nazareth and massacred all the Turks found within its walls. In revenge, perhaps, for this act, an assassin, on June 12, 1272, stabbed him in three places with a poisoned arrow; but his vigorous constitution triumphed over his injuries and he completely recovered. In the same year his father died, and he was proclaimed king. He had arrived at Sicily when the news reached him, but instead of going direct to England, he crossed over to Italy, and thence into France, where in a tournament his followers quarrelled with those of the count of Chalons, and he slew the count in single combat. He landed in England August 2, 1274, and was crowned on the 19th. In October of the same year he issued writs to inquire into the state of the realm, and the next year there were passed the laws called the Statutes of Westminster, which reformed many of the abuses of the feudal system, secured freedom from undue influence in the election of sheriffs and other justices, and threatened with penalties certain oppressive acts on the part of the barons. In 1277 he conquered Wales and caused Llewelyn to sue for peace; but in 1280, a Welsh war again broke out, which continued till the death of Llewelyn in 1282. Edward's plan to obtain money for the expenses of this war, by summoning for consultation in 1283 representatives of the shires, the boroughs, and the church, was the germ of the English House of Commons, although the first properly constituted Parliament did not meet till 1295. A less creditable method of raising money was the banishment, in 1290, of the Jews from England, on condition that the clergy and laity submitted to a tax of a fifteenth. Two other important decisions were the consequence of his money difficulties:—in 1297 he refused submission to the bull of Boniface VIII. forbidding the clergy to be taxed on their ecclesiastical revenue, and in 1299 he was obliged to confirm the charters conferring on the people the right to fix their own taxation. In 1290 Queen Eleanor died, and in 1293 Edward entered into negotiations for a marriage with Margaret, sister of Philip IV. of France; but on account of an act of treachery on the part of the French, the negotiations were broken off for a time, and the marriage did not take place till 1299. From 1295 the affairs of Scotland occupied his chief attention. In 1292 he had decided the claims of the candidates for the Scottish crown in favour of Baliol, on condition that the latter acknowledged him as lord paramount, and on the breaking out of war with France he demanded his assistance. On Baliol's refusal, and on learning that he had entered into a treaty with France, Edward in 1296 captured Berwick, defeated the Scots at Dunbar, took the castles of Roxburgh, Jedburgh, Edinburgh, Dumbarton, and Stirling, and, receiving at Perth Baliol's unconditional surrender, sent him prisoner to the Tower. In 1297 Wallace headed a rebellion of the Scots, and defeated the English with great slaughter at the battle of Stirling bridge; but next year the Scots suffered an overwhelming defeat at Falkirk, and only prevented the further success of the English by laying waste their own country. In 1299 and 1300 Edward's attempts at invasion met with little success on account of opposition from his barons. In 1301 he invaded Scotland for the fifth time, but at the request of the king of France granted it a truce. In 1304 he compelled its submission, and excepted from the amnesty granted to the Scotch nobles Sir William Wallace, who was captured and executed in 1305. In 1307, to avenge Bruce's murder of Comyn and his attacks on the English, Edward resolved on a seventh invasion, and, though in great bodily weakness, determined to lead his army in person; but his almost unexampled labours had already undermined his vigorous health, and he died 7th July 1307, at the village of Burgh-on-the-Sands, on the fifth day of his march northwards from Carlisle. He had given orders that his dead body should be carried before the army until his enemies were conquered; but his son Edward made no endeavour to fulfil his wish. The body was escorted to Waltham, and was buried at Westminster on the 27th October. In Edward were united in a rare degree both the physical and mental qualities of a great general; and he is one of the few English kings, and perhaps the first, who can lay claim to the higher qualities of statesmanship. The measures which he passed for the government of his own kingdom, and the concessions he made to the demands of his subjects, almost entitle him to be called the founder of England's constitutional freedom; while the far-seeing wisdom of his foreign policy was shown by his sacrificing his influence in France in order to quell the opposition to his authority in Scotland. That his claims on Scotland were altogether just can scarcely be affirmed; but that he clearly saw the necessity of a union of Scotland and England, and devoted his whole efforts to the attainment of this end, is perhaps his highest title to honourable remembrance. His harsh manner of attaining his end, and the cruel punishments he exercised on those who sought to thwart his efforts, may be excused partly on account of the times in which he lived, and partly as arising from the just vexation of a stern and eager nature; and they are somewhat counter-balanced by the righteousness and clemency with which he governed Scotland at the periods when it was under his rule.

See Hallam's *Middle Ages;* Pearson's *History of England during the Early and Middle Ages*, vol. ii.; Longman's *Lectures on the History of England*, vol. i.; Stubbs's *Early Plantagenet Kings;* Hill Burton's *History of Scotland*, vol. ii.; and Green's *Short History of the English People.*

EDWARD II. (1284–1327), king of England, fourth son of Edward I. and of Eleanor, was born at Carnarvon, April 25, 1284, and became heir-apparent in 1285. His first title was earl of Carnarvon, but in 1301 he was created earl of Chester and prince of Wales. His personal character, and the whole tenor and tendency of his reign, may perhaps be best described as the opposite of those of his father. Though not the slave of any of the worst vices, and not without natural abilities, he was weak, indolent, and faithless; and his utter incompetence for the position in which fortune had placed him requires no other proof than the fate which finally overtook him. His first acts after the death of his father foreshadowed his future career. He at once recalled Piers Gaveston, a favourite whom his father had banished from the court, and created him earl of Cornwall, caused his father's body to be buried at Westminster, and, after rejoining the army for a few days, returned again to London, and for six years made no serious effort to prosecute the war with Scotland. Previous to his coronation he went to France to be married to Isabella, daughter of Philip II.; and by appointing Gaveston guardian of the kingdom during his absence, and loading him with honours and presents on his return, he roused the animosity of the nobles to such a height that it was only on his promising to agree to certain demands that might be submitted to him at a future Parliament, that they consented to his coronation. It took place 25th February 1308. Until the nobles rose in rebellion in 1312, and executed Gaveston at Warwick castle, the favourite formed a perpetual subject of dispute between the nobles and the king, and was alternately banished and recalled according to the king's exigencies. In 1311 Parliament confirmed the report of the "Committee of Ordinances" appointed to reform the abuses of the administration. The king nominally agreed to act in accordance with the report, but by a saving clause secured to himself full liberty to evade the principal enactments, the result of which was a series of quarrels with the nobles, becoming more serious each successive time, followed by reconciliations increasing gradually in hollowness till the end of his reign. Robert Bruce took full advantage of the internal difficulties of England, and in 1314 had reconquered the principal strongholds of Scotland with the exception of Stirling castle. For its relief Edward raised an army of 100,000 men, but suffered a ruinous defeat at the battle of Bannockburn, 24th June 1314. Edward made no further effort of importance against the Scots till 1319, when he besieged Berwick, which Bruce had taken, but was compelled to raise the siege, and concluded a two years' truce with Scotland. After the death of Piers Gaveston, the place of favourite with the king was occupied by Hugh Despenser. He was banished by Parliament in 1321, but soon returned; and, provoked at this, the barons under Lancaster declared war, but were defeated and Lancaster executed in March 1322. In 1323 a fourteen years' truce was concluded with Scotland. In 1324 Edward was persuaded to send the queen to France in order to settle some disputes with the French king. She succeeded in her mission, but refused to return home, on account, she affirmed, of previous ill-treatment by her husband, although doubtless intrigues with Roger Mortimer had something to do with her refusal. From France she went to Flanders, and, raising a small army against the king, landed at Orwell in Suffolk, 22d September 1326. The whole nation flocked to her standard, Despenser was executed, and young Edward was appointed guardian of the kingdom. In 1327, the king was formally deposed by Parliament, and his son elected in his stead. A plot was formed against the deposed monarch in the same year, and he was murdered with great cruelty at Berkeley Castle on the 27th September. (See the same writers for this reign as for the last.)

EDWARD III. (1312–1377), king of England, the eldest son of Edward II. and of Isabella, was born at Windsor, November 13, 1312. He was appointed guardian of the kingdom October 26, 1326, and received the crown February 1, 1327. On the 24th January 1328 he was married to Philippa, daughter of the count of Hainault. During his minority the government of the kingdom was intrusted to a body of guardians with Henry of Lancaster at their head, but was virtually usurped by Roger Mortimer, until the king, irritated by his arrogance, caused him to be

seized at Nottingham on the 15th October 1330, and conveyed to the Tower. He was executed at Tyburn on the 29th November. It is said to have been chiefly through Mortimer's influence that, on the 24th April 1328, a peace was concluded between England and Scotland, the chief provisions of which were that the Scots agreed to pay England the sum of £20,000, and that Edward agreed definitely to recognise the independence of the Scotch crown. The treaty was very unpopular in England, and it is not surprising, therefore, that, when Edward Baliol in 1332 made his attempt to mount the Scotch throne, Edward III. gave him indirect assistance, and that after Baliol's dethronement in 1333 an invasion of Scotland was resolved on. On July 19 Edward defeated the Scots at the battle of Halidon Hill, and receiving as the result of his victory the submission of the principal Scotch nobles, he annexed the whole of Scotland south of the Forth to his own crown, and allowed Baliol to reign over the remainder as titular king. Soon after, Baliol was again a fugitive, but was again aided by Edward to mount a nominal throne. After a short period of peace Edward in July 1336 ravaged and burned Scotland as far as Aberdeen, but growing complications with France compelled him in the same year to return to England. Though he professed to have a claim, through his mother, on the French throne against Philip of Valois, that claim was left in abeyance until several acts of aggression on the part of Philip brought about a rupture between the two kings. The count of Flanders, at Philip's instigation, had broken off commercial relations with England; French privateers were daily committing ravages on English commerce; Aquitaine was continually threatened by desultory attacks; and Philip, though he hesitated to accept the responsibility of being the first to declare war, scarcely attempted to conceal his endeavours to throw that responsibility on Edward. Edward sailed for Flanders July 16, 1338, and at Coblentz held a conference with the emperor Louis V., at which the latter appointed him his vicar-general, and gave orders for all the princes of the Low Countries to follow him in war for the space of seven years. In 1339 Edward laid siege to Cambrai, but soon afterwards raised the siege and invaded France. Philip advanced to meet him, but declined battle, and Edward concluded his first campaign without achieving anything, to compensate him for its cost. In 1340 he defeated the French fleet before Sluys, and after landing in France laid siege to Tournai, but before he succeeded in capturing it he was induced through money difficulties to conclude a truce of nine months with France. In 1342 a truce for two years was concluded between England and Scotland, and at the end of the same year Edward again set out on an expedition against France, but at the intercession of the Pope he agreed to a truce. Shortly after his return to England a great tournament was held by him at Windsor in memory of King Arthur. In 1346 he set sail on the expedition which resulted in the great victory of Crécy and the capture of Calais; and in 1348 he again concluded a truce with France. This year and the following are darkly memorable in English annals from the outbreak of the "black death," which spread terror and desolation throughout the whole country, but on account of the reduction it made in the population, was the ultimate cause of the abolition of serfdom and villanage in England. From this time Edward as a warrior retires somewhat into the background, his place being taken by the prince of Wales (See EDWARD THE BLACK PRINCE), who in 1356 won the battle of Poitiers, and took King John prisoner. In 1359 Edward again invaded France, and in 1360 he signed the peace of Bretigny, according to which the French agreed to pay for King John a ransom of three million crowns, and Edward renounced his title to
the throne of France, but retained his full sovereig
over the whole of the ancient duchy of Aquitaine, th
counties of Ponthieu and Guignes, and the town of Cala
Peace was again broken in 1369 by Charles of France, an
when he concluded a truce with England in 1375 all o
France that remained in Edward's hands was Bayonne an
Bordeaux in the south, and Calais in the north. Th
last years of Edward's reign form a sad and gloomy close t
a career which had had a vigorous and energetic commenc
ment, and had afterwards been rendered illustrious by gre
achievements. His empire in France was virtually ove
thrown; the vast expenditure which had had such a fruitles
result was sorely burdening his subjects, and awakenin
increasing discontent; and he himself, through the gradu
decay of his mental faculties, had become a mere tool in th
hands of Alice Perrers and of ministers whose only ai
was their own aggrandizement. In 1367 the "Goo
Parliament" virtually seized the helm of the state fro
the hands of the king and his ministers. It compell
Alice Perrers to swear never to return to the king's presenc
suspended the ministers Latimer and Lyons, protest
against the means then adopted for raising taxes, and d
manded a vigorous prosecution of the war. The Black Prin
was the chief agent in urging these reforms, but his deat
in the midst of the Parliament's deliberations, for a ti
rendered almost abortive the good work he had begu
Edward died 21st June 1377. The splendour of his rei
belongs properly rather to the people than to the monar
Both in his home and foreign relations he showed co
siderable prudence and sagacity, and he may be allowed t
merit of having endeavoured as much as possible to ke
on good terms with his subjects; but under him the p
gress of constitutional reform was due either to his mon
difficulties or to events entirely beyond his control. Althou
endowed with high courage and daring, there is no pr
that he possessed more than average ability as a gener
His expeditions were planned on a scale of great m
nificence, but he entered on his campaigns without
definite aim, and his splendid victories were mere isol
achievements, won partly by good fortune, but chiefly
the valour of Welsh and Irish yeomen and the sk
English archers.

See *History of Edward the Third*, by W. Longman (
Edward III., by Rev. W. Warburton, M.A. (1876); P
England in the Fourteenth Century (1876); and essay on
III., by E. A. Freeman (*Essays*, first series).

EDWARD IV. (1441-1483), king of England,
second son of Richard duke of York, and was
Rouen, April 29, 1441. His father was a
protector of the kingdom during the incapacity o
VI., and having in 1460 laid claim to the thr
descendant of Edward III., was named by P
successor of Henry VI. on condition that he allow
to retain his throne. As an heir had been bo
king, it was only natural that Queen Margaret s
to resist this proposal. She accordingly raised
against the duke of York, and he was defeated a
the battle of Wakefield, December 30, 1460.
who was at that time in Wales, on hearing of
death resolved to avenge it, and gathering a
of Welsh and English, defeated the earls of P
Ormond at Mortimer's Cross in Hereford, Febr
On February 17, Queen Margaret defeated th
St Albans; but Edward, notwithstanding her
ing united his forces with those under Wa
London, and, being received by the citiz
shouts of welcome, was proclaimed king 4t
But he could not permit himself to enjoy
idle security. King Henry had escaped
army of the queen, which, having withdra

was to the number of about 60,000 encamped at Towton, about eight miles from York. Here Edward and Warwick met the queen's forces, and a battle of great obstinacy ensued, which, notwithstanding the arrival of a reinforcement to Margaret in the middle of the battle, ended in her utter defeat. Henry and Margaret fled to Scotland, and on the 28 June Edward was crowned at London. Margaret afterwards escaped to France, from which country in 1462 she made two separate attempts to retrieve the fallen fortunes of her house, but these, as well as one made by Henry in 1464, proved utterly abortive. In May 1461 Edward was secretly married to Elizabeth, daughter of Richard Woodville, Lord Rivers, and widow of Sir John Gray; and having in the September following publicly acknowledged her as his queen, he grievously disappointed and displeased his chief supporter, the earl of Warwick, who had been negotiating for the marriage of Edward with the sister of Louis XI. of France. Though from this time secretly bending all his energies to accomplish Edward's overthrow, Warwick skilfully concealed not only his intentions but even his share in overt acts; and it was not till 1369 that, receiving intelligence of the success of an insurrection secretly fomented by him in Yorkshire, he showed his hand by taking the king prisoner near Coventry. Shortly after, Edward either escaped or was allowed his freedom; and in 1470 he defeated the rebels near Stamford, and compelled Warwick to make his escape to France. Here the earl, through the good offices of Louis, was reconciled with Queen Margaret, and agreed to invade England in behalf of her husband. Landing at Dartmouth, he soon had an army of 60,000 men. Edward, taken by surprise and unable to raise a force sufficient to oppose him, fled to Holland; and Warwick, having released Henry, again got him acknowledged king. Edward in his turn adopted the tactics that had been successful against him. In 1471 he landed at Ravenspur, and professing at first to resign all claims to the throne, and to have no further aim than merely to recover his inheritance as duke of York, he soon collected sympathizers, and then, throwing off all disguise, issued proclamations against Henry and Warwick. He marched without opposition direct to London, and after entering it and taking Henry prisoner, advanced against the army which had been collected to oppose him. The encounter took place at New Barnet, April 14, when the party of Warwick were defeated and Warwick himself was slain. On the same day Margaret with her son Edward, now eighteen years of age, had landed at Weymouth, but on May 4 she was defeated at Tewkesbury and taken prisoner. Her son either perished in battle, or was slain shortly afterwards by the order of the king; and her husband Henry died in the Tower on May 21, the evening of the day on which Edward re-entered London. Secure at home, Edward now turned his thoughts on foreign conquest. In 1475 he formed an alliance with Charles of Burgundy against Louis, but on landing on the Continent with a large army he learned that the duke and Louis had come to an understanding, and prudence compelled him to enter into a seven years' treaty with the power he had hoped to conquer. Shortly after this, the duke of Burgundy having died, Clarence, the brother of Edward, wished to marry Mary, the duke's daughter and heiress; but Edward, perhaps on account of chagrin at the former deceit of her father, refused his consent to the suit. Exasperated at his brother's conduct, Clarence took no pains to conceal his anger, and Edward thought it necessary to impeach him of treason before the House of Lords. He was condemned to death, February 7, 1478, and on February 17 was executed in the Tower, but with so great secrecy that the manner of his death is unknown. Edward died April 9, 1483. The beauty of his person and the freedom of his manners rendered Edward a great favourite with the lower and middle classes, but there appears to have been little in his character to awaken real esteem. He had certainly an ability for subtle scheming and intrigue, but his memory is connected with no act conferring any benefit of importance on his country, and it is tarnished by several deeds of ruthless cruelty, and by the helpless self-indulgence into which he sank during his later years. On account of the unsettled nature of the country during his reign, the influence of Parliament on the affairs of the kingdom became virtually suspended; while the antipathy and contentions between the two parties of the nobles made it almost a necessity that that party which supported the king should be unable to present any strong resistance against undue exercise of authority on his part. The result was the inauguration of that form of despotism known as the New Monarchy.

EDWARD V. (1470–1483), king of England, was the son of Edward IV. and of Elizabeth, and was born in the sanctuary of Westminster Abbey, November 4, 1470. As soon as Edward IV. was dead his brother Richard, duke of Gloucester (see Richard III.), acting so far in accordance with the late king's wishes, secured possession of the person of the young king, and was appointed by Parliament protector of the realm. He had previously arrested Earl Rivers, the young king's uncle, and Lord Richard Gray his half-brother, and his next step was to accuse Lord Hastings, president of the royal council, of designs on his life, and to have him executed almost immediately afterwards on Tower Green. The way being now cleared for a full declaration of his designs, he caused it to be decided at a meeting of the Lords and Commons that the marriage of Edward IV. had been invalid on account of the existence of a precontract; and, receiving a petition to act in accordance with this decision and assume the crown, he after a very slight reluctance consented to do so. Edward V. and his brother were confined in the Tower.. Shortly after it was known that they were dead, but though it was the general conviction that they had been murdered, it was not till twenty years afterwards that the manner of their death was discovered. Brackenbury, the constable of the Tower, had refused to obey the command of Richard to put the young princes to death, but complied with a warrant ordering him to give up the keys of the Tower for one night to Sir James Tyrrel, who had agreed to provide for the accomplishment of the infamous act. He gave admittance to two assassins hired by himself, who smothered the two youths under pillows while they were asleep.

For Edwards IV. and V. see Green's *Short History of the English People*, the *Houses of Lancaster and York*, by James Gairdner, and "König Richard III." in Pauli's *Aufsätze zur Englischen Geschichte*.

EDWARD VI. (1537–1553), king of England, was the son of Henry VIII. and of Jane Seymour, and was born at Hampton Court, 12th October 1537. "Till he came to six years old," he says in his journal, "he was brought up among the women." He was then transferred to the direction of several masters, who instructed him in Latin, Greek, French, philosophy, and divinity. In his tenth year he was created prince of Wales and duke of Cornwall, and very shortly afterwards he succeeded to the throne on the death of his father, 28th January 1547. The will of Henry, for the protection of the young king, had named merely a council of regency, but that council immediately chose Edward, earl of Hertford, as protector, and on the 16th February ordered that he should be created duke of Somerset. The leanings of the protector were strongly Protestant, and he inaugurated his protectorate by the repeal of various Acts whose tendency was to support the waning influence of the Church of Rome, and by additional legislation in favour of Reformation principles. Though England was in a somewhat unsettled state, this did not prevent him from planning an expedition against Scotland, on account of that power refusing to fulfil a former treaty by which a marriage had been agreed upon between Mary Queen of Scots and Edward. He defeated the Scots at the battle of Pinkie Cleugh, September 10, 1547, and next year captured Haddington; but, on account of growing dissensions at home, he was compelled to give up all further attempts against Scottish independence. His brother, who had been created Lord Seymour of Sudeley and made lord admiral of England, was suspected of being at the head of a plot to overturn his authority, and with something of bravado admitted as much as was sufficient to criminate himself, although he refused to answer in regard to the more serious charges. In the House of Lords a bill was framed against him which passed the House of Commons almost unanimously, and, it being assented to by the king shortly afterwards, he was executed on Tower Hill, March 20, 1549. In the following summer the distress consequent on the depreciation of the currency and the wasteful expenditure of the court awakened a general discontent, which in different parts of the kingdom broke out into open insurrection. The protector, instead of repressing the rebellion by vigorous measures, gave considerable concessions to the demands of the populace, his sympathy with whom he openly admitted. By such an avowal he necessarily alienated the nobility, and they speedily planned his overthrow. The council, headed by Dudley, earl of Warwick, declared against him, deposed him, and imprisoned him in the Tower, October 14, 1549. He regained his freedom shortly afterwards, but a plot which he was concocting for the overthrow of Warwick having prematurely come to light, he was again arrested in 1551, and being convicted of high treason, he was executed on Tower Hill, January 22, 1552. The king, who, except where his religious convictions were concerned, was a mere puppet in the hands of the faction which at any time was paramount, yielded his assent to the execution, apparently without any feelings of compunction. Warwick, some time before this created duke of Northumberland, now exercised absolute sway over the affairs of the kingdom, but he was hated by the populace, and distrusted even by the friends who had raised him to power. He found it necessary, therefore, to take further steps to guarantee the stability of his authority. The king was dying rapidly of consumption, and his sister Mary being heir to the throne, Northumberland could not hide from himself the probability that his own overthrow would follow her accession. He therefore took advantage of the king's strong religious prejudices to persuade him to make a will, excluding Mary and Elizabeth from the succession to the throne on the ground of their illegitimacy, and nominating as his successor Lady Jane Grey, who was married to the duke's eldest son. The arbitrary urgency of Northumberland and the religious obstinacy of Edward prevailed over the strong objections of the judges, and letters patent being drawn out in accordance with the king's wishes, passed under the Great Seal, and were signed by the chief nobles, including, although only after repeated endeavours to alter Edward's determination, Cranmer, archbishop of Canterbury. Edward died July 4, 1553. There were some suspicions that his death had been hastened by Northumberland, but although his malady showed at last some symptoms of poisoning, it is now believed that these were caused by accidental administrations of over-doses of mineral medicine. The early age at which Edward VI. died makes it impossible to form a confident estimate of his character and abilities. The exceptional talent which he manifested in certain respects may have been due largely to the precocity caused by disease. He was undoubtedly highly accomplished, but there is some reason for suspecting that he was defective in force of character, and that he was too much of a recluse to have become a successful ruler. His own writings show that he was fully aware of the abuses which had crept into the administration of affairs, and that he was conscientiously desirous that they should be remedied; but they leave it uncertain whether he had the practical sagacity to discern the true causes of these evils, and whether he had sufficient energy to remedy them even had he known the proper remedies.

The *Writings of Edward VI.* (including his Journal), *edited with Historical Notes and a Biographical Memoir by John Gough Nichols*, have been printed in two vols. by the Roxburgh Club (London, 1857). See also Hayward's *Life of Edward VI.* and Froude's *History of England*, vols. iv. and v.

EDWARD THE BLACK PRINCE (1330–1376), son of Edward III. of England, and of Philippa, was born at Woodstock, June 15, 1330. In 1337 he was created duke of Cornwall. He was appointed guardian of the kingdom during the king's absences in France in 1338, 1340, and 1342, and on his return in 1343 was created prince of Wales. In 1346 he accompanied his father's fourth expedition against France, when the division led by him bore the chief brunt in the battle of Crécy. In 1350 he shared with his father the glory of defeating the Spanish fleet at the battle of "L'Espagnols-sur-Mer." In 1355 he commanded the principal of the three armies raised by the English for the invasion of France, and landing at Bordeaux captured and plundered the chief of its southern towns and fortresses. In the year following he gained the great victory of Poitiers, and took King John prisoner; and returning to England in 1357, he entered London in triumphant procession, accompanied by his illustrious captive. During the pause of arms which followed the treaty of Bretigny he was married to his cousin Joan, commonly called the Fair Maid of Kent, of whom he was the third husband. This event took place in 1361. Shortly after, he was created duke of Aquitaine, and he set sail for his new dominions in February 1363. Here his life was spent in comparative quietude until Pedro, the deposed monarch of Castile, sought his assistance to remount the Spanish throne. Trusting to Pedro's promises to defray the cost of the expedition, the Black Prince agreed to his request. He marched across the Pyrenees, defeated Don Henry with great slaughter at the battle of Navarette, and two days afterwards, along with Don Pedro, entered Burgos in triumph. Don Pedro, however, speedily forgot the promise of payment which his distresses had induced him to make, and after the Black Prince had waited some months in vain for its fulfilment, he was compelled to return to his duchy, having lost four-fifths of his army by sickness alone. To defray his expenses he found it necessary to impose on Aquitaine a hearth tax, and the Gascon lords having complained to the king of France, he was summoned in 1369 to Paris to answer the complaint. He replied that he was willing and ready to come, but it would be with "helm on head, and with 60,000 men." War was consequently again declared between England and France. Two simultaneous invasions of English territory were planned by the French—the one under the duke of Anjou, the other under the duke of Berri. The latter laid siege to Limoges, which by the treachery of its bishop basely surrendered. Enraged almost to madness, the prince swore by the "soul of his father" that he would recover the city, and after a month's siege fulfilled his oath. Surprising the garrison by the springing of a mine, he carried the city by assault, and massacred without mercy every man, woman, and child found within its walls. This terrible act of cruelty, attributable, it is only charitable to suppose, partly to the irritation of ill health, and possibly to chagrin arising from the presentiment that the English power in France was now on the wane, is the one blot on his fair fame. It closed also his military career, for he was compelled in 1371, by the advice of his physicians, to return to England. From this time his constitution was utterly broken, but he lingered on to witness the loss of his duchy to England, and also to originate the measures of the "Good Parliament," although his death prevented their completion. He died at Westminster, 8th June 1376. He was buried at Canterbury Cathedral, where his mailed effigy may still be seen.

See Longman's *Life and Times of Edward III.; Edward III.* by Rev. W. Warburton, M.A.; Pauli's *Aufsätze zur Englischen Geschichte* (Edward, Der Schwarze Prinz), Leipsic, 1869; and Creighton's *Edward the Black Prince.*

EDWARDES, Sir Herbert Benjamin (1819–1868), major-general in the East Indian army, one of the noblest names on the roll of the soldier-statesmen of the British Indian empire, was born at Frodesley, in Shropshire, November 12, 1819. The family was of high standing. Sir Herbert's father was Benjamin Edwardes, rector of Frodesley, and his grandfather Sir John Edwardes, baronet, eighth holder of the title, which was conferred on one of his ancestors by Charles I. in 1644. After receiving his early education at a private school, he was sent to King's College, London, to complete his studies. Through the influence of his uncle, Sir Henry Edwardes, he was nominated in 1840 to a cadetship in the East India Company; and on his arrival in India, at the beginning of 1841, he was posted as ensign in the First Bengal Fusileers. He remained with this regiment about five years, and during this period gave proof of that "great capacity for taking pains" which is the characteristic of genius. He mastered the lessons of his profession, obtained a good knowledge of Hindustani, Hindi, and Persian, and attracted attention by the political and literary ability displayed in a series of letters which appeared in the *Delhi Gazette*. In November 1845, on the breaking out of the first Sikh war, Edwardes was appointed aide-de-camp to Sir Hugh (afterwards Viscount) Gough, then commander-in-chief in India. On the 18th of the following month he served at the battle of Moodkee, and was severely wounded. He soon recovered sufficiently to resume his duties, and fought by the side of his chief at the decisive battle of Sobraon (February 10, 1846), which closed the war. He was soon afterwards appointed third assistant to the commissioners of the Trans-Sutlej Territory; and in January 1847 was named first assistant to Sir Henry Lawrence, the resident at Lahore. Lawrence became the great exemplar of the young hero, who looked up to him with the affectionate reverence of a disciple and a son, and in later years was accustomed to attribute to the influence of this "father of his public life" whatever of great or good he had himself achieved. He took part with Lawrence in the suppression of a religious disturbance at Lahore in the spring of 1846, and soon afterwards assisted him in reducing, by a rapid movement to Jummoo, the conspirator Imaum-ud-din. In the following year a more difficult task was assigned him,—the conduct of an expedition to Bunnoo, a tributary Afghan district, in which the people would not tolerate the presence of a collector, and the revenue had consequently fallen into arrear. By his rare tact and fertility of resource, Edwardes succeeding in completely conquering the wild tribes of the valley without firing a shot, a victory which he afterwards looked back upon with more satisfaction than upon other victories which brought him more renown. His fiscal arrangements were such as to obviate all difficulty of collection for the future. In the spring of 1848, in consequence of the murder of Mr Vans Agnew and Lieutenant Anderson at Mooltan, by order of the Dewan Moolraj, and of the raising of the standard of revolt by the latter, Lieutenant Edwardes was authorized to march against him. He set out immediately with a small force, occupied Leia on the left bank of the Indus, was joined by Colonel Cortlandt, and, although he could not attack Mooltan, held the enemy at bay and gave a check at the critical moment to their projects. He won a great victory over a greatly superior Sikh force at Kineyree (June 18), and received in acknowledgment of his services the local rank of major. In the course of the operations which followed near Mooltan, Edwardes lost his right hand, by the explosion of a pistol in his belt. On the arrival of a large force under General Whish the siege of Mooltan was formed, but was suspended for several months in consequence of the desertion of Shere Singh with his army and artillery. Edwardes distinguished himself by the part he took in the final operations, begun in December, which ended with the capture of the city, January 4, 1849 For his services he received the thanks of both houses of parliament, was promoted major by brevet, and created C.B. by special statute of the order. The directors of the East India Company conferred on him a gold medal and a good service pension of £100 per annum. After the conclusion of peace Major Edwardes came to England for the benefit of his health, married during his stay there, and wrote and published his fascinating account of the scenes in which he had been engaged, under the title of *A Year on the Punjab Frontier in* 1848–1849. His countrymen gave him fitting welcome, and the university of Oxford conferred on him the degree of D.C.L. In 1851 he returned to India and resumed his civil duties in the Punjab under Sir Henry Lawrence. In November 1853, he was entrusted with the responsible post of commissioner of the Peshawur frontier, and this he held when the Mutiny or Sepoy War of 1857 broke out. It was a position of enormous difficulty, and momentous consequences were involved in the way the crisis might be met. Edwardes rose to the height of the occasion. He saw as if by inspiration the facts and the need, and by the prompt measures which he adopted he rendered a service of incalculable importance, by effecting a reconciliation with Afghanistan, and securing the neutrality of the Amir and the tribes during the war. So effective was his procedure for the safety of the frontier that he was able to raise a large force in the Punjab and send it to co-operate in the siege and capture of Delhi. In 1859 Edwardes once more came to England, his health so greatly impaired by the continual strain of arduous work that it was doubtful whether he could ever return to India. During his stay he was created K.C.B., with the rank of brevet colonel; and the degree of LL.D. was conferred upon him by the university of Cambridge. Early in 1862 he again sailed for India, and was appointed commissioner of Ambala and agent for the Cis-Sutlej states. He had been offered the governorship of the Punjab, but on the ground of failing health had declined it. In February 1865, he was compelled finally to resign his post and return to England. A second good service pension was at once conferred on him; in May 1866, he was created K.C. of the Star of India, and early in 1868 was promoted major-general in the East Indian army. It was known that he had been for some time engaged on a life of Sir Henry Lawrence, and high expectations were formed of the work; but he did not live to complete it. He died in London, December 23, 1868. Sir Herbert Edwardes, great in council and great in war, was singularly beloved by personal friends, and was generous and unselfish to a high degree. He was also a man of deep religious convictions, and naturally desired and hoped for the evangelization of India. But his zeal was under the restraint of knowledge, and he knew how to reconcile private aspiration with public duty. Like Sir John Lawrence, he advocated toleration for the native religious systems, and at the same time deprecated Government support of them in any way. "India," says a writer in the *Pall Mall Gazette*, "has produced many great men, some of whom have done more for their country, but there were few upon whom the stamp of genius was more visibly impressed than upon Herbert Edwardes." The life of Sir Henry Lawrence was completed by Mr Herman Merivale, and was published in 1873.

EDWARDS, Bryan (1743–1800), the well-known historian of the West Indies, was born at Westbury, in Wiltshire, on the 21st of May 1743. His father died in 1756, and his education and maintenance were undertaken by his maternal uncle, Zachary Bayly, a wealthy West Indian merchant. He had been placed by his father at the school of a dissenting clergyman in Bath, where he received a careful training in English composition; his uncle's agent, however, removed him to a French boarding school, on discovering that he had received no instruction in classics. Edwards went out to Jamaica to join his uncle, in whom he seems to have found everything he could desire,—the most enlightened mind, the sweetest temper, and the most generous disposition. To this was added a truly paternal regard for himself, which was returned with all the warmth of filial affection. His uncle, finding him possessed of literary talents, but deficient in classical acquirements, engaged a Mr Teale, a clergyman and formerly master of a free grammar-school, as resident tutor for him. The relationship proved a very agreeable one to both teacher and pupil, though the training imparted was somewhat fragmentary. A large proportion of their time was spent in tasting the beauties of Dryden and Pope, and in laughing at the comic sallies of Molière. Edwards, upon the whole, acquired during this period small Latin and less Greek; but he continued to practise composition both in prose and verse, and the two companions sent occasional pieces to the colonial newspapers. On the death of his uncle Edwards succeeded to his property; and, in 1773, he became heir to the much larger estate of Mr Hume, also of Jamaica. In 1784 he published *Thoughts on the Proceedings of Government respecting the Trade of the West Indian Islands with the United States of America*. This was followed by a speech delivered at a free conference between the Council and Assembly at Jamaica, held November 25, 1789, on the subject of Wilberforce's propositions concerning the slave trade. It was in 1793, however, that he published his great work, on which he had been many years engaged, entitled *History, Civil and Commercial, of the British Colonies in the West Indies*, 2 vols. 4to. On the question of slavery and the slave trade he naturally took the planter's view, but he expressed himself with moderation and candour. In 1796 he published, in one volume quarto, a *History of St Domingo*, which had then excited a deep interest, on account of the insurrection of the slaves, and the consequent establishment of an independent negro government. In 1801 a new edition of both these works was published, in three vols. 8vo, under the general title of *History of the West Indies*. A fifth edition issued from the press in the year 1819. When Mungo Park returned from his celebrated journey in Africa, Edwards, from his oral information, drew up a report of it, which was submitted to the African Society, and published in their *Transactions*. Park afterwards incorporated the greater part of this into the general narrative of his *Travels*, in preparing which he availed himself much of the assistance and suggestions of Edwards. After a lengthened residence in Jamaica Edwards returned to England, and in 1796 became M.P. for the borough of Grampound, which he continued to represent till his death, July 15, 1800. He left a short narrative of his life, which was prefixed to the edition of his history published in 1801.

EDWARDS, George (1693–1773), a celebrated antiquarian and ornithologist, was born at Stratford, in Essex, on the 3d April 1693. He was originally apprenticed to a tradesman in Fenchurch Street, London; but obtaining by accident access to a number of books on natural history, painting, astronomy, and antiquities, he lost his inclination for mercantile pursuits, and acquired a desire for foreign travel. In 1716 he visited the principal towns in Holland, and two years afterwards travelled in Norway and Sweden. In 1719 he went to Paris for the purpose of studying its natural history collections, and during his stay in France he made two journeys of a hundred miles each, the first to Châlons in Champagne, and the second on foot to Orleans and Blois. On his arrival in England he closely pursued his favourite study of natural history, applying himself to drawing and colouring such animals as fell under his notice. Birds first engaged his particular attention, and having purchased some of the best pictures of them, he made a few drawings of his own, which were admired by the curious, who encouraged the young naturalist by paying a good price for his early labours. In 1731 he made an excursion to Holland and Brabant, where he collected several scarce books and prints, and had an opportunity of examining the original pictures of several great masters, at Antwerp, Brussels, Utrecht, and other cities. In December 1733, by the recommendation of Sir Hans Sloane, the president of the college of physicians, he was chosen librarian to that body, and had apartments assigned him in the college. Here he had the opportunity of a constant recourse to a valuable library filled with scarce and curious books on the subject of natural history, which he so assiduously studied. By degrees he became one of the most eminent ornithologists in his own or any other country. He published the first volume of the *History of Birds* in 1743, a second volume in 1747, a third in 1750, and a fourth in 1751. In 17[illegible] he continued his labours under a new title, that of *Gleanings of Natural History*. A second volume of the gleanings was published in 1760, and a third in 1764. The two works contain engravings and descriptions of more than six hundred subjects in natural history not before described or delineated. He likewise added a general index in French and English, which was afterwards perfected with the Linnæan names by Linnæus himself, who frequently honoured him with his friendship and correspondence. In 1750 he received the gold medal of the Royal Society, given annually on St Andrew's day to the author of any new discovery in art or nature. He was, a few years afterwards, elected fellow of the Royal Society, and of the Society of Antiquaries, London, and also a member of many of the academies of sciences and learning in different parts of Europe. After the publication of his last work, having arrived at his seventieth year, and finding his sight beginning to fail, and his hand losing its wonted steadiness, he retired from public employment to a little house which he had purchased at Plaistow. The conversation of a few select friends, and the perusal of a few select books, were the amusement of the evening of his life; and now and then he made an excursion to some of the principal cities in England, particularly to Bristol, Bath, Exeter, and Norwich. His general health began to fail some years before his death, which took place on the July 23, 1773.

EDWARDS, Jonathan (1703–1758), the most distinguished metaphysician and divine of America, was the son of the Rev. Timothy Edwards, and of Esther, daughter of the Rev. Solomon Stoddard, of Northampton, and was born at

East Windsor, Connecticut, October 5, 1703. He was the only son in a family of eleven children, of whom four were older than himself. Even in his very early years the religious instruction communicated to him by his parents seems to have engaged a large share of his interest, and to have exercised a strong influence on his character. In a statement of his religious views in youth, he says, "I had a variety of concerns and exercises about my soul from my childhood," and also, "from my childhood up my mind had been full of objections against the doctrine of God's sovereignty." In his eighth or ninth year he experienced, he tells us, "two remarkable seasons of awakening;" but these objections against the doctrine of God's sovereignty continued to trouble him more or less until about his 17th year, "when," he says, "I seemed to be convinced and fully satisfied as to this sovereignty of God, and his justice in thus eternally disposing of men, according to his sovereign pleasure, but never could give an account how or by what means I was convinced, nor in the least imagined at the time, nor a long time after, that there was any extraordinary influence of God's Spirit in it." Until he entered college his education was conducted by his father, with the occasional assistance of his elder sisters. At the age of six he began the study of Latin, and in that language, as well as in Greek and Hebrew, he attained to considerable proficiency. In September 1716 he entered Yale College. He took his B.A. degree in 1720, but with a view to preparation for the ministry he continued his residence at college for two additional years. In 1718 he read Locke on the *Human Understanding*, and it was from its perusal that his intense passion for abstract thought was first kindled. He declared that it had afforded him "far higher pleasure than the most greedy miser finds when gathering up handfuls of silver and gold from some newly discovered treasure." He received licence to preach in 1722, and in August of that year, on the invitation of a number of ministers in New England, he went to preach to the Presbyterians in New York, where he continued eight months. He was invited by the congregation to continue with them permanently, but on account of doubts as to his future usefulness in that particular sphere, he declined their invitation, and returned to his father's house at East Windsor. Here he prosecuted his studies in theology and metaphysics till June 1724, when he was appointed tutor in Yale College. About this time he completed the series of seventy resolutions begun during his preparation for the ministry, and designed to "regulate his own heart and life." No. 11 of these may be mentioned as specially characteristic:—"Resolved, when I think of any theorem in divinity to be solved, immediately to do what I can towards solving it, if circumstances do not hinder." He resigned his tutorship in September 1726, on receiving an invitation from Northampton to become colleague and successor to his grandfather, the Rev. Samuel Stoddard, and in February 1727 he was ordained to that office. In the following July he was married to Sarah, daughter of the Rev. James Pierrepoint, of Newhaven. He continued at Northampton till June 22, 1750, when, on account of a dispute that had arisen from an attempt on his part to prohibit some of the younger members of his congregation from perusing certain books, which in his opinion were obscene, he found himself compelled to resign his charge. On learning of his resignation some of his friends in Scotland advised him to settle in that country, and he was also invited to a church in Virginia, but he accepted in preference to either invitation the proposals made to him by the "Society in London for Propagating the Gospel in New England," that he should become missionary to the Housatonnuck Indians, who were settled at Stockbridge, Berkshire Co., Massachusetts. The nature of his work now left him in possession of considerable leisure, of which he made use to such advantage that, within the six years of his residence at Stockbridge, he completed four of his principal treatises, including that on the *Freedom of the Will*, which was published in 1754. On account of the fame which this work acquired for him he was in 1757 called to succeed President Burr of Princeton College, New Jersey. He was installed February 16, 1758, but was scarcely spared to enter upon the performance of his duties. On account of the prevalence of small-pox in the neighbourhood, he submitted to inoculation and the disease taking an unfavourable turn, he died on the 28th March. Edwards says of himself that he possessed "a constitution in many respects peculiarly unhappy, attended with flaccid solids, vapid, sizy, and scarce fluids, and a low tide of spirits, often occasioning a kind of childish weakness and contemptibleness of speech, presence, and demeanour." Notwithstanding this unhappy constitution, he was throughout life a laborious student, often prosecuting, pen in hand, his arduous metaphysical researches for thirteen hours daily. As an orator he sometimes held not only the feelings but the intellects of his hearers completely under his sway. The extraordinary influence which he thus exercised was not due to any personal advantages, for even when his oratory was most effective the "contemptibleness of his speech and demeanour" still remained, although it was no longer felt by his hearers, nor to any special excellences of style, for though his language conveyed his meaning without ambiguity, it did so not only without any of that peculiar felicity of arrangement which is usually one of the chief elements of successful oratory, but in a bald, even in a lumbering and awkward, manner. His eloquence was simply intense moral earnestness, expressed in the form of what, in more senses than one, might be called "merciless logic."

His writings present a very remarkable conjunction of apparently contradictory qualities, a conjunction attributable partly to a peculiar combination of natural mental characteristics, and partly to a habit of solitariness which rendered him almost completely ignorant of the dominant tendencies of contemporary thought, and placed him almost beyond the reach of any external influences fitted to aid him in freeing himself from the shackles of past systems. The outstanding features of his character were undoubtedly his sense of reverence and his passion for ratiocination. In one respect these two opposite characteristics combined to produce a harmonious result, namely, to impress him with an almost overwhelming conviction of the claims of duty. His awe of the Supreme Power was in one aspect of such a nature as to seem consistent only with the grossest superstition, but from the very fact that it was the awe of an intellect, within the sphere of logic, so keen and penetrating, it was necessarily a moral awe, an awe which intensified that sense of duty whose requirements his logical faculty revealed with a distinctness which admitted of no fallacy or evasion. It was his overwhelming conviction of duty which gave to his system, theological, moral, and metaphysical, what unity it possesses. That unity is, however, nothing more than seeming; the positive and negative elements are held apart in different spheres; if they were brought into contact the necessary result would be an utterly destructive explosion. The basis of his whole system is the "sovereignty of God;" and of his conviction of God's "sovereignty" he tells us that of how or by what means he arrived at it he could give no account. This mysterious and unaccountable conviction he, however, endeavours to justify by a protracted logical process, without being at all conscious of any incongruity between means and end. This unconsciousness is due to the fact that the strength of his original conviction prevented him from discerning the real difficulties he had to surmount. We have thus presented to us the spectacle of a mystic endeavouring to expound his belief by a mere process of reasoning, almost mathematical in its cold and definite precision and in its rigour. It is quite possible that his strong prepossessions would in any case have prevented him from estimating at their proper importance the new problems that were beginning to appear on the horizon of contemporary thought, but, so far from having given these problems the attention necessary in order to understand them, he was scarcely aware of their existence. The impulse he received from Locke's *Essay on the Human Understanding* did not lead him to seek full acquaintance with the whole circle of the philosophical speculation of his time,—partly no doubt because his circumstances prevented him from doing so, but partly also because he had a strong bias towards the pursuit of solitary trains of thought. In his essay on the *Freedom of the Will* he confesses having never read Hobbes; and although he mentions in a letter having read one of Hume's works, this would appear to have been subsequent to the publication of the essay on the *Freedom of the Will*, and its perusal does not seem to have impressed him with any idea of its author's exceptional metaphysical ability, for he merely says of it and of some other books, "I am glad of an opportunity to read such corrupt books, especially when written by men of considerable genius, that I may have an idea of the notions which prevail in our country." He was scarcely conscious of the presence of the new influence which was then stirring the stagnant waters of speculation; but it certainly influenced him unconsciously, and compelled him to check his vague unrest by more stedfastly clinging to his old convictions. He succeeded in doing so, but not without the exercise of constant watchfulness, for, apart from any immediate external influence, his strong and eager logical faculty seems often as if bent on carrying him beyond the bounds of traditional opinion, and requires frequently to be pulled up with a certain measure of abruptness.

The theological system of Edwards emphasized all the sterner features of Calvinism and revealed them in strong relief. Calvinism in its original form was founded on extreme statements regarding "God's sovereignty" and "man's depravity by nature," but the inferences implied in these statements are set forth by Edwards in their terrible and repulsive aspects with a thoroughness and a logical completeness not previously attempted. The argument he employs to establish his propositions is unanswerable as against the Libertarians of his time, for he shows conclusively that their plight is, if anything, rather worse than his own; but when he seeks to go beyond this very circumscribed sphere he involves himself in a labyrinth of scholastic quibbling, where all that seems to present itself is only a choice of two evils,—either to remain for ever utterly bewildered by the contradictory paths which open up before him, or by selecting one of them to wander irrevocably beyond the bounds of what he recognized as orthodox. We have an example of this when he endeavours to prove that though men are born utterly depraved, God is not the author of their depravity. His theory is that Adam was originally possessed of two principles,—one which may be called *natural*, being the mere *principles of human nature*, or as it is called in Scripture the *flesh*, and another called the *supernatural* principle, or as in Scripture the *divine nature*. When Adam ate of the tree of forbidden fruit the divine nature was withdrawn from him, and thus his nature became corrupt without God infusing any evil thing into it. "So," says Edwards, "does the nature of his posterity; they come into the world mere flesh, and entirely under the government of natural and inferior principles." Here it will be seen, not only that Edwards appears to very little advantage as a reasoner, but that he is in imminent peril of overthrowing the central position of his own system; for, first, if to represent sin as a merely negative quality in any degree solves the difficulty of God being its author, it does so at the expense of denying to it a real existence; and secondly, to represent men as born into the world "mere flesh" entirely destroys the distinction, so essential to Edwards's system, between "moral and natural inability." He soon, however, escapes back to his old position although not by the way he set out. "If any," he says, "should object to this that, if the want of original righteousness be thus according to an established course of *nature*, then why are not principles of holiness, when restored by divine *grace*, also communicated to posterity, I answer, the divine law and establishments of the Author of nature are precisely settled by Him as He pleaseth, and limited by His wisdom."

The moral theory of Edwards is but a corollary from his theological system. Virtue he places in love or benevolence towards being in general, or more accurately in a "*disposition* to benevolence towards being in general," for he does not mean to affirm that "every virtuous act must have universal existence for its direct and immediate object," but merely that "no affections towards particular persons or beings are of the nature of true virtue, but such as arise from a generally benevolent temper." He shows that this love cannot be primarily a "love of complacence," that is, a love having any regard to excellence in the object, for that "would be going in a circle, and the same as saying that virtue consists in love to virtue," and that it cannot consist in "gratitude, or one being benevolent to another for his benevolence to him," because "this implies the same inconsistence;" consequently that "the first object of a virtuous benevolence is being simply considered, and, if being simply considered, then being in general." There is, however, "a second object of a virtuous propensity of heart, namely, benevolent being, for one that loves being in general will necessarily value good-will to being in general." True virtue must, therefore, chiefly consist in love to God, for "he that has true virtue, consisting in benevolence to being in general, and in benevolence to virtuous being, must necessarily have a supreme love to God both of benevolence and complacence." This theory he applies to support the theological dogma that no one whose virtuous acts are not the result of real conscious love to a personal God can possess any true righteousness, or be in any other moral condition than that of utter depravity. As to the merits of the theory in itself, these are not helped by the form in which it is stated. Being in general, being without any qualities, is too abstract a thing to be the primary cause of love. The feeling which Edwards refers to is not love, but awe or reverence, and, moreover, necessarily a blind awe. Properly stated therefore, true virtue, according to him, would consist in a blind awe of being in general, and a love of complacency to those who possess a blind awe of being in general—only this would be inconsistent with his definition of virtue as existing in God. In reality, as he makes virtue merely the second object of love, his theory becomes identical with that utilitarian theory with which the names of Hume, Bentham, and Mill are chiefly associated; but it is utilitarianism necessarily expressed in very awkward terms, because these are hampered by its derivation from certain theological principles, and its necessary connection with a theological belief. Unlike Hume and Mill, he deduces his theory primarily from certain scholastic propositions regarding God's purpose in the creation of the world. He accepts the Scripture statement that God makes himself his own chief end, and he endeavours by scholastic reasoning to show the "reasonableness" of his doing so. He is, however, unable to proceed a step in his argument without committing himself to such pantheistic statements as that "God's existence, being infinite, must be equivalent to universal existence," and that "the eternal and infinite Being is in effect being in general, and comprehends universal existence." He is, therefore, obliged to confess that "there is a degree of indistinctness and obscurity in the close consideration of such subjects," and to fall back "on revelation as the surest guide in these matters;" although affirming at the same time that, in his endeavours "to discover what the voice of reason is so far as it can go," he has been successful in "obviating cavils insisted on by many."

The fame of Edwards is associated chiefly with his treatise on *The Freedom of the Human Will*. The will is defined by him as that by which the "mind chooses anything." By "determining the will" he means "causing that the act of the will or choice should be thus and not otherwise." And, "with respect to the inquiry, What determines the will?" he answers, "It is that motive which as it stands in the view of the mind is the strongest." Liberty, according to him, belongs not to the will itself, but to the person, and the liberty which any one possesses is merely liberty to act as he wills. Any other kind of liberty, he affirms, implies three suppositions:—(1) "A self-determining power in the will," (2) "Indifference,—that previous to the act of volition the mind is in a state of equilibrium;" and (3) "Contingence,—that events are not necessarily connected with their causes." These suppositions, as involving in different forms denials of the law of causality, are severally shown to be absurd. That Edwards demonstrates the position of his opponents to be utterly untenable must without the least qualification be admitted; but he is unconsciously equally successful in overthrowing his own theological position. Accordingly Edwards's theory of the will, like his ethical theory, is now held only by those who, in regard to the supreme power, are agnostics. His theory differs in no respect from that of John Stuart Mill, except that his statement of the law of causality is a little confused, and that he gives a different account of the origin of our knowledge of causality. He so far anticipated Hume as to recognize that by cause is often meant "any antecedent with which a consequent event is so connected that it truly belongs to the reason why the proposition which affirms that event is true, whether it has and positive influence in producing it or not." There is, of course, some confusion here, as the word "reason" is, in the position in which it stands, ambiguous, showing that Edwards never properly grasped the distinction between causality and mere sequence; and further differing from Hume in recognizing that there are causes which have a positive influence in producing their effects, his statements are rendered additionally perplexing by his unconsciously making use of either signification of the word cause, according to the exigencies of his argument. Thus he makes our knowledge not only of the law of positive causality but of mere sequence to depend not on experience but on a primary intuition "implanted by God in the minds of all mankind," which is virtually a contradiction in terms. There is also the further difficulty as to how, consistently with his theory in regard to the will, he can hold any other doctrine regarding causality than that it is that mere sequence which experience enables us to believe in; for it seems impossible that we can have a primary intuition of causality unless from the consciousness of our own casual energy.

That part of Edwards's argument in which he most decidedly fails is his endeavour to reconcile his theory of the will with his own views in regard to moral agency, and more particularly in regard to the nature of reward and punishment. John Stuart Mill admits that, on his own theory, the only ends that can justify punishment are the benefit of the offender himself and the protection of others, and the only "feeling of accountability" he contends for is that "caused by the experience of punishment." It has been disputed whether even the kind of punishment contended for by Mill is on his theory justifiable, but he has endeavoured to obviate objections to it by distinguishing between what he calls "modified fatalism" and what he calls the "true doctrine of causation." The distinction is similar to that drawn by Edwards between "moral" and "natural" necessity. It may be questioned whether Mill's doctrine of causality leaves room for this distinction, but undoubtedly Edwards's doctrine does not; for by tracing our knowledge of causality not to experience but to a primitive intuition, he becomes not merely a "determinist," but a "necessitarian." Whether the doctrine of the will held by Edwards, Hume, and Mill be the correct one, or whether the true solution of the problem or its true statement is to be found in some form of the transcendental philosophy which received its great impulse from Kant, it is not our province to inquire; but there need be no hesitation in affirming both that Edwards is successful in showing that the doctrine of the freedom of the will must be stated in different terms and justified by different methods than those employed up to his time, and that, on account of his attempting to build on principles so widely removed from each other as to be utterly irreconcilable, his own well-planned structure, notwithstanding extraordinary applications of architectural skill, inevitably collapses.

The collected works of Jonathan Edwards, including a large number of sermons, were first published at Worcester, Mass., 1809, in 8 vols. 8vo. Among various other editions afterwards published may be mentioned that by his relative Sereno E. Dwight, 1830, in 10 vols., containing a memoir by Dr Dwight. This edition, with an introductory essay by Henry Rogers, was published at London in 1840, in two vols. Edwards's principal treatises are:—*Religious Affections* (1746); *Life of Brainerd* (1749); *Freedom of the Will* (1754); *God's Last End in the Creation of the World* (1755); *Original Sin* (1758); the uncompleted *History of Redemption* (1777); and *Nature of Virtue* (1788). There is an interesting sketch of Edwards's life, character, and opinions in Leslie Stephen's *Hours in a Library* (2d series, 1876). (T. F. H.)

EDWARDS, Richard (1523?–1566?), a musician and writer of interludes, was born in Somersetshire, studied at Corpus Christi College, Oxford, took his master of arts degree in 1547, entered at Lincoln's Inn, and was appointed in 1561 a gentleman of the royal chapel and master of the singing boys. He probably died about the end of 1566, as his epitaph was written by Turberville in the following year. A "tragedy" from his pen—possibly, in spite of the designation, the comedy of *Damon and Pithias*—was acted before Queen Elizabeth at Christmas 1564; and on September 3, 1566, the same honour was accorded to his *Palamon and Arcite*. The latter play was never printed, and like most of the author's productions is now lost, but the former, entered at Stationers' Hall in 1567–8, appeared in 1571 with the title of "The excellent Comedie of two the moste faithfullest freendes, Damon and Pithias," was reprinted in 1582, and may be found in Dodsley's *Old Plays*, vol. i., and *Ancient British Drama*, vol. i. It is written in rhymed lines of rude construction, varying in length and neglecting the *cæsura*, and, according to A. W. Ward, it is "one of the clumsiest of our early plays, both in action and in language." Its principal subject is tragic, but it is interlarded with scenes of vulgar and witless farce. A number of the author's shorter pieces are preserved in the *Paradise of Dainty Devices*, first published in 1575, and reprinted in the *British Bibliographer*, vol. iii.; the best known are the lines on May, the *Amantium Iræ*, and the *Commendation of Music*, which has the honour of furnishing a stanza to *Romeo and Juliet*. The *Historie of Damocles and Dionise* is assigned to him in the 1578 edition of the *Paradise*. In his own day Edwards was held in the highest estimation. "He united," says Warton, "all those arts and accomplishments which minister to popular pleasantry; he was the first fiddler, the most fashionable sonneteer, the readiest rhymer, and the most facetious mimic of the court."

See, besides the numerous authorities given by Allibone in *Dict. of Brit. and Amer. Authors*, the *Shakespeare Soc. Papers*, vol. ii. art. vi.; Ward, *English Dram. Literature*, vol. i.

EDWIN, or Eadwine, king of Northumbria, was the son of Ælla, king of Deira, and was born about 586. At the death of Ælla, in 588, Ethelfrid, king of Bernicia, Ælla's brother-in law, usurped the throne of Deira, and united the two kingdoms Deira and Bernicia, under the name of Northumbria. Edwin ultimately found shelter with Rædwald of East Anglia, who, in 617, defeated and slew Ethelfrid near the river Idle, and enabled Edwin to mount the Northumbrian throne. In 625 Edwin married Ethelburgha, daughter of Edbert, king of Kent. She had been converted to Christianity, and, at her desire, Paulinus, a Christian missionary, was allowed to enter Northumbria. Not long after Paulinus's arrival, Eumer, an envoy of the king of Wessex, made an attempt to assassinate Edwin, who was only saved by Lilla, one of his thanes, throwing himself between him and the assassin's weapon. The thane was killed, and the sword passing through his body inflicted also a dangerous wound on the king. The queen about the same time was seized by the pangs of childbirth, and was so alarmed on account of what had happened that she and her infant were for a time in imminent danger. Paulinus offered up prayers for their recovery, and Edwin was so much impressed by the seeming answer to the petition, that, though he did not at once adopt the Christian faith, he permitted the infant and twelve of his household to be baptized. He also declared to Paulinus that if he should succeed in overthrowing the West Saxons, against whom he had determined to make war, he would himself become a Christian, and receive the rite of baptism. After his victorious return he renounced his heathen gods, but it required all Paulinus's powers of persuasion to get him finally to adopt Christianity, and to give it his sanction as the religion of Northumbria. Ultimately, however, he convened a council of his nobles to ask their advice, and when they unanimously declared for the new religion, Coifi, the high priest, at once offered to destroy all the heathen places of worship throughout the land. This was done, and in 628 the Northumbrians flocked in crowds to be baptized by Paulinus. While the introduction of Christianity into Northumbria is the circumstance most worthy of mention in Edwin's reign, it was also remarkable in other respects. So strict was his administration of justice, that it was said that "a woman with her babe might walk scatheless from sea to sea in Edwin's day." He was also the first real Bretwalda, although Ælla, his father, first laid claim to the title. He compelled the submission of the West Saxons, conquered Anglesea and Man by his fleet, and received tribute from all the kingdoms south of the Humber, with the exception of Kent. To guard his northern dominion he erected the fortress of Edinburgh or Edwin's burgh. In 633 Penda, king of Mercia, taking advantage of a reaction that was setting in in favour of the old paganism, determined to resist Edwin's authority, and combining with Cadwallader, king of the

Western Britons, defeated and slew him at the battle of Heathfield.

See Palgrave's *History of the Anglo-Saxons*, and Green's *Short History of the English People*.

EDWY, Eadwig, or Edwin, surnamed the Fair, an Anglo-Saxon king, was the son of Edmund I., and succeeded his uncle, Edred, on the throne in 955, being then from 16 to 18 years of age. His immediate rule was limited to Wessex, his younger brother Edgar reigning over Mercia with the title of sub-king. On account of the relation in which Edwy stood to Dunstan, abbot of Glastonbury, it is impossible, from the narratives that have been transmitted to us, to arrive at any certainty as to the interpretation to be given to his character, and to the main facts of his reign. It is said that on the day of his coronation he retired early from the banquet to the apartment of Elgiva, whom he undoubtedly recognized as his wife, but who, according to the monks, was related to him within the prohibited degrees; and that Dunstan, abbot of Glastonbury, enraged at the affront thus put upon the church, followed him, and not without violence dragged him back to the banqueting hall. Either for this particular manifestation of authority, or because the king was opposed to his policy of substituting monks for secular canons and was unable to restrain his domineering spirit, Dunstan was deprived of his offices and banished from the kingdom. The Mercians, however, revolted, and, proclaiming Edgar sole king, recalled Dunstan to their dominions. It is said also that Odo, archbishop of Canterbury, instigated a plot for separating Elgiva from Edwin, that she was sent to Ireland where her face was disfigured with hot searing irons, and that on her escape to England she was again seized and put to death by torture at Gloucester; but the monks affirm that the lady who was subjected to this treatment was not Elgiva, but her mother Ethelgiva, who was also the mistress of the king. Edwy died in 958.

EECKHOUT, Gerbrand Van den (1621–1674), a painter, born at Amsterdam on the 19th of August 1621, entered early into the studio of Rembrandt. Though a companion pupil to F. Bol and Govaert Flinck, he was inferior to both in skill and in the extent of his practice; yet at an early period he assumed Rembrandt's manner with such success that his pictures were confounded with those of his master; and, even in our day, the Resurrection of the Daughter of Jairus, in the Berlin Museum, and the Presentation in the Temple, in the Gallery of Dresden, have been held to represent worthily the style of Rembrandt. As evidence of the fidelity of Eeckhout's imitation we may cite his Presentation in the Temple, at Berlin, which is executed after Rembrandt's print of 1630, and his Tobit with the Angel, at Brunswick, which is composed on the same background as Rembrandt's "Philosopher in Thought." Eeckhout not merely copies the subjects; he also takes the shapes, the figures, the Jewish dress, and the pictorial effects of his master. It is difficult to form an exact judgment of Eeckhout's qualities at the outset of his career. His earliest pieces are probably those in which he more faithfully reproduced Rembrandt's peculiarities. Exclusively his is a tinge of green in shadows marring the harmony of the work, a certain gaudiness of jarring tints, uniform surface, and a touch more quick than subtle. Besides the pictures already mentioned we should class amongst early productions on this account, the Woman taken in Adultery, in the Museum of Amsterdam; Anna presenting her Son to the High Priest, at the Louvre, the Epiphany, at Turin; and the Circumcision, at Cassel. Eeckhout matriculated early in the Guild of Amsterdam. A likeness of a lady at a dressing table with a string of beads, in possession of Mr Von Stummer, at Vienna, bears the date of 1643, and proves that the master at this time possessed more imitative skill than genuine mastery over nature. As he grew older he succeeded best in portraits, a very fair example of which is the historian Dappers (1669), in the Städel collection. Eeckhout occasionally varied his style so as to recall in later years the "small masters" of the Dutch school. Waagen justly draws attention to his following of Terburg in Gambling Soldiers, at Stafford House, and a Soldiers' Merrymaking, in the collection of the Marquis of Bute. A Sportsman with Hounds, probably executed in 1670, now in the Vander Hoo gallery, and a Group of Children with Goats (1671), in the Hermitage at St Petersburg, hardly exhibit a trace of the artist's first education. Amongst the best of Eeckhout's works Christ in the Temple (1662), at Munich, and the Haman and Mordecai of 1665, at Luton House, occupy a good place. Eeckhout died at Amsterdam on the 22nd of October, 1674.

EECLOO, the head town of a district in the province of East Flanders, Belgium, is situated near the Lieve, 11 miles N. W. of Ghent. It is a neat, clean, and well-built town, and possesses a variety of industries, among which are woollen and linen mills, manufactories of tobacco, chocolate, soap, and starch, breweries, and distilleries. It has also a considerable timber, grain, and cattle trade. Population in 1874, 10,200.

EEL, a name applied more or less generally to all the species of *Murænidæ*, a family of soft-finned apodal fishes, but more specially applicable to the species belonging to the sub-family *Anguillina*. The body throughout the family of eels is greatly elongated and of snake-like form. The ventral fins are awanting in all the species, while in certain forms, as the Muræna, the pectoral fins are also absent. The skin is thick and soft, and is covered over with a glutinous secretion which gives the eel its proverbial slipperiness. It is also sufficiently tough to enable it to be stripped entire from the body, and in some countries the skin is thus used as a bag or purse. Scales, disposed in groups, are present in the eels belonging to the genus *Anguilla*, but they are so buried beneath the outer layer or scarf skin as not to be apparent, while in such forms as the conger they are altogether awanting. The bronchial openings are small, and lead into a sac, from which another sac is given off. The gills are thus exposed but slightly to the drying influence of the atmosphere, and it is owing to this, and to the slimy condition of the skin, that eels can exist for a considerable time out of water. According to Dr Günther, the *Murænidæ* comprise 26 genera and 230 species, inhabiting the seas and fresh waters of temperate and tropical regions. Of these only the true eels, *Anguilla*, inhabit fresh water, although most of the latter are likewise marine.

Although abounding in almost every river, lake, and estuary in Europe, little was known until recently of the life-history of the fresh-water eels. With regard to their origin Aristotle believed that they sprang from the mud, Pliny that they took their rise from portions of the skin scraped off the parent body, while horse hairs and May-dew have both been regarded as fertile sources of eels. Until quite recently, they were regarded by naturalists as viviparous, a mistake which probably arose from the frequent presence of parasitic worms, supposed to be the young, in their bodies, and the absence of anything exactly resembling milt and roe as usually found. Like all other Teleostean fishes they are oviparous, the milt and roe occurring in the same position, but differing considerably in appearance from those elements in other fishes. The spawn of the eel is generally deposited in sand and mud at the mouths of rivers, and in harbours where the water is brackish. To reach these spawning grounds, eels migrate in autumn down the river channels, and at these times they are taken in large numbers by various devices, such as the "eel-buck" of the Thames, a wooden framework supporting wicker baskets, the mouths of which are opposed to the stream, and which are so constructed that the fish when once inside is unable to extricate itself. When there are obstacles in the way of their getting to the sea, eels are known to deposit their spawn in the beds of fresh-water streams, but it is still doubtful whether this may not also occur in cases where the sea is quite accessible. Eels are peculiarly averse to cold, and the fact that the temperature of the brackish waters of estuaries is always higher than that of unmixed salt or fresh water is an additional reason for their seaward migration on the approach of winter. In performing this journey the darkest nights are chosen, the moonlight being sufficient to stay their progress. During the cold of winter they lose their appetite and become torpid, large numbers of them congregating together for the sake of the additional warmth thus obtained, and burying themselves to a depth of 12 to 16 inches in places where the receding tide leaves them dry. In such places they are taken in large numbers by means of eel-spears. In Somersetshire, according to Yarrell, "the people know how to find the holes in the banks of the rivers in which eels are laid up, by the hoar frost not lying over them as it does elsewhere, and dig them out in heaps." In spring, the migration of the young eels up the rivers takes place, the parents, according to some observers, performing a similar ourney. This migration takes place from February to May, according to the temperature, and some idea of the vast numbers of young eels which annually pass up our rivers may be formed from the fact that 1800 of them, each about 3 inches long, have been observed to pass a given point on the Thames in a single minute. This monster procession of *elvers*, as these young eels are called, is known on the Thames as *eel-fare*, and usually takes place about the beginning of May; and at these times, unfortunately, they are often caught in countless numbers in sieves, especially on the Severn, cartloads of them being sometimes seen for sale in the Exeter market. This upward migration, unlike that of autumn, is performed entirely by day, and it is carried through in spite of obstacles apparently insuperable to a fish. Eels have been known to climb up steep ascents, 20 feet above the water, showing great skill and ingenuity in availing themselves of whatever natural aids the locality might afford. Couch tells of a remarkable case in the neighbourhood of Bristol, where the elvers passed from one stream to another by means of a tree which stood between, and the branches of which dipped into the water of the lower. Ascending by these, the eels dropped from the branches on the opposite side into the upper stream. In some parts of Ireland the fishermen place haybands on the rocky parts of the river-courses, in order to facilitate the upward progress of the eels. The most effectual obstacle, however, to their advance in either direction is found in a muddy or polluted state of the water; and old eels, to get rid of such nauseous conditions, have been known to leave the water and travel for considerable distances in search of purer surroundings. When confined also in ponds they often shew their migratory instinct by leaving these in the night time, and attempting to make their way to the nearest river or to the sea.

Like most animals that pass the winter in a torpid condition, eels are exceedingly voracious during the summer months, occasionally eating vegetables, but generally preferring such animal food as young fishes, worms, and the larvæ of insects; they have also been known to devour much larger creatures, as water-hens, rats, and snakes. Although their food is thus very various, it is essential that it be fresh, eels at once rejecting whatever their keen sense of smell detects as tainted. Eels were held in great esteem by the Greeks and Romans, and enormous prices were sometimes paid for them; by the Egyptians, on the other hand, they were held in abhorrence. Their snake-like appearance has had much to do with the prejudice entertained by many people against eels, and to this may be attributed the fact that in Scotland this valuable fish is almost wholly rejected as an article of food. Their value in this respect has, however, been recognized in England from very early times, the taste for eels having probably been acquired during the Roman occupation. The Venerable Bede states that England in his time was famous for its salmon and eel fisheries, and Ely is said to have got its name from the abundance of the eels in that fenny neighbourhood. Eels are very largely consumed in London, the greater proportion of these, numbering about 10 millions, being brought alive annually from Holland in welled boats. The greatest eel-breeding establishment in the world is that at Commachio on the Adriatic, where an immense swamp, bounded and fed by two of the mouths of the river Po, 140 miles in circumference, has been utilized for this purpose. The industry is very ancient, having yielded in the 16th century an annual revenue to the Roman Pontiffs, in whose territory it was, of £12,000. The eels are cooked at Commachio, and forwarded to the principal towns of Italy.

The best known and most widely distributed fresh-water species is the Sharp-nosed Eel (*Anguilla vulgaris*). It occurs, according to Dr Günther, in Europe to 64° 30′ N. lat., in the Mediterranean region, and in North America, but neither in the Danube, nor in the Black and Caspian Seas. Like all other eels it is of comparatively slow growth, but often attains a large size, measuring sometimes 5 feet in length, and weighing in such cases from 20 to 30 lb. Few eels, however, weigh more than 6 lb. They are believed to be long-lived, one authentic instance being known of an eel which was at least 31 years old. The colour of the species is generally dark olive-green on the upper surface, becoming lighter on the sides, and white beneath; but the colour depends somewhat on the nature of the stream it inhabits, those obtained in pure water being known as silver eels from the lightness of their colour, while those found in muddy rivers are darker.

The Conger (*Conger vulgaris*) is the only British species of sea-eel. It differs from the true eels in having the upper jaw projecting beyond the lower, and in the entire absence of scales. It is abundant in all parts of the British coasts, especially on rocky ground, and attains a length of 10 feet, weighing in large examples over 100 lb. The conger is exceedingly voracious, feeding on other fishes, and not sparing even its own kind. Its jaws are strong and well-armed, and the capture of a large specimen is not unattended with danger to the fisherman. Its tail is exceedingly sensitive and prehensile, the conger being able with this organ to grasp the gunwale of the boat, and by a sudden contraction of the muscles to throw itself overboard, a smart blow on the tail, however, is sufficient to prevent the possibility of this occurrence. The conger is peculiarly sensitive to cold, and during severe frosts it is often taken floating helplessly on the surface of the sea. Mr F. Buckland states that in 1855 thousands of congers were found floating upon the water; they could progress readily in any direction on the surface, but could not descend, and consequently fell an easy prey to the boatmen. In this way, no less than 80 tons were captured. "The action of the frost," he says, "caused the air in their swimming bladders to expand so much that the ordinary muscles could not expel it at will." The chief conger fisheries are on the south and west coasts of England, but these are not nearly so productive now as they formerly were. The flesh is not held in much esteem.

The Electric Eel (*Gymnotus electricus*) belongs to a different family of apodal fishes (*Gymnotidæ*). In it both caudal and dorsal fins are entirely awanting, and the anal fin is very long, forming a fringe from the throat to the extremity of the tail. It attains a length of 5 or 6 feet, and frequents the marshes of Brazil and the Guianas, where it is regarded with terror, owing to the formidable electrical apparatus with which it is provided, and which extends along each side of the lower portion of the tail. When this natural battery is discharged in a favourable position, it is sufficiently powerful to kill the largest animal; and, according to Humboldt, it has been found necessary to change the line of certain roads, owing to the number of horses that were annually killed in passing through the pools frequented by the gymnoti. These eels are eaten by the Indians, who, before attempting to capture them, seek to exhaust their electrical power by driving horses into the ponds. By repeated discharges upon these, they gradually expend this marvellous force; after which, being defenceless, they become timid, and approach the edge for shelter, when they fall an easy prey to the harpoon of the Indian. It is only after long rest and abundance of food, that this fish is able to resume the use of its subtle weapon. (J. GI.)

EFFIGIES, MONUMENTAL.—In the course of the twelfth century the idea appears, for the first time, to have been carried into effect that the figure of a deceased personage should be represented by effigy upon his monumental memorial. These earliest attempts at commemorative portraiture were executed in low relief upon coffin-lids of stone or purbeck marble, some portions of the designs for the most part being executed by means of incised lines, cut upon the raised figure. Gradually, with the increased size and the greater architectural dignity of monumental structures, effigies attained to a high rank as works of art, so that before the close of the 13th century, very noble examples of figures of this order are found to have been executed in full relief; and, about the same period, similar figures also began to be engraved, either upon monumental slabs of stone or marble, or upon plates of metal, which were affixed to the surfaces of slabs that were laid in the pavements of churches. Engraven plates of this class, known as "Brasses," continued in favour until the era of the Reformation, and in our own times their use has been revived. It seems probable that the introduction and the prevalence of flat engraven memorials, in place of commemorative effigies in relief, were due, in the first instance, to the inconvenience and obstruction resulting from increasing numbers of raised stones on the pavement of churches; while the comparatively small cost of engraven plates, their high artistic capabilities, and their durability combined to secure for them the popularity they unquestionably enjoyed. It will be kept in remembrance that, if considerably less numerous than contemporary incised slabs and engraven brasses, effigies sculptured in relief, and with some exceptions in full relief, continued for centuries to constitute the most important features in more than a few mediæval monuments. In the 13th century, it must be added, their origin being apparently derived from the endeavour to combine a monumental effigy with a monumental cross upon the same sepulchral stone, parts only of the human figure sometimes were represented, whether in sculpture or by incised lines, as the head or bust, and occasionally also the feet; in some of the early examples of this curious class the cross symbol is not introduced, and after a while half-length figures became common.

Except in very rare instances, that most important element which may be distinguished as genuine face-portraiture is not to be looked for, in even the finest sculptured effigies, earlier than about the middle of the 15th century. In works of the highest order of art, indeed, the memorials of personages of the most exalted rank, from an early period in their existence effigies may be considered occasionally to have been portraits properly so called; and yet even in such works as these an approximately correct general resemblance but too frequently appears to have been all that was contemplated or desired. At the same time, from the first, in these monumental effigies we possess contemporary examples of vestments, costume,[1] armour, weapons, royal and knightly insignia, and other personal appointments and accessories, in all of which accurate fidelity has been certainly observed with scrupulous care and minute exactness. Thus, since the monumental effigies of England are second to none in artistic merit, while they have been preserved in far greater numbers, and generally in better condition than in other countries, we may claim to possess in unbroken continuity an unrivalled series of original personal representations of the successive generations of our predecessors, very many of them being, in the most significant acceptation of that term, veritable contemporaneous portraits.

Till recently esteemed to be simply objects of antiquarian curiosity, and at no distant period either altogether disregarded or too often subjected to injurious indignity, the monumental effigies of England still await the formation of a just estimate of their true character and their consequent worth in their capacity as authorities for face-portraiture. In the original contract for the construction of the monument at Warwick to Richard Beauchamp, the fifth earl, who died in the year 1439, it is provided that an effigy of the deceased noble should be executed in gilt bronze, with all possible care, by the most skilful and experienced artists of the time; and the details of the armour and the ornaments of the figure are specified with minute particularity and precision. It is remarkable, however, that the effigy itself is described only in the general and decidedly indefinite terms—"an image of a man armed." There is no provision that the effigy should even be "an image" of the earl; and much less is there a single word said as to its being such a "counterfeit presentment" of the features and person of the living man, as the contemporaries of Shakespeare had learned to expect in what they would accept as true portraiture. The effigy, almost as perfect as when it left the sculptor's hands, still bears witness, as well to the conscientious care with which the conditions of the contract were fulfilled, as to the eminent ability of the artists employed. So complete is the representation of the armour, that this effigy might be considered actually to have been equipped in the earl's own favourite suit of the finest Milan steel. The cast of the figure also evidently was studied from what the earl had been when in life, and the countenance is sufficiently marked and endowed with the unmistakable attributes of personal character. Possibly such a resemblance may have been the highest aim in the image-making of the period, somewhat before the middle of the 15th century. Three quarters of a century later, a decided step further in advance towards the requirement of fidelity in true portraiture is shewn to have been taken, when, in his will (1510 A.D.), Henry VII. spoke of the effigies of himself and of his late queen, Elizabeth of York, to be executed for their monument, as "an image of our figure and another of hers." The existing effigies in the Beauchamp chapel and in Henry VII.'s chapel, with the passages just quoted from the will of the Tudor king and from the contract made by the executors of the Lancastrian earl, with remarkable significance illustrate the gradual development of the idea of true personal portraiture in monumental effigies, during the course of the 15th and at the commencement of the 16th century in England. A glance upwards naturally first rests on the royal effigies still preserved in this country, which commence in Worcester Cathedral with King John. This earliest example of a series of effigies of which the historical value has never yet been duly appreciated is rude as a work of art, and yet there is on it the impress of such individuality as demonstrates that the sculptor did his best to represent the king. Singularly fine as achievements of the art of the sculptor are the effigies of Henry III., Queen Alianore of Castile, and her ill-fated son Edward II., the two former in Westminster Abbey, the last in Gloucester Cathedral; and of their fidelity also as portraits no doubt can be entertained. In like manner, the effigies of Edward III. and his queen Philippa, and those of their grandson Richard II. and his first consort, Anne of Bohemia (all at Westminster), and of their other grandson, the Lancastrian Henry, whose greater might made his better right to Richard's throne, with his second consort, Joan of Navarre, at Canterbury—these all speak for themselves that they are true portraits. Next follow the effigies of Henry VII. and Elizabeth of York,—to be succeeded, and the royal series to be completed, by the effigies of Queen Elizabeth and the hapless Mary Stuart, all of them in Westminster Abbey. Very instructive would be a close comparison between the two last-named works and the painted portraits of the rival queens, especially in the case of Mary, whose pictures differ so remarkably from one another.

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[1] It is well-known that the costume of effigies, almost as a rule, represented what was actually worn by the remains of the person commemorated, when prepared for interment and when lying in state; and, in like manner, the aspect of the lifeless countenance, even if not designedly reproduced by mediæval "image" makers, may long have exercised a powerful influence upon their ideas of sculptured monumental portraiture.

As the 15th century advanced, the rank of the personage represented and the character of the art that distinguishes any effigy will go far to determine its portrait qualities. Still later, when more exact face-portraiture had become a recognized element, sculptors must be supposed to have aimed at the production of such similitude as their art would enable them to give to their works; and accordingly, when we compare effigies with painted portraits of the same personages, we find that they corroborate one another. The prevalence of portraiture in the effigies of the 16th and 17th centuries, when their art generally underwent a palpable decline, by no means raises all works of this class or indeed the majority of them, to the dignity of true portraits; on the contrary, in these effigies, as in those of earlier periods, it is the character of the art in each particular example that will go far to determine its merit, value, and authority as a portrait. In judging of these latter effigies, however, they must be estimated by the standard of art of their own era; and, as a general rule, the effigies that are the best as works of art in their own class are the best also and the most faithful in their portraiture. The earlier effigies, evidently produced in the great majority of instances without any express aim at exact portraiture, as we now employ that expression, have nevertheless strong claims upon our veneration. Often their sculpture is very noble; and even when they are rudest as works of art, there rarely fails to be a rough grandeur about them, as exhibited in the fine bold figure of Fair Rosamond's son, Earl William of the Long Sword, which reposes in such dignified serenity in his own cathedral at Salisbury. These effigies may not bring us closely face to face with the more remote generations of our ancestors, but they do place before us true images of what the men and women of those generations were.

Observant students of monumental effigies assuredly will not fail to appreciate the singular felicity with which the mediæval sculptors adjusted their compositions to the recumbent position in which their "images" necessarily had to be placed. Equally worthy of regard is the manner in which not a few monumental effigies, and particularly those of comparatively early date, are found to have assumed an aspect neither living nor lifeless, and yet impressively life-like. The sound judgment also, and the good taste of those early sculptors, were signally exemplified in their excluding, almost without an exception, the more extravagant fashions in the costume of their era from their monumental sculpture, and introducing only the simpler but not less characteristic styles of dress and appointments. In all representations of monumental effigies, it must be kept in remembrance that they represent recumbent figures, and that the accessories of the effigies themselves have been adjusted to that position. With rare exceptions, when they appear resting on one side, these effigies lie on their backs, and as a general rule (except in the case of episcopal figures represented in the act of benediction, or of princes and warriors who sometimes hold a sceptre or a sword) their hands are uplifted and conjoined as in supplication. The crossed-legged attitude of numerous armed effigies of the era of mail-armour has been supposed to imply the personages so represented to have been crusaders or Knights of the Temple; but in either case the supposition is unfounded, and inconsistent with unquestionable facts. Much beautiful feeling is conveyed by figures of ministering angels being introduced as in the act of supporting and smoothing the pillows or cushions that are placed, in very many instances to give support to the heads of the recumbent effigies. The animals at the feet of these effigies, which frequently have an heraldic significance, enabled the sculptors, with equal propriety and effectiveness, to overcome one of the special difficulties inseparable from the recumbent position. In conclusion, it remains only to remark upon the masterly treatment of outline composition which so honourably distinguishes the earlier examples of the engraven effigies in monumental brasses. (C. B.)

EGBERT, or Ecgberht, king of the West Saxons, was born about 775, and laid claim to the throne in 786, but Brihtric was elected, and he was compelled to take refuge with Offa, king of Mercia. Although Offa refused to surrender him when requested by Brihtric, he declined to give him further protection. Egbert thereupon fled to France, and took up his residence at the court of Charlemagne; and it is doubtless to the training he received from that great general and statesman that the success of his reign in Wessex is in a large measure to be traced. When Brihtric was poisoned by his queen Edbrugha in 800, Egbert was recalled and ascended the West Saxon throne. From his reign may be dated the supremacy of the West Saxon kings in England. In 823 he defeated Beornwulf, king of Mercia, at Ellandun (near Wilton); and in the same year he united Kent, Essex, and Sussex to his crown, and compelled East Anglia to acknowledge him as its over-lord. In 827 he compelled the submission of Mercia, and leading an army into Northumbria received its submission without trial of battle. In 828 he conquered Wales, and thus the isle of Britain, with the exception of the Picts, the Scots, and the Strathclyde Welsh, acknowledged a West Saxon king as its over-lord. During the last period of his reign his kingdom was subjected to repeated attacks by the Danes. In 832 they ravaged Sheppey, and in 833 defeated Egbert at Carrum (thought by some to be Charmouth, in Devon), but in 835 he gained a great victory over a united force of Danes and Welsh at Hengestesdun, in Cornwall. He died in 836.

EGEDE, Hans (1686–1758), the first missionary of Greenland, was born in the vogtship of Senjen, in Norway, on the 31st January 1686. In his 22d year he became pastor at Waagen, in the bishopric of Drontheim, but the study of the chronicles of the northmen having awakened in him the desire to visit the colony of northmen in Greenland, and to convert them to Christianity, he resigned his charge in 1717; and having, after great difficulty, obtained the sanction and help of the Danish Government in his enterprise, he set sail with three ships from Bergen on the 3d May 1721, accompanied by his wife and children. He landed on the west coast of Greenland on the 3d July, but found to his dismay that the northmen were entirely superseded by the Esquimaux, in whom he had no particular interest, and whose language he would be able to master, if at all, only after years of study. But, though compelled to endure for some years great privations, and at one time to see the result of his labours almost annihilated by the ravages of small-pox, he remained resolutely at his post. He soon gained the affections of the people, and succeeded gradually in converting many of them to Christianity, and in establishing a considerable commerce with Denmark. Ill-health compelling him to return home in 1734, he was made principal of the seminary at Copenhagen, in which workers were trained for the Greenland mission; and from 1740 to 1747 he was superintendent of the mission. He died in 1758. He is the author of a book on the natural history of Greenland.

EGEDE, Paul (1708–1789), son of the preceding, accompanied his father to Greenland, assisted him in his labours there, and acted as his successor from 1734 to 1740. On his return to Denmark he became professor of theology in the mission seminary, and afterwards was superintendent of the Greenland mission. He published a Greenland-Danish-Latin Dictionary (1750), Greenland Grammar (1760), and Greenland Catechism (1756). In 1766 he completed the translation, begun by his father, of the New Testament into the Greenland tongue; and in 1787 he translated Thomas à Kempis. In 1789 he published a journal of his life in Greenland.

EGER, the chief town of a circle in the kingdom of Bohemia, is situated on the river Eger, and lies at the foot of one of the spurs of the Fichtelgebirge. It possesses an upper gymnasium and a real-school. In the townhouse, which at that time was the burgomaster's house, Wallenstein was murdered, 25th February 1634. His sword and writing table are exhibited in the town. Among the industries of Eger are the manufacture of cloth of various sorts, hats, and shoes. Population in 1869, 13,390.

Previous to the middle of the 12th century Eger and the Egergau formed an allodial possession of the counts of Vohburg; but they were added to the imperial domains on the marriage of Adelheid of Vohburg with Frederick I. After being repeatedly transferred from the one power to the other, according to the preponderance of Bohemia or the empire, the town and territory were finally incorporated with Bohemia in 1350, after the Bohemian king became the emperor Charles IV. Several imperial privileges, however, continued to be enjoyed by the town till 1849. It suffered severely during the Hussite war, during the Swedish invasion in 1631 and 1647, and in the War of the Austrian Succession in 1742. (See Gruber, *Die Kaysersburg zu Eger*, 1865; Drivok, *Aeltere Geschichte der Deutschen Reichstadt Eger und des Reichsgebietes Egerland*, 1874.)

EGG, the name given to the body formed in the female reproductive organs, which, when impregnated by the male element, gives origin to the young of animals. Although differing widely among themselves in form and structure, the eggs of all animals are found to consist of the same essential parts, viz., the germ cell, the yolk, and the yolk membrane, one chief difference between them consisting in the relative quantity of the yolk element present, this apparently depending on the degree of development which the young attain before leaving the egg. Thus birds, which leave the shell in a highly developed state, have in their eggs a large quantity of yolk, besides the albumen or "white," which is added to the egg before it receives the outer calcareous covering and which, along with the yolk, serves as a storehouse of food for the young chick during the process of incubation. In insects, on the other hand, which leave the egg in the immature condition of larvæ, the yolk is comparatively small, as it is also in mammals, whose eggs or ova are exceedingly minute, and which owe the high development they attain before birth to nourishment drawn directly from the parent. The majority of animals are *oviparous*,—that is, the eggs leave the body of the female and are hatched outside; a few are *ovo-viviparous*, the eggs being retained in the oviduct until the young are ready to leave; while mammals are *viviparous*, the young, after leaving the egg, attaining considerable development before birth, in the womb of the female. In oviparous animals the egg, within certain limits, is proportional in size to that of the adult form to which it gives origin; the larger the bird, for example, the larger, as a rule, is the egg. This, however, is not without exceptions; thus the egg of the guillemot is as large as that of the eagle, and ten times larger than that of the raven, although guillemot and raven are of nearly equal size.

Owing to the fluid nature of the contents of eggs, they are generally roundish in form, although in this respect they also offer considerable variety; thus the eggs of owls and of turtles are nearly spherical, those of ducks, crocodiles, and snakes oval, and those of most sea-fowl pear-shaped. The external covering is generally more or less smooth, as in the eggs of birds, but in the case of insects they exhibit the most varied markings, being covered with spines, tubercles, and pits, often symmetrically arranged. Considerable diversity also exists in the composition of the outer covering of the egg in oviparous animals; in snakes and lizards it consists of a parchment-like membrane not unlike the inner coating of a hen's egg; in birds, turtles, and crocodiles, there is a hard calcareous shell; in cartilaginous fishes, as sharks and rays, the egg in passing through the oviduct is imbedded in a four-sided horny case, from the corners of which tendrils are given off, by which the egg-capsule is moored to floating sea-weed. These, after the escape of the young fish, are often cast upon the shore, where they are familiarly known as "mermaids' purses." The external covering of the eggs of osseous fishes, as salmon and trout, is exceedingly tough and elastic, "rebounding," says Mr Frank Buckland, "from the floor like an india-rubber ball;" and this no doubt prevents them from being crushed in the gravelly beds of the running streams in which they are deposited. The eggs of frogs and toads are surrounded with a tough layer of albuminous substance, which expands in water into a transparent jelly. The eggs of the frog occur in great masses, piled together like miniature cannon balls, while those of the toad are connected together so as to resemble strings of beads. Among many molluscous animals the eggs are provided with an additional covering or *nidus*, consisting of a leathery pouch or cup, containing a large number of eggs. These capsules are either attached singly, by little stalks, to the rocks as in the common purpura (*Purpura lapillus*), or are extruded in a compound mass as in the whelk (*Buccinum undatum*). Those of the latter were named by Ellis "sea wash balls," from being used by the sailors instead of soap to wash their hands, and are common objects on the sea-shore. The greatest variety exists in the number of eggs produced by different animals, and even among forms allied to each other. Thus the common snail produces only from thirty to fifty eggs at a time, while other mollusks, as the whelk, deposit their spawn in tens of thousands. Among insects, the white ant is pre-eminently prolific, the queen being said to lay about sixty eggs in a minute, or upwards of 80,000 in a day, and as this probably continues for two years, it is estimated that the total number of her eggs amounts to fifty millions. Among mollusks the spawn of s it is called, in a single mature oyster, numbers 000. Among vertebrate animals, fish are the most ; the eggs or roe, as they are called, however, often get fertilized by the *milt* of the male, and great ties are also eaten by fishes and crustaceans, so that lo not increase so rapidly as might be supposed from ormous number of their eggs. Thus in trout and there are over a thousand eggs to every pound of weight. According to Buckland (*Fish Culture*) a weighing ¾ ℔ was found to contain 480,480 eggs; a g weighing ½ ℔, 19,840; a turbot of 8 ℔ weight, 00; and a cod of 20 ℔, 4,872,000. Large quantities roe of the cod are used in France as food, and also as the sardine fishery. The sturgeon is also exceed- prolific, the eggs usually forming one-third of the weight of the creature; and in Russia these, in a pre- form known as *caviare*, are much esteemed as a table cy. The number of eggs in reptiles and birds is com- vely small, the common English snake depositing 16 of these in such situations as dung-hills, where they ft to be hatched by the heat generated in the decom- mass. The crocodile buries about 25 eggs on the y banks of the rivers it frequents, and the turtle the ocean to deposit from 150 to 200 on the of such oceanic islands as Ascension. The eggs of ocodile are considered a luxury by the natives along nks of the Nile, while those of the turtle are regarded cial delicacies by people of more refined tastes. Of the most prolific in eggs are those domesticated forms have been carefully selected by man for centuries, view to the improvement of their egg-laying capacity. hief of these are the duck, which lays an egg daily the season extending from March to July, and the loor fowl, which produces annually about 120 eggs. earing of the latter for egg-producing purposes has ecome an important industry in France and Belgium, a customs' return just issued (July 1877) it is that eggs were imported into Britain last year to the of 753 millions, valued at £2,620,000. The number creased 41 per cent. since 1872, and it is now nearly times what it was in 1856. Besides these, the eggs of rkey, the guinea fowl, the partridge, and other gallinace- rds are in great request as articles of food. The eggs guillemot are also occasionally offered for sale in our ts, while these and the eggs of other species of sea- orm an important article of food among the western s and along the north-western sea-coast of Scotland. argest eggs are those produced by the emu and the h, a single ostrich egg weighing as much as three dozen f the barn-door fowl. These are eaten in Africa both e natives and by Europeans. From two to five female hes are said to deposit their eggs (10 in number) in est, and the natives by removing, during the absence female, a few of these at a time, taking care not to them with their fingers, but using sticks to prevent aint of their presence being left behind, get them to ue depositing eggs for a considerable time to supply ace of those removed. The shells are used through- frica as drinking-cups. The egg of the moa, some nens of which have been found buried in New Zealand, ch larger than that of the ostrich, measuring in one nen 10 inches in length and 7 inches broad. A still egg has been found fossil in Madagascar, the produce extinct æpiornis, and having a capacity equal to that 3 eggs of the common fowl.

Hewitson, *Coloured Illustrations of the Eggs of British Birds*, d ed., London, 1856; C. F. Morris, *A Natural History of the nd Eggs of Birds*, 3 vols., London; Lefèvre, *Atlas des œufs eaux d'Europe*, 8vo, Paris, 1845; Brewer, *North American* , 4to, Washington, 1859; Bädeker, *Die Eier der Europä- Vögel*, Leipsic, 1863. (J. GI.)

EGG, Augustus Leopold (1816–1863), a painter, was born on 2d May 1816, in Piccadilly, London, where his father carried on business as a gun-maker. He had some schooling at Bexley, and was not at first intended for the artistic profession; but, developing a faculty in this line, he entered in 1834 the drawing class of Mr Sass, and in 1835 the school of the Royal Academy. His first exhibited picture appeared in 1837 at the Suffolk Street Gallery. In 1838 he began exhibiting in the Academy, his subject being a Spanish Girl; altogether he sent twenty-seven works to this institution. In 1848 he became an associate, and in 1860 a full member, of the Academy. In 1857 he took a leading part in selecting and arranging the modern paintings in the Art-Treasures Exhibition in Manchester. His constitution being naturally frail, he went in 1853, with Dickens and Wilkie Collins, to Italy for a short trip, and in 1863 he visited Algeria. Here he benefited so far as his chronic lung-disease was concerned; but, riding out one day exposed to a cold wind, he caught an attack of asthma, which cut him off on 26th March 1863, at Algiers, near which city his remains were buried.

Egg was a gifted and well-trained painter of *genre*, chiefly in the way of historical anecdote, or of compositions from the poets and novelists. As years progressed, he developed in seriousness of subject-matter and of artistic treatment; and at the time of his death he might be ranked among our best painters in his particular class—clever, skilled, and observant—although he had not any marked originality of point of view or of style. Among his principal pictures may be named:—1843, the Introduction of Sir Piercie Shafton and Halbert Glendinning (from Scott's *Monastery*); 1846, Buckingham Rebuffed; 1848, Queen Elizabeth discovers she is no longer young; 1850, Peter the Great sees Catharine for the first time; 1854, Charles I. raising the Standard at Nottingham (a study); 1855, the Life and Death of Buckingham; 1857 and 1858, two subjects from Thackeray's *Esmond*; 1858, Past and Present, a triple picture of a faithless wife; 1859, the Night before Naseby; 1860, his last exhibited work, the Dinner Scene from *The Taming of the Shrew*. The National Gallery contains one of his earlier pictures, Patricio entertaining two Ladies, from the Diable Boiteux; it was painted in 1844.

Egg was rather below the middle height, with dark hair and a handsome well-formed face; the head of Peter the Great (in the picture of Peter and Catharine, which may be regarded as his best work, along with the Life and Death of Buckingham) was studied, but of course considerably modified, from his own countenance. He was manly, kind-hearted, pleasant, and very genial and serviceable among brother-artists; social and companionable, but holding mainly aloof from fashionable circles. As an actor he had uncommon talent. He appeared among Dickens's company of amateurs, in 1852 in Lord Lytton's comedy *Not so Bad as we Seem*, and afterwards in Wilkie Collins's *Frozen Deep*. playing the humorous part of Job Want.

EGINHARD is best known as the biographer of Charlemagne. His name is variously spelled in manuscripts. Einhardus, Einhartus, Ainhardus, Heinhardus, are the earliest forms. In the 10th century it was altered into Agenardus, and out of this form arose Eginardus and Eginhardus. The French and English languages have adopted this later form; but it is unquestionably wrong, and the weight of authority is for Einhardus or Einhartus. The circumstances of his life are involved in considerable obscurity, owing partly to the want of information and partly to the doubtfulness or indefiniteness of our authorities. According to the statement of Walafridus Strabo, a contemporary, he was born in the district which is watered by the river Maine in the modern duchy of Hesse-

Darmstadt. Teulet has disputed the genuineness of the document in which the statement is contained, because "it exists only in one manuscript of the 15th century, and it contains an evident anachronism." The anachronism, however, is a mistake on the part of Teulet, for he understands by "pedagogium Sancti Bonifacii" a school taught by St Boniface, whereas it plainly means a school in the monastery of St Boniface, as Jaffé takes it. The date of his birth can only be conjectured, but it must be somewhere about the year 770 A.D. His parents were noble, and probably their names were Einhart and Engilfrit. He was educated at the monastery of Fulda. There is documentary evidence that he was resident in that place in the years 788 and 791. Owing to his intelligence and ability he was transferred from the monastery by its abbot Baugolfus to the palace, where he became intimate with the emperor and his family, and received commissions of great trust and importance. His removal to the palace took place not later than 796.

He was entrusted by the emperor with the charge of public buildings. He thus became one of the imperial ministers, and resided with the emperor at Aix-la-Chapelle. In reference to his artistic skill he received the Scripture name of *Beseleel* (Exod. xxxi. 2*ff*, and xxxv. 30*ff*), according to a fashion then prevalent of giving ancient names to contemporaries. Some suppose that he constructed the basilica at Aix-la-Chapelle and the other buildings mentioned in chapter xvii. of his *Life of Charlemagne*, but there is no express statement to that effect. The emperor employed him in 806 as legate to Rome to obtain the Pope's signature to a will which he had made in regard to the division of his empire. Hence the inference has been drawn that he was the emperor's secretary; but no contemporary ascribes this office to him.

It was owing to Eginhard's influence that in 813 Charlemagne made his son Louis partner in the empire. Louis, on becoming sole emperor, proved grateful to Eginhard, retained him in the office of head of public works, made him tutor to his son Lothaire in 817, and showed him every mark of respect.

Eginhard married Imma, a noble lady, a sister of Bernharius, who was bishop of Worms and abbot of the monastery of Wizenburg. Later tradition converted Imma into the daughter of Charlemagne, and invented a romantic story in regard to the marriage of Eginhard and Imma.[1] It is doubtful whether he had any offspring. Eginhard addresses a letter to a person called Vussin, whom he styles "fili," "mi nate." These expressions and the tenderness of the language almost compel the belief that Vussin was his son; but as Vussin is never mentioned in several deeds in which his interests would have been concerned, and in which the names of Eginhard and Imma appear, some have supposed that Vussin was merely a spiritual son.

On January 11, 815, Louis bestowed on Eginhard and his wife the domains of Michelstadt and Mulinheim in the Odenwald on the Maine. In the document conveying this property to him he is simply called Einhardus, but in a document of June 2, 815, he is called abbot. In becoming abbot he did not dismiss his wife. After this period we find him at the head of several monasteries, Blandigny of Ghent, Fontenelle in the diocese of Rouen, St Bavon of Ghent, St Servais of Maestricht, and St Cloud (but not the St Cloud near Paris), and he had also charge of the church of St John the Baptist at Pavia.

Eginhard began to grow tired of the intrigues and troubles of court life, and in 830 finally withdrew to Mulinheim, which he named Seligenstadt, where he had erected a church to which he had transported the relics of St Marcellinus and St Peter. His wife helped him in all his efforts, and her death in 836 caused him bitter grief. The emperor Louis visited him in his retreat the same year, probably to console him, but Eginhard did not long survive his wife, for he died March 14, 840.

Eginhard was a man of culture. He had reaped the benefits of the revival of education brought about by Charlemagne, and was on intimate terms with Alcuin. He was well versed in Latin literature, and knew Greek. He was very small in body, a feature on which Alcuin wrote an epigram. His most famous work is his *Vita Caroli Magni*, written in imitation of the *Lives* of Suetonius. It is the most reliable account of Charlemagne that we have, and a work of some artistic merit. It was written soon after the death of the great emperor. It was very popular in the Middle Ages. Pertz collated upwards of sixty MSS. for his edition.

The other works of Eginhard are—(1) *Annales Francorum*, extending from 741 A.D. to 829 A.D.; some doubt their authenticity, without good reason, (2) *Epistolæ*, handed down only in one MS., now at Laon and of considerable importance for the history of the times, (3) *Historia Translationis Beatorum Christi Martyrum Marcellini et Petri*, written in 830, and giving a curious narrative of how the bones of the martyrs were stolen and conveyed to Seligenstadt, and what miracles they wrought. To this is added a poem on the same subject. A treatise written by him, *De Adoranda Cruce*, has not come down to us.

The literature on Eginhard is very extensive, almost all who deal with Charlemagne, early German literature, and early French literature treating of him. The fullest and best accounts are given by Teulet and Jaffé in their editions.

The modern editions of Eginhard's works are by Pertz in vols. i. and ii. of his *Monumenta Germaniæ Historica*, Hanover, 1826-1829; Teulet, *Einhardi omnia quæ extant Opera*, Paris, 1840; Migne, *Patrologiæ Latinæ, tom.* 104, Paris, 1866 (the *Life of Charlemagne* is in vol. 97); and Philip Jaffé in vol. iv. of his *Bibliotheca Rerum Germanicarum*, Berlin, 1867. Teulet's is the handiest and most complete edition, and he deserves special praise in connexion with the letters. Pertz and Jaffé published the *Life of Charlemagne* separately for the use of schools. Teulet gives a full account of all previous editions, of the MSS., and of translations. Some of the other editions contain bibliographical references. A translation of the *Life of Charlemagne* has appeared in English by W. Glaister, London, 1877 (J. D.)

EGLANTINE (E. Frisian, *egeltiere*; French, *aiglantier*), a name for the sweet-brier, *Rosa rubiginosa*, and for *R. lutea*, another species of Lindley's tribe of *Rosæ Rubiginosæ*, and apparently the *R. Eglanteria* of Linnæus. The signification of the word seems to be thorn-tree or thorn-bush, the first two syllables probably representing the Anglo-Saxon *egla*, *egle*, a prick or thorn, while the termination is the Dutch *tere*, *taere*, a tree (see Wedgwood, *Dict. Eng. Etymology*). Eglantine is frequently alluded to in the writings of English poets, from Chaucer downwards. Milton, in *L'Allegro*, l. 48, is thought by the term "twisted eglantine" to denote the honeysuckle.

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[1] The story of his courtship, although apocryphal, deserves to be noticed, as it frequently appears in literature. He is said to have made a practice of visiting the emperor's daughter secretly by night. On one of these occasions a fall of snow occurred which made it impossible for him to walk away without leaving footprints that would have led to his detection. The risk was obviated by an expedient of Emma, who carried her lover across the court-yard of the palace on her back. The scene was witnessed from a window by Charlemagne, who related it next morning to his counsellors and asked their advice. The severest punishments were suggested for the clandestine lover, but Charlemagne rewarded the devotion of the pair by consenting to their marriage. The story is inherently improbable, and it is further discredited by the fact that Eginhard himself does not mention Emma among the number of Charlemagne's children, and that a story similar in its details has been told of a daughter of the emperor Henry III.

EGLINTON, ARCHIBALD WILLIAM MONTGOMERIE, THIRTEENTH EARL OF (1812–1861), lord lieutenant of Ireland, was born at Palermo, September 29, 1812. He was the grandson of Hugh, the twelfth earl, and only son of Archibald, Lord Montgomerie, who at the time of his son's birth held a diplomatic post in Sicily. He was only in his eighth year when he succeeded to the title and estates on the death of his grandfather, in December 1819. The young earl was educated at Eton College; and for some time his chief object of interest was the turf. He had a large racing stud, and won success and a reputation in the sporting world. In 1839 his name became more widely known in connection with a tournament which he projected, and which was held at his seat in August of that year. At this attempted revival of mediæval pageantry, one of the knights was Prince Louis Napoleon, afterwards emperor of the French. The earl of Eglinton was a staunch adherent of the Conservative party, and, on the formation of the first Derby administration in February 1852, he was called from his comparative retirement to fill the office of lord lieutenant of Ireland. He retired with the ministry in the following December, having by the manliness of his character, his affability, and his princely hospitality made himself one of the most popular of Irish viceroys. On the return of the earl of Derby to office in February 1858, the earl of Eglinton was again appointed lord lieutenant, and discharged the duties of this post till June 1859. Before his second retirement he was created earl of Winton in the peerage of the United Kingdom. He had been elected in 1852 lord rector of Glasgow University. The earl was twice married; first, in 1841, to Theresa, widow of Captain R. H. Cockerell, R.N., by whom he had four children. The countess died in December 1853; and in 1858 the earl married the Lady Adela Capel, only daughter of the earl of Essex. He lost his second wife in December 1860, and died suddenly himself at St Andrews, October 1, 1861. He was succeeded in the earldom by his eldest son, Archibald William, Lord Montgomerie.

EGMONT (EGMOND), LAMORAL, COUNT OF, Prince of Gavre (1522–1568), was born in Hainault in 1522. He was the younger of the two sons of John IV., count of Egmont, by his wife Francisca, princess of Gavre, and succeeded to the title and estates on the death of his elder brother Karl, about 1541. In this year he served his apprenticeship as a soldier in the expedition of the emperor Charles V. to Algiers, distinguishing himself in command of a body of cavalry. In 1545 he married Sabina of Bavaria, sister of the Elector Palatine, and the wedding was celebrated with great pomp at Spiers in the presence of the emperor. Soon afterwards Egmont was invested with the order of the Golden Fleece. He accompanied the emperor in the various campaigns and progresses of the following years, was with him at the unsuccessful siege of Metz (1553), and in 1554 was sent to England as head of an embassy to seek the hand of Queen Mary for Philip (II.) of Spain. He was present at their marriage solemnized shortly after at Winchester. In the summer of 1557 Count Egmont was appointed commander of the Spanish cavalry in the war with France; and it was by his vehement persuasion that the battle of St Quentin was fought. The victory was determined by the brilliant charge which he led against the French. The reputation which he won at St Quentin was raised still higher in 1558, when he encountered the French army under De Thermes at Gravelines, on its march homewards after the invasion of Flanders, totally defeated it, and took Marshal de Thermes and many officers of high rank prisoners. The battle was fought against the advice of the duke of Alva, and the victory made Alva Egmont's enemy. But the count now became the idol of his countrymen, who looked upon him as the saviour of Flanders from devastation by the French. He was nominated by Philip stadtholder of the provinces of Flanders and Artois. At the conclusion of the war by the treaty of Cateau Cambrésis, Egmont was one of the four hostages selected by the king of France as pledges for its execution. As stadtholder he now showed some sympathy with the popular discontent excited by the Spanish Government, and particularly by Cardinal Granvella, minister to the regent Margaret. As a member of the council of state he joined the prince of Orange in a vigorous protest addressed to Philip (1561) against the proceedings of the minister; and two years later he again protested in conjunction with the prince of Orange and Count Horn. He was invited by Philip to go to Spain to confer with him on the subject of the remonstrance, but he declined. Egmont, however, who was a strict Catholic, afterwards spoke in less hostile terms of the minister; and, at the same time that he was courting the favour of the middle classes, he was becoming more a favourite at the court of the regent. In January 1565 he accepted a special mission to Spain to make known to Philip to some extent the state of affairs in the Netherlands and the demands of the people. At Madrid the king gave him an ostentatiously cordial reception, and all the courtiers vied with each other in lavishing professions of respect upon him. But earnest discussion of the real object of the mission was evaded by the king, and Egmont had to return to the Netherlands loaded only with fine words of flattery and promise. At the very same time instructions were sent to the regent to abate nothing of the severity of persecution, and the Inquisition was re-established. Egmont was indignant, and the people were in a state of frenzied excitement. In 1566 a confederation of the nobles (*Les Gueux*) was formed, the document constituting it being known as the Compromise. Egmont then withdrew to his government of Flanders, and showed himself, after some vacillation, an unscrupulous supporter of the Spaniards and fierce persecutor of heretics. In the summer of 1567 the duke of Alva with an army of veterans arrived in the Netherlands, to supersede the regent Margaret, and to crush with the strong hand the popular opposition. One of his first acts was the treacherous seizure of Counts Egmont and Horn, who were imprisoned at Ghent. A sham process was begun against them, and after some months they were removed to Brussels, where sentence was pronounced by Alva himself on the 4th June 1568. Egmont was declared guilty of high treason and condemned to death. It was in vain that the most earnest intercessions had been made in his behalf by the emperor Charles V., the order of the Golden Fleece, the states of Brabant, the electors of the empire, and the regent herself. Vain, too, was the pathetic pleading of Egmont's wife, who with her eleven children was reduced to want, and had taken refuge in a convent. Egmont was beheaded at Brussels the day after the sentence was pronounced, June 5. He met his end with calm resignation; and in the storm of terror and exasperation to which this tragedy gave rise Egmont's failings were forgotten, and he and his fellow victim to Spanish tyranny were glorified in the popular imagination as martyrs of Flemish freedom. This memorable episode proved to be the prelude to the famous revolt of the Netherlands, the issue of which was independence. Goethe made it the theme of a tragedy. In 1865 a monument to Counts Egmont and Horn, by Fraiken, was erected at Brussels.

Full details may be found in Bercht's *Geschichte des Grafen Egmont* (1810); Clouet's *Éloge historique du Comte d'Egmont* (1825); Prescott's *History of Philip II.* (1855–59); Motley's *Rise of the Dutch Republic* (1856); and Juste's *Le Comte d'Egmont et le Comte de Hornes* (1862).

EGRET. See HERON.

EGYPT

EGYPT is a country at the north-eastern extremity of Africa, bounded on the N. by the Mediterranean Sea, on the S. by Nubia, on the E. by Palestine, Arabia, and the Red Sea, and on the W. by the Great Desert.

The name of Egypt in hieroglyphics is Kem, which becomes Kemi in demotic, a form preserved in the Coptic ⲕⲏⲙⲉ (Sahidic), ⲕⲏⲙⲓ (Bashmuric), and ϫⲏⲙⲓ (Memphitic), with unimportant variants. The sense is "the black (land)," Egypt being so called from the blackness of its cultivable soil.[1]

In Hebrew Egypt is called Mizraim, מִצְרַיִם, a dual, sometimes used as a singular.[2] It describes the country with reference to its two great natural divisions, Upper Egypt and Lower Egypt, or the Delta. In the prophets Mazor, מָצוֹר, occurs as the singular form, and means Lower Egypt, Pathros being used for Upper Egypt.[3] Thus Mizraim may be compared to the two Sicilies, though sometimes we find Mizraim for the lower country where we should expect Mazor. (Gesen. *Thes. s. v.* Mizraim.) The meaning of Mazor is probably the "fortified," rather than the "border," referring to the natural strength of the country.

The Greek Αἴγυπτος first occurs in the Homeric writings. In the *Odyssey* it is the name of the Nile (masculine) as well as of the country (feminine). Afterwards it is not used for the river. No satisfactory Egyptian[4] or Semitic origin has been proposed for it. The probable origin is the Sanskrit root gup, "to guard," whence may have been formed âgupta, "guarded about," a similar sense to Mazor.[5]

The Hebrew Mazor is preserved in the Arabic Misr, مِصر, pronounced Masr in the vulgar dialect of Egypt. It occurs in the Korán as the name of Egypt (xliii. 50), but has been applied to the country and to its chief capitals since the Arab conquest, El-Fustát, now called Masr-el-'Ateekah, or Old Masr, and El-Káhireh, the Cairo of the Europeans.[6]

By the Greeks and Romans Egypt was usually assigned to Asia, though some gave it to Libya, or Africa. This difference was owing to the adoption of the Nile as the division of the two continents, which would naturally have given half of the country to each continent.

In ancient times Egypt was the country watered by the Nile north of the First Cataract, the deserts on either side being assigned to Arabia and Libya.[7] The Egyptian name, "the black land," is only applicable to the cultivable land. The Misr of the Arabs is distinctly restricted to the same territory, the adjoining deserts being called the deserts of Egypt. Physically, ethnographically, and politically, the two tracts are markedly different, but it is now usual to treat them as a single country.

PHYSICAL GEOGRAPHY, PRODUCTIONS, AND INHABITANTS.

The political advantages of Egypt, in situation, natural strength, and resources, can hardly be overrated. It lies in the very route of the trade between Europe and Asia, and that between Africa and the other two continents. It is the gate of Africa, and the fort which commands the way from Europe to the East Indies. The natural ports on the Red Sea and the Mediterranean, selected and improved by the wisdom of Alexander and the Ptolemies, whose enterprises have been eclipsed by those of M. de Lesseps in our own days, have always been enough for its commerce, which the great inland water-way of the Nile has greatly aided. The inhabited country, guarded by deserts and intersected in Lower Egypt by branches of the Nile and canals, in Upper Egypt closely hemmed in by the mountains on either side, is difficult to reach and to traverse; at the same time its extreme fertility makes it independent of supplies from other lands, and thus easier to defend. The ancient wealth and power of Egypt should occasion us no wonder, nor even that the country still prospers in spite of centuries of Turkish misrule.

"The extent of the cultivated land in Egypt [Mr. Lane calculates] to be equal to rather more than one square degree and a half; in other words, 5500 square geographical miles. This is less than half the extent of the land which is comprised within the confines of the desert; for many parts within the limits of the cultivable land are too high to be inundated, and consequently are not cultivated; and other parts, particularly in Lower Egypt, are occupied by lakes, or marshes, or drifted sand. Allowance also must be made for the space which is occupied by towns and villages, the river, canals, &c. Lower Egypt comprises about the same extent of cultivated land as the whole of Upper Egypt."[8] Since the date when this was written,

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[1] *Cf.* Plut. *De Iside et Osiride*, cap. 33. Dr Brugsch objects to the idea that Kem may be connected with the biblical patriarchal name Ham חָם (forming part of poetic names of Egypt in the Psalms:—"the land of Ham," cv. 23, 27, cvi. 22; "the tents of Ham," lxxviii. 51), on the ground that it is philologically difficult to connect the Egyptian K with ח (*Geogr. Inschr.*, i. p. 74, note *). This objection would be valid were the case one of a Semitic word transcribed in ancient Egyptian; it is not so where we have a root which is common, as this may be, to both (*cf.* Bunsen's *Egypt's Place*, v. 757, 758). The meaning of the Hebrew root חָם is "hot, warm." The Arabic root حَمِمَ signifies "it became hot," and describes blackness as a result of heat; and the word حَمْأَة "black mud" also occurs.

[2] The use of Mizraim as the proper name of an individual appears to be as early as the time of Rameses II. Mázrima occurs as the name of a Hittite, the brother of the king (Brugsch, *Geogr. Inschr.*, ii. 25, pl. xviii. 77). The Hebrew dual form is similarly transcribed in Mâhanemâ, Mahanaim (ii. 61, pl. xxiv. 22), a word not actually dual, and the Aramaic dual also in Neharina, the Hebrew Naharaim (i. pl. ix. 333).

[3] Pathros may take its name from the Pathyrite Nome, so called from its metropolis, P-hat-har (Brugsch, *Geogr. Inschr.*, i. 188, 189, pl. xxvii. 839). As this nome contained Thebes, it might have a signification like Thebais. De Rougé prefers p-to-res, "the country of the south," or Upper Egypt. (*Six Premières Dynasties*, *Mém. de l'Inst.*, xxv. ii. 231)

[4] Dr Brugsch has conjecturally identified Αἴγυπτος with Ha-ke-ptah, the sacred name of Memphis, from which the westernmost branch of the Nile, the Canobic, with its two mouths, the Canobic and the Bolbitine, those best known to the early Greeks, seem to have been called (*Geogr. Inschr.*, i. 83).

[5] The apparent relation of Αἴγυπτος to αἰγυπιός, a vulture, might seem to suggest a mythological origin for the proper name. M. Pictet has, however, most ingeniously traced both to gup, to guard, though his supposition that the name originally was connected with the Shepherd rule in Egypt must be regarded as hazardous (*Origines Indo-Européennes*, i. 459, *seq.*). It is better to consider it a translation of Mazor, as Νεῖλος of Shihor.

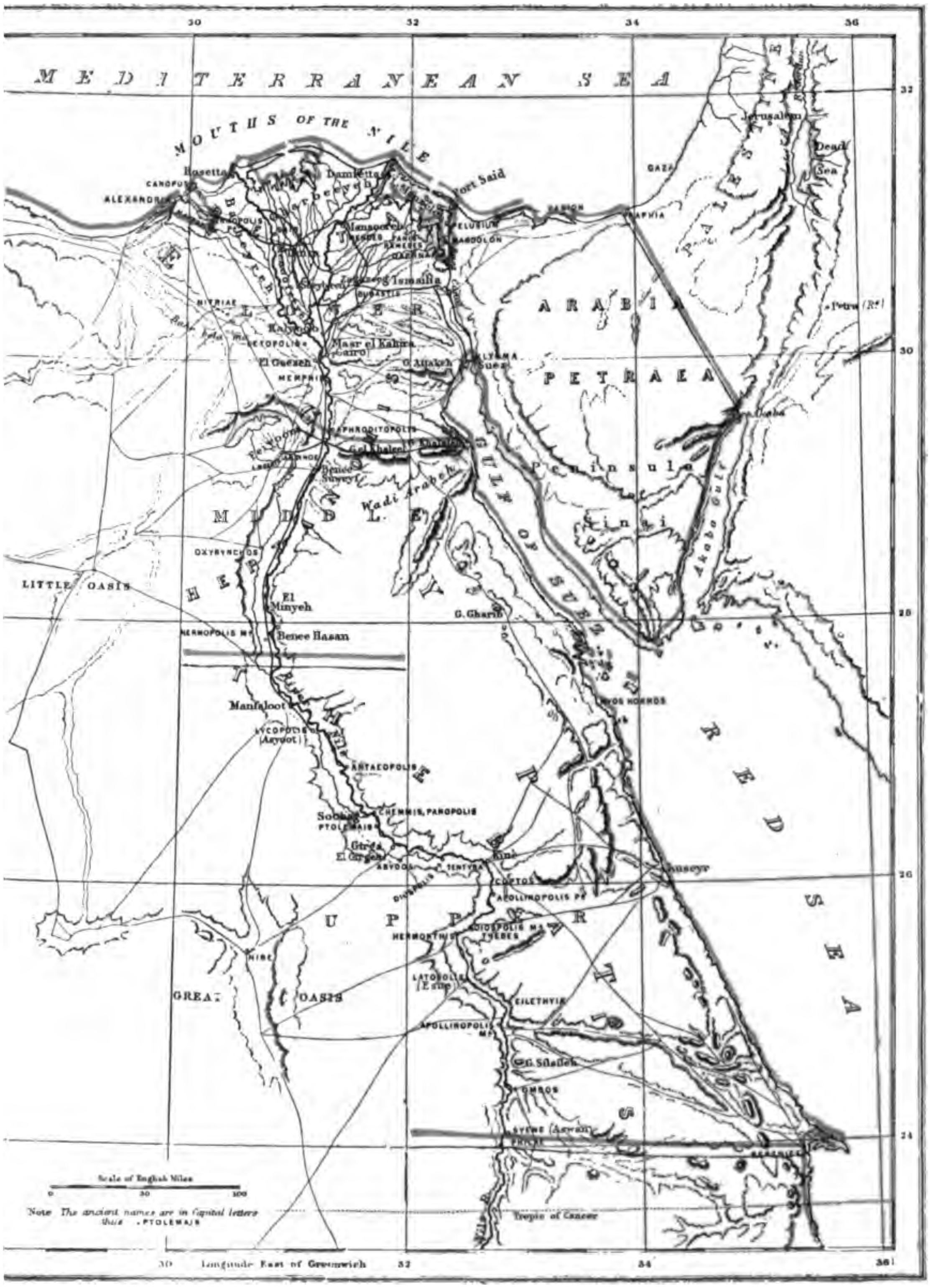
[6] In the Arabic lexicons مِصْر is placed under the root مَصَّرَ which in the second conjugation has the sense "he built cities," "he commanded a city should be a capital;" but we also find مَصْر "red mud," the term used meaning both red and reddish brown.

[7] Probably the oldest southern boundary was at Silsilis, near Gebel es-Silsileh.

[8] Mrs Poole, *Englishwoman in Egypt*, i. 85, 86. Mr Lane "made his calculation from a list of all the towns and villages in Egypt, and the extent of cultivated land belonging to each. This list is appended to De

EGYPT

PLATE VI.



ɔxtent of cultivated land has increased. This :hiefly due to works of irrigation in Lower increased cultivation of cotton, and the greater transport. The increase cannot, however, be

:.—The ancient like the modern Egyptians ɜ natural division of the country into two tracts, ɔf Upper Egypt and the plain of Lower Egypt. in hieroglyphics are to-res, the "south land" with the article prefixed, p-to-res, to Pathros by ;é), and to-mehit, the "north land." The two ɜd by the southern boundaries of the highest Lower Egypt, the Memphite and Heliopolite, ıe political boundary was somewhat south of the ıere the valley extends into the plain. The ern nome of Upper Egypt was called that of l began at Silsilis. The Greek and Roman :ludes the Memphite Nome from Lower Egypt.

; known at what date Egypt was first divided ɔvinces called Nomes. They are noticed in in-ɔf Dynasty IV. (Brugsch, *Geogr. Inschr.*, i. 93), symbol occurs in the name of Hesp-ti, "the ," fifth king of Dynasty I., Manetho's Usa-The hieroglyphic name is hesp. In late in-the term (p-)tesh occurs, which is also the m. and the origin of the Coptic (*Id.* i. 94, 95). r of nomes is somewhat different in the various ɾptian lists, all of which, except fragments, are co-Roman age. Probably the number varied at nes. Dr Brugsch conjectures the true number -two, considering the forty-two judges of the *ıl*, ch. 125) as called from the chief towns of m to a great tribunal (*Geogr. Inschr.*, i. 99), hinks represents the earthly court described by iculus (i. 75.)—(*Geogr. Inschr.*, i. 124.)

ɪs a double system of names for the nomes,— usual in hieroglyphics, and the vulgar, taken pitals, and preserved in Greek in transcriptions ions. In consequence of this double system cation of the hieroglyphic names with those of and Romans is not always certain. This is the ɾer Egypt, where the form of the country makes determine the exact geographical relation in-any order. On account of this difficulty, and ɜ hieroglyphic names are of inferior importance raphy of Egypt, they are not here given. (See *eogr. Inschr.*, i. 93, *seqq.*)

reeks and Romans Egypt was divided into the ɾer country, and the Thebaïs or upper country. ɪivision, the so-called Middle Egypt, first occurs as the Seven Nomes, Ἑπτὰ νομοί, or Heptanomis, Ἑπτανομία. This new division, and the transfer of the Memphite Nome from Lower Egypt to the Heptanomis, are the chief innovations, for the fanciful divisions of Lower Egypt in Ptolemy are no doubt theoretical.

The following list of the nomes is taken from Parthey's *Vocabularium Coptico-Latinum*, compared with the same author's *Erdkunde des alten Aegyptens*, Berl. Akad., 1858. The authorities are Herodotus, Agatharchides, Strabo, Pliny, Ptolemy, the coins of the nomes struck under Trajan, Hadrian, and Antoninus Pius, the last indicated by the abbreviation Nu., and other sources. The letters L., H., and T. indicate Lower Egypt, the Heptanomis, and the Thebaïs, as the divisions to which nomes thus designated are known to belong.

L. Alexandria, Ἀλεξανδρέων χώρας νομός, Ptol. Nu.
L. Andropolites, Ἀνδροπολίτης, Ptol., formerly Gynæcopolites.
H. Antæopolites, Ἀνταιοπολίτης, Plin. Ptol. Nu.
H. Antinoites, Ἀντινοΐτης, Ptol.
L. Anysius, Ἀνύσιος, Her.
H. Aphroditopolites Hept., Ἀφροδιτοπολίτης τῶν Ἑπτὰ Νομῶν, Strab. Ptol. Nu.
T. Aphroditopolites Theb., Ἀφροδιτοπολίτης τῆς Θηβαΐδος, Plin. Ptol.
L. Aphthites, Ἀφθίτης, Her.
T. Apollopolites, Plin., Ἀπολλωνοπολίτης, Nu.
L. Arabicus, Plin., Ἀραβίας νομός, Ptol. Nu.
Arsinoitæ duo, Ἀρσινοῖται δύο, Strab. Plin. Ptol. Nu.
L. Arsinoites Æg. inf., Plin., the same as Heroopolites, Plin.
H. Arsinoites Hept., Ἀρσινοΐτης, Strab. Nu., the same as Crocodilopolites, Plin.
L. Athribites, Ἀθριβίτης, Her. Strab. Ptol. Nu.; Atharrabites, Plin.
L. Bubastites, Βουβαστίτης, Her. Strab. Plin. Ptol. Nu.
L. Busirites, Βουσιρίτης, Her. Strab. Plin. Ptol. Nu.
L. Cabasites, Καβασίτης, Plin. Ptol. Nu.
T. Chemmites, Χεμμίτης, Her., later Panopolites, Plin. Ptol. Nu.
T. Coptites, Κοπτίτης, Plin. Ptol. Nu.
H. Crocodilopolites, Plin., the same as Arsinoites Hept., Strab. Nu.
H. Cynopolites, Κυνοπολίτης, Strab. Plin. Ptol. Nu.
T. Diospolites Magnus, Διοσπολίτης Μέγας, Nu.
T. Diospolites, Plin., Διοσπολίτης, Ptol. Nu.
L. Gynæcopolites, Γυναικοπολίτης, Strab. Plin. Nu. later Andropolites?
Hammoniacus, Plin., the same as Oasites?
L. Heliopolites, Ἡλιοπολίτης, Strab. Plin. Ptol. Nu.
Heptacometis (?), Ἑπτακωμ—, Nu.
H. Heracleopolites, Plin., Ἡρακλεοπολίτης, Agatharch. Ptol. Nu., Ἡρακλεώτης, Ἡρακλεωτικός, Strab.
T. Hermouthites, Ἑρμωνθίτης, Plin. Ptol. Nu.
H. Hermopolites, Ἑρμοπολίτης, Plin. Ptol. Nu., Ἑρμουπολίτης, Agatharch.
L. Heroopolites, Plin., the same as Arsinoites Æg. inf.
T. Hypselites, Ὑψηλίτης, Ptol. Nu.
T. Latopolites, Λατοπολίτης, Plin. Nu.
L. Leontopolites, Λεοντοπολίτης, Strab. Plin. Ptol. Nu.
L. Letopolites, Λητοπολίτης, Strab. Ptol. Nu.
L. Libyæ, Λιβύης νομός, Ptol.
T. Lycopolites, Λυκοπολίτης, Agatharch. Plin. Ptol. Nu.
L. Mareotis, Plin., Μαρεώτου νομός, Ptol. Nu.
Marmaricæ, Μαρμαρικῆς νομός, Ptol.
H. Memphites, Μεμφίτης, Plin. Ptol. Nu.
L. Mendesius, Μενδήσιος, Her. Strab. Plin. Ptol. Nu.
L. Menelaites, Μενελαΐτης, Strab. Plin. Ptol. Nu.
L. Metelites, Μετηλίτης, Plin. Ptol. Nu.
L. Momemphites, Μωμεμφίτης, Strab.
L. Myecphorites, Μυεκφορίτης, Her.
L. Natho, Ναθῶ, Her., the same as Neut, Ptol. Nu.?
L. Naucratites, Plin. Nu.
L. Neut, Νεούτ, Ptol. Nu., the same as Natho, Her.?
Nitriotes, Νιτριώτης, Strab.
Oasitæ duo, Ὀασῖται δύο, Plin. Ptol. See Hammoniacus, Plin.
T. Ombites, Plin., Ὀμβίτης, Nu.
L. Onuphites, Ὀνουφίτης, Her. Plin. Ptol. Nu.
H. Oxyrynchites, Ὀξυρυγχίτης, Agatharch. Strab. Plin. Ptol. Nu.
T. Panopolites, Πανοπολίτης, Plin. Ptol. Nu., the same as Chemmites, Her.
L. Papremites, Παπρημίτης, Her.
T. Pathyrites, Παθυρίτης τῆς Θηβαΐδος. Papyr. Anast., the same as Phaturites, Plin.?
L. Pelusiacus? Nu.
Pemptites, Πεμπτίτης, Steph. Byz., the same as Phthemphu?
T. Perithebæ, Περιθῆβαι, the same as Thebarum nomus, or its eastern part (Peyron, *Pap. Taurin.* i. 51).
L. Phagroriopolites, Φαγρωριοπολίτης, Strab.

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llatif. It was made in the year of the Flight 777 (A.D. ɔrding the census of 715, A.D. 1315–6], and may be rather an the reverse. The estimate of M. Mengin (*Histoire de* 42–344) shows that in 1821 the extent of the cultivated h less; but since that period considerable tracts of waste rendered fertile" (*Englishwoman in Egypt*, i. 85, note). In *n de l'Égypte* there is an excellent memoir on the super-country by Col. Jacotin, who computes the space which or can water or fertilize, including its bed, north of the at 9582·39 square geographical miles, of which but in a state of cultivation or fit for cultivation. The space · cultivation was found by M. Estève to be 5469·86 but it is stated that 2735·07 more may have been ıvable, of which much might be reclaimed. *Description* ɾviii. ii. 101, *seqq.* The close agreement of Mr Lane's Col. Jacotin's shows that the bases of both were accurate, ɔnce from M. Mengin's may be explained by the disasters d the establishment of Mehemet Ali as pasha.

ɔugé has already noticed the possibly commemorative two other not much later royal names, ..akau and *x Prem. Dyn.*, 243, 244), and this may therefore perhaps he same kind.

L. Pharbæthites, Φαρβαιθίτης, Her. Strab. Plin. Ptol. Nu.
Phaturites, Plin., the same as Pathyrites?
L. Phthemphu, Φθεμφουθι, Plin. Ptol. Nu.
L. Phtheneu, Nu., Ptenethu, Plin., Φθενότου, Ptol.
L. Phylace vel Schedia, Φυλακή, Σχεδία, Agatharch. See Menelaites.
L. Prosopites, Προσωπίτης, Her. Strab. Plin. Ptol. Nu.
L. Ptenethu, Plin. See Phtheneu. ab,
L. Saites, Σαΐτης, Σαϊτικός, Her. Strab. Plin. Ptol. Nu.
L. Schedia, Agatharch. See Phylace.
L. Sebennytæ duo, Σεβεννύτης ἄνω τόπων, Σεβεννύτης κάτω τόπων, Ptol.; Sebennytes, Her. Strab. Plin. Nu.
L. Sethroites, Σεθρωίτης, Strab. Plin. Ptol. Nu.
L. Tanites, Τανίτης, Her. Strab. Plin. Ptol. Nu.
T. Tenthyrites, Tentyrites, Τενθυρίτης, Agatharch. Plin. Ptol. Τεντυρίτης, Nu.
L. Thebanus, Θηβαῖος, Her.
T. Thebarum, Θηβῶν νομός, Ptol., Θηβαικός, Her. See Perithebæ.
T. Thinites, Θινίτης, Plin. Ptol. Nu.
L. Thmuites, Θμουίτης, Her.
L. Xoites, Ξοΐτης, Plin. Ptol. Nu.

It is very remarkable that the Arsinoïte Nome of the Heptanomis does not appear in the hieroglyphic lists, because Sebek, the crocodile-headed divinity there worshipped was, at least in later times, disliked in most parts of Egypt (Brugsch, *Hist.*, 2 ed., 109, 107).

The *Notitia Dignitatum*, composed under Theodosius II., A.D. 408–450, gives a new a division of Egypt into four provinces—Ægyptus, Augustamnica, Arcadia, and Thebais. Roughly the first comprised all Lower Egypt except the part east of the Delta, which was assigned to the second, and Arcadia appears to have succeeded the Heptanomis (Parthey, *Erdkunde*, 518, taf. vii.)

About the time of Justinian I. this division is found to be further developed, according to the statements of Hierocles. Egypt contained six eparchies:—1. Egypt Proper, Αἰγυπτιακή, the west of Lower Egypt to the Sebennytic branch of the Nile; 2. The First Augusta, Αὐγουστα α', the north-eastern part of Lower Egypt to the Syrian border; 3. The Second Augusta, Αὐγουστα β', the territory southward of the First Augusta; 4. Arcadia, 'Αρκαδία, the earlier Heptanomis; 5. The Nearer Thebais, Θηβαὶς ἡ ἔγγιστα, extending to Panos, or Panopolis, and including the Great Oasis; 6. The Upper Thebais, Θηβαὶς ἡ ἄνω, as far as Philæ. The division into nomes had evidently been almost effaced at this time (*Id.* 520, taf. ix.).

The Copts preserved the oldest division of the country, and called Lower Egypt, the Northern Region, ⲉⲙϩⲓⲧ (Mem.), ⲙϩⲓⲧ, &c. (Sah.), Upper Egypt, the Southern Region, ⲣⲏⲥ (Mem.), ⲙⲁⲣⲏⲥ (Sah.) The names of the nomes were also known to them, and are given by Champollion in *L'Égypte sous les Pharaons.*

Like the Copts, the Arabs generally know of but two divisions, the names of which are such as the people of the desert would naturally give to the country watered by the Nile. Lower Egypt is called Er-Reef, the cultivated, or fertile, and Upper Egypt, Es-Sa'eed, the happy, or fortunate.

Under the Memlook sultans of the Bahree dynasty, as we learn from the list appended to De Sacy's *Abd Allatif*, referring to A.H. 715 (A.D. 1315–6), the provinces of Egypt were less numerous than the ancient nomes. They are for Lower Egypt—the territory of Cairo and the provinces of Kalyoob, the Sharkeeyeh, the Dakahleeyeh, Ed-Dimyát, the Gharbeeyeh, Menoof, Abyar and Benee-Nasr, the Boheyreh, Fooweh, Nesterawiyeh, Alexandria, and El-Geezeh; and for Upper Egypt—the provinces of Atfeeh, the Feiyoom, Behnesè, Ashmooneyn, Manfaloot, Asyoot, Akhmeem, and Koos. At the time of the French occupation the provinces had been reduced in number to sixteen, and the division of the Middle Provinces introduced, thus reviving the Heptanomis. The Northern Provinces, El-Akaleem el-Bahreeyeh, were the Gharbeeyeh, that of Er-Rasheed, the Boheyreh, that of El-Mansoorah, the Menoofeeyeh, that of Ed-Dimyát, the Sharkeeyeh, the Kalyoobeeyeh, and that of El-Geezeh. The Middle Provinces, El-Akaleem el-Wustaneeyeh, were that of Atfeeh, the Feiyoom, and those of Benee-Suweyf or Behnesè, and of El-Minyeh or Ashmooneyn.[1] The Southern Provinces, El-Akaleem el-Kibleeyeh, were those of Asyoot, Girgeh, and Kinè. There is no doubt that these provinces sometimes correspond to the ancient nomes, though generally composed of the territories of more than one. (*Cf.* Jomard in *Descr. de l'Égypte*, 2d ed. ix. 594, 595.) By Mehemet Ali a new division was formed into districts governed by a mudeer, of which Lower Egypt, including a small portion of the Middle Provinces, contained four, and the rest of Egypt three. At the present time Egypt is divided into fifteen provinces, each governed by a mudeer.

I. Lower Egypt—		
1. Boheyreh	chief town,	Demenhoor.
2. El-Geezeh	„	El-Geezeh.
3. Kalyoobeeyeh	„	K. 'vooh.
4. Sharkeeyeh	„	Zagazeeg.
5. Menoofeeyeh	„	Sheybeen.
6. Gharbeeyeh	„	Tantah.
7. Dakahleeyeh	„	Mansoorah.
II. Middle Egypt—		
1. Benee-Suweyf and Feiyoom	„	Benee-Suweyf.
2. El-Minyeh and Benee-Mazar (double province)	„	El-Minyeh.
III. Upper Egypt—		
1. Asyoot	„	Asyoot.
2. Girgeh	„	Soohág.
3. Kinè and Kuseyr (double province)	„	Kinè.
4. Isnè	„	Isnè.

*—Edmond (*L'Égypte*, 269, 270).

It will be readily understood that much confusion prevails as to the divisions of the country, more especially at times when an arbitrary administrative division has been used side by side with a popular one, depending upon what nature and artificial aids, such as canals and dikes, have done to map out the country.

The general appearance of Egypt is remarkably uniform. The Delta is a level plain richly cultivated, and varied alone by the lofty dark-brown mounds of ancient cities, and the villages in groves of palm-trees, standing on mounds often if not always ancient. We sometimes see groves of palm-trees besides those around the villages, but other trees are, except in some parts, rare. In Upper Egypt the valley is in as rich a state of cultivation, but very narrow and bounded by mountains of no great height which hem it in. They form the edge of the desert on either side of the valley, which has been cut through a rocky table-land by the river. They rarely take the form of peaks. Sometimes they approach the river in bold promontories and at others are divided by valleys with the beds of torrents which flow only at very long intervals. The bright green of the fields, the reddish-brown or dull green of the great river, and the tender tints of the bare yellow rocks, beneath the deep blue sky, always form a beautiful view. In form the landscape varies little and is not remarkable; in colour its qualities are always splendid, and under a general uniformity show continual variety.

Climate.—The climate of Egypt, being remarkably equable, is healthy to those who can bear great heat, and who avoid the unwholesome tracts of the country, such as the northern coast, where there are extensive salt-marshes. Upper Egypt is healthier than Lower Egypt. The least healthy time of the year is the latter part of autumn, when the inundated soil is drying. In the desert, at a very short distance from the cultivable land, the climate is uniformly dry and unvaryingly healthy. Egypt, however, is unsuitable as a permanent residence to Europeans who do not greatly modify their mode of life;[1] and it is almost impossible to rear European children there; but if they arrive after the age of ten or a little more they do not usually feel its ill effects.[2] As a resort for invalids Egypt cannot be recommended without caution. Persons suffering from asthma and bronchitis are likely to gain benefit from a Nile-voyage, unless the season is unusually cold. The climate of the desert does not in all cases suit them, the small particles of sand which are inhaled increasing the irritation. The desert air is undoubtedly good for consumption, and a wise plan is to encamp near Cairo, or still better to find some kind of house within the limits of the desert; and there are ancient sepulchral grottoes at Thebes and other sites which afford excellent quarters for any one who will take the pains to build a court and a few rooms in front of them. A Nile-voyage cannot be so safely recommended. The climate on the river itself is more changeable than elsewhere, and often in winter far colder than is good for delicacy of the lungs. No one should visit Egypt in the winter without heavy as well as light clothing.

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[1] M. Jomard states that the older appellations were used for the two provinces of Benee-Suweyf and El-Minyeh, though these towns had succeeded the earlier chief places after which the provinces were named. – *Descr. de l'Égypte*, ix. 594

The atmosphere is remarkably dry and clear, except on the sea-coast; and even the humidity which is the consequence of the spreading of the inundation is scarcely felt but by its rendering the heat more oppressive. Sometimes a white fog, very dense and cold, rises from the river in the morning, but it is of rare occurrence and short duration. The heat is extreme during a great part of the year, but it is chiefly felt when accompanied by the hot winds of spring and the sultry calm of the season of the inundation. The winter is often comparatively severe in its cold, especially as the domestic architecture is intended to protect rather from heat than cold. "The general height of the thermometer in the depth of winter in Lower Egypt, in the afternoon and in the shade is from 50° to 60°; in the hottest season it is from 90° to 100°, and about 10° higher in the southern parts of Upper Egypt" (*Mod. Eg.*, Introd.)

On the coast of the Mediterranean rain is frequent, but in other parts of Egypt very unusual. At Cairo there is generally one heavy storm in the winter, and a shower or two besides, the frequency of rain having increased since the growth of Ibrahim Pasha's plantations between the city and the river. At Thebes a storm occurs but once in about four years, and light rain almost as rarely.

The wind most frequently blows from the N.W., N., or N.E., but particularly from the first direction. The proportionate prevalence of these winds to those from all the other quarters, in the year, is about 8 to 3; but to those from the S., S E., and S.W., about 6 to 1. (Clot-Bey, *Aperçu Général sur l'Égypte*, i. p. 30.) The northerly winds are the famous Etesian winds of Herodotus (ii. 20), which enable boats constantly to ascend the Nile against its strong and rapid current, whereas in descending the river they depend on the force of the stream, the main-yard being lowered. These winds also cool the temperature during the summer months. The southerly winds are often very violent, and in the spring and summer, especially in April and May, hot sand-winds sometimes blow from the south, greatly raising the temperature, and causing especial suffering to Europeans. The famous Simoom, properly called Samoom,[3] is a much more violent hot sand-wind, which is more usual in the desert than in the cultivated tracts, but in either occurring only at long intervals. It is a kind of hurricane, most painful to experience, and injurious in its effects. (*Englishwoman in Egypt*, i. 96, 97.) The zóbá'ah is a common but remarkable phenomenon. It is a very lofty whirlwind of sand resembling a pillar, which moves with great velocity. Mr Lane measured some with a sextant, and found them to be between 500 and 700 feet in height, and one to have an altitude of 750 feet. When crossing the Nile a zóbá'ah frequently capsizes any boat which may be in its way, and of which the main-sheet is tied by the carelessness of the boatmen instead of being held. (*Id., loc. cit.; Modern Egyptians*, chap. x.) It may be mentioned that a sudden gust of wind from a valley in the mountains is equally dangerous when the sheet is tied, and a third danger is the attempt to move during a southerly gale, when the long shallow Nile-boat is easily caught broadside and capsized.

One of the most interesting phenomena of Egypt is the mirage, which is frequently seen both in the desert and in the waste tracts of uncultivated land near the Mediterranean; and it is often so truthful in its appearance that one finds it difficult to admit the illusion.

Diseases.—Notwithstanding the fineness of the climate, the stranger who visits Egypt is struck by the signs which he sees everywhere of the prevalence of many serious diseases, and in the first half of this century he might have witnessed the effects of a great epidemic of the plague or the cholera. Yet he should remember the poverty of the great mass of the inhabitants and the insufficiency of their food (both due to the selfish rapacity of the Government), the insufficient training of the native medical practitioners, the false system of many of the foreigners established in the country, and the reluctance of the natives to take medical advice. Ophthalmia when neglected is frequently followed by blindness, and dysentery in the same circumstances is very often fatal.

The plague has been the greatest scourge of Egypt. We cannot tell whether the pestilences mentioned by Manetho as having occurred in the reign of one of the most ancient kings were the same as the modern plague; it seems, however, to be alluded to in the Bible as peculiarly Egyptian (Zech. xiv. 18). In 1835 there was an epidemic of plague of extreme severity, during which there died in Cairo a number of the inhabitants equal to the whole adult male population (*Modern Egyptians*, Introduction). The last occurrence of the disease was in 1843, when the mortality was comparatively insignificant. The immunity which Egypt has enjoyed for more than thirty years, in which interval there would ordinarily have been several plagues, has been attributed to the sanitary measures of the Egyptian Government, and no doubt these may have somewhat contributed to this result. It should, however, be remembered that the plague is always imported into Egypt, and that there have been no severe epidemics of undoubted plague elsewhere in the period.

This disease has usually first appeared in the east and south coasts of the Mediterranean, and part of the north coast, and when epidemic seems to pursue a similar course to the cholera in advancing steadily from place to place. In Egypt it usually appears first at Alexandria in the winter or spring, and if the earliest cases occur towards the close of the year, one may be sure of a plague of great severity and long continuance. At first the cases are generally few, but they gradually increase, and in the hottest weather attain their maximum. The disease is not long in travelling from Alexandria to Cairo, but it rarely ascends much higher up the river, and has seldom been known at Thebes in modern times. Many medical writers have denied the contagious character of the plague, in particular Clot-Bey, a French physician, who was long chief medical officer of the Egyptian Government, and who published a treatise on the subject (Clot-Bey, *De la Peste*); yet the evidence on the other side is too strong to be rebutted. An epidemic of plague is greatly to be dreaded in the present circumstances of Egypt. Rapid communications would readily bring the disease to Europe, and the interests of commerce would stand in the way of the reasonable precaution of quarantine. It is stated that the plague is endemic in the marshes of Chaldæa. Surely it would be well if the European Governments were to appoint a commission for the investigation of the disease and to ascertain what, if any, is the value of the sanitary measures of the Turkish Government.

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[1] Beer, wine, and all alcohol should be very sparingly used, and little meat eaten in the hot season.

[2] One resident at Alexandria adopted with success the method of sending her children to sea as soon as any weakness showed itself.

[3] Of the term samoom Mr Lane writes, "In the present day it is commonly applied to a violent and intensely-hot wind, generally occurring in the spring or summer, in Egypt and the Egyptian deserts usually proceeding from the south-east or south-south-east, gradually darkening the air to a deep purple hue, whether or not (according to the nature of the tract over which it blows) accompanied by clouds of dust or sand, and at length entirely concealing the sun; but seldom lasting more than about a quarter of an hour or twenty minutes." —*Arabic Lexicon*, s.v., pt. iv. 1420.

Dysentery is an extremely common malady, and causes very large mortality. It may usually be traced to a careless course of diet, and especially to eating uncooked vegetables, unripe fruit, or other unwholesome food, and to drinking brackish water. Mr Lane has published a mode of treatment which has been attended with extraordinary success (*Modern Egyptians*, App. E. of all later editions). Asiatic cholera visited Egypt in its westward course on the first two occasions of its appearance in Europe. According to the Government returns, which were probably below the truth, nearly 200,000 persons perished from the disease in all Egypt during the great cholera of 1848. It is remarkable that after each of these great epidemics the disease appeared a second time, but with far less destructive results. Among the diseases most dreaded by the European residents is liver-complaint. Those who abstain from alcoholic drinks, or use them with extreme moderation, escape the complaint altogether, or suffer from it in a comparatively mild form. Hemorrhoids and herniæ are among the commonest maladies. Skin diseases have been at all times very prevalent in Egypt. Leprosy is now well known, but not common, unlike elephantiasis, which in more than one form has numerous victims. Small-pox was formerly very severe, but it has been checked in its virulence by vaccination. The so-called guinea-worm occurs, but it is perhaps not indigenous.

Of the diseases of the eye, ophthalmia is the most formidable, from its prevalence and malignant character; yet perhaps no malady more readily yields to treatment if promptly used. Where the predisposition exists, a slight cause, such as the irritation occasioned by a grain of dust or sand, is enough to produce an inflammation, which, if not checked, inflicts a lasting injury if it does not produce blindness. For this disease Mr Lane has published a very efficacious mode of treatment (*Mod. Eg.*, App. E).

Clot-Bey affirms that pulmonary consumption is extremely rare among the native inhabitants (*Aperçu*, ii. 372), yet another physician asserted (but not in print) that he had met with not a few cases in a short practice. Asthma and bronchitis are among the common disorders. The occurrence of *coup-de-soleil* is not unusual, but it is rarely attended with fatal results, probably on account of the sobriety of the people. Madness is common, generally in the form of idiocy. Maniacs alone are confined; idiots are regarded with much respect as saints, and it is probable that some persons feign idiocy to become objects of popular veneration, supported by alms. One of the Memlook sultans, Kaláoon, following the example of Saladin (*Abulfedæ Annales*, ed. Reiske, iv. 30, 31) founded a madhouse, or máristán, at Cairo, which was still used thirty years ago (*Englishwoman in Egypt*, i. 166). Its inmates were subsequently transferred to a modern hospital. Nervous affections are uncommon, probably owing to the calm life which the inhabitants lead. Rheumatism is of more usual occurrence; but, according to Clot-Bey, gout is unknown (*Aperçu*, ii. 377). It is well worthy of notice that, although ownerless dogs are very common in Cairo and the other towns, and watch-dogs are kept by the villagers, canine madness and hydrophobia are unknown; but Clot-Bey is probably in error when he says that rabies has never been observed in Egypt (*id.* ii. 78), for the Coptic prayer-books contain a prayer to be used for a person suffering from hydrophobia,[1] and this is not likely to have been derived from a foreign source. (For an account of the diseases of Egypt, see Clot-Bey's *Aperçu Général* and *De la Peste*, and *Descr. de l'Égypte*, xiii. 29).

Geology.—In considering the geology of Egypt, its deserts claim our first notice. By a desert is generally understood a wide plain of shifting sand; but this is usually an erroneous description of such a tract, and especially inapplicable to the deserts which border the valley of the Nile. These are raised mountain regions, the surface of which is often covered with sand, debris, and pebbles, intersected by valleys, and diversified, in the case of the western desert, by some oases.

On both sides of the Nile the mountains are limestone, until a little above Thebes, where the sandstone commences. At the First Cataract red granite and other primitive rocks burst through the sandstone beneath the bed of the Nile, and for a considerable space on the east, obstructing the course of the river by numerous small islands and rocks, and thus forming the rapids. In several places, chiefly on the eastern side, the mountains approach the river, and sometimes reach it. They are always utterly devoid of vegetation, and, except the granite, generally of a yellowish or reddish colour, though in some places they are greyish. Near the Cataract the sandstone mountains are partially covered with bright yellow sand in drifts. The mountains on both sides near the river are usually about 300 feet in height, and rarely much loftier. The highest point on the western bank at Thebes is four times that altitude. If one leaves the river and ascends the mountains, he finds a great rocky tract before him, the only easy paths through which are along valleys often very winding. The eastern desert gradually rises until about midway between the Nile and the Red Sea, where primitive rocks burst through the later formation, and the loftiest of them, a granite mountain called Gebel-Ghàreb (about lat. 28°), attains the height of about 6000 feet. In this portion of the desert are porphyry, breccia, and basalt rocks, which were anciently much prized for purposes of architecture and sculpture. The western desert is of a lower elevation, and is principally remarkable for its oases, which are deep valleys containing alluvial soil, but they are little productive except in dates. Their beauty and fertility have been naturally much exaggerated. Notwithstanding the inequalities of their surface, it is evident that the deserts rise towards the Red Sea, attaining their greatest height in the peninsula of Sinai, which is but a continuation of the same tract.

The most remarkable geological change which has been observed to have taken place in Egypt is one still in operation, the depression of the northern shore notwithstanding the constant deposit of the Nile, and the corresponding elevation of the southern part of the isthmus of Suez. The consequence of this change of level has been the ruin of places on the shore of the Mediterranean, the extension of the salt-marshes, and the drying up of a considerable part of the northernmost portion of the Gulf of Suez. The bed of the Red Sea may be traced for several miles north of Suez, which now stands at the head of the western gulf; and places far north of that town were on the coast in historic times.

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[1] This is stated on the authority of the late Rev. J. R. T. Lieder of Cairo.

The form of the plain and valley inclosed by the deserts is remarkably regular. In Lower Egypt the cultivable land little exceeds the limits of the ancient Delta, but greatly exceeds those of the space between the two remaining branches of the Nile. The northern coast is protected by shoals and a low range of sand-hills. To the south of these are extensive salt marshes and lakes, or waste tracts, and beyond, the cultivated land. The deserts on either side are of low elevation. To the east of the ancient Delta, a valley, the Wádee-et-Tumeylát, is in course of being reclaimed by the Sweet-Water Canal.

The form of the valley, or Upper Egypt, may be best seen on the map; its leading peculiarities may here be noticed. Its course is nearly north and south until just within the border of the Thebaïs, when it takes a south-easterly direction as far as the town of Girgà, and then turns due east as far as Kinè, from which town it resumes its former direction. The mountains and desert on the western side throughout Upper Egypt, that is, above Cairo, are generally further from the river than those on the eastern side, which frequently reach to the water's edge. The difference is most remarkable as far as the town of Farshoot, by the course of the river about 350 miles above Cairo, and about 70 miles below Thebes. Near Farshoot begins a continuous series of canals, which flow parallel to the Nile, and near the Libyan chain, until they terminate in Lower Egypt, not far north of Cairo. Above Farshoot, the eastern mountains recede as far as a little above Thebes, and the western mountains gradually approach the Nile. Halfway between Thebes and the First Cataract, the cultivable soil is equally narrow on each bank. The greatest breadth of the cultivable land, all of which is not now cultivated, on the western bank seldom exceeds about 8 or 10 miles, and on the eastern bank, about 3 miles, but it is usually much narrower.

There is in Upper Egypt one striking deviation from the uniform character of the country. About 70 miles above Cairo, by the course of the Nile, an opening in the Libyan range leads to a kind of oasis, the Feiyoom, a fertile tract, lying in a hollow of the desert, and having at its further extremity a great lake of brackish water.

The Nile.—The chief natural feature of Egypt is the Nile, and the great phenomenon of the country the yearly inundation. With the ancient inhabitants the river had, according to their usage with such names, its two appellations, sacred and common. The sacred name was Hapi, the same as that of one of the four genii of Amenti (Hádes) and of the bull Apis. The probable meaning is "the concealed" (Brugsch, *Geogr. Inschr.*, i. 77). The profane name was Atur, or Aur, usually with the epithet áä, the great. The two forms, of which the first appears to be the older, the second the younger, mean "river," as is equally the case with the demotic and Coptic forms of Aur (*Id.* p. 78). There are at least three names of the Nile in the Bible,—Yeôr (יְאוֹר, יְאֹר), the same as the Egyptian name last mentioned, and probably of Egyptian derivation; Shichôr (שִׁיחוֹר, שִׁחוֹר, שִׁחֹר), "the black;" and "the river of Egypt," נְהַר מִצְרַיִם. The "torrent," or "brook of Egypt" (נַחַל מִצְרַיִם), spoken of as the western limit of Palestine, and so the eastern limit of Egypt, is either a desert stream at Rhinocorura, now El-'Areesh, or the Pelusiac or easternmost branch of the Nile.[1]

The Greek and Roman name Νεῖλος, Nilus, is certainly not traceable to either of the Egyptian names of the river, nor does it seem to be philologically connected with the Hebrew ones. It may be, like Shichôr, indicative of the colour of the river, for we find in Sanskrit, Nîla, "blue,' probably especially "dark blue," also even black, as Nîlapan·ka, "black mud." The two great confluents of the Nile are now called the Bahr-el-Abyad, or "White River," and the Bahr-el-Azrak, or "Blue River," and the latter most nearly resembles the Nile in Egypt. As already noticed, Αἴγυπτος, in the *Odyssey*, is the name of the Nile (masc.) as well as of the country (fem.).

The Arabs preserved the classical name of the Nile in the proper name En-Neel النِّيل, or Neel-Misr نِيل مِصْر, the Nile of Misr (Egypt). The same word signifies indigo.[2]

The modern Egyptians commonly call the river El-Bahr, "the sea," a term also applied to the largest rivers, and the inundation "the Nile," En-Neel; and the modern Arabs call the river Bahr-en-Neel, "the river Nile."

The course of the Nile has already been noticed in speaking of the form of the Nile valley. In ancient times the Delta was watered by seven branches; now there are but two, the other ancient branches being canals not always navigable. The ancient branches were, beginning at the west, the Canobic, Bolbitine, Sebennytic, Pathmitic, Mendesian, Tanitic, and Pelusiac, of which the modern Rosetta and Damietta branches represent the Bolbitine and Pathmitic.

The mean breadth of the river in Upper Egypt may be put at from half a mile to three-quarters, except where large islands increase the distance. In the Delta the branches are generally narrower.

A remarkable change has been ascertained to have occurred in the level of the Nile above Gebel-es-Silsileh, (near the ancient Silsilis, more than 80 miles south of Thebes), and throughout part of Nubia. Indications of this change were first observed by Professor Lepsius, who discovered hieroglyphic inscriptions on rocks at the Cataract of Semneh, not far above the Second Cataract, showing that the river attained a much higher level in the time of Dynasties XII. and XIII. before B.C. 2000. He gives the difference of the mean water-level at Semneh as 7·30 metres, or 23·94 feet English. He observes that the whole level of Upper Nubia was anciently greater, and similarly that of Lower Nubia between the First and Second Cataracts, but that in this second tract the present level was attained since the time of Thothmes III. of Dynasty XVIII. (*Auszug aus einen Schreiben des Hrn. Lepsius an Hrn. Ehrenberg*, Philæ, 10th Sept. 1844.) Sir Gardner Wilkinson pursued the inquiry in a paper in which he argued that the cause of the change of level which he traced in the Upper Thebaïs was the breaking of a rocky barrier at Gebel-es-Silsileh, where the low mountains on either side confine the river to a narrow channel (*Trans. R. Soc. Lit.*, n.s., iv.).

The water of the Nile differs considerably in appearance and purity at various seasons of the year. A little after midsummer it becomes very turbid, and not long afterwards it assumes a green colour for more than a fortnight, owing to the quantity of vegetable matter which it brings down from its upper course. It then resumes its turbid character for the period of the rise, and retains it, though in a less degree, for the remaining portion of the year, until the following midsummer. The water is extremely sweet, particularly in its turbid state. A careful filtration destroys its peculiar flavour, and the best method is to allow it to settle in the porous jars manufactured in the country. It is very wholesome, except during the short period at which it is green. The turbid appearance, greatest during the rise and inundation, is owing to the presence of large quantities of earthy matter, which are annually deposited. This deposit or mud of the Nile has been analyzed by M. Regnault. The specimen was dry, and taken from a canal which conducted the waters of the inundation. He obtained the following results:—

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[1] The manner in which this term is used (Num. xxxiv. 5; Josh. xv. 4, 47; 1 K. viii. 65; 2 K. xxiv. 7; Is. xxvii. 12), to designate the boundary of Egypt and Palestine, precisely as Shichôr is employed (Josh. xiii. 3; 1 Chr. xiii. 5), would be conclusive as to their identity, were it not that the country between the Pelusiac branch and Rhinocorura is a waste region, which may have been wholly considered as boundary.

[2] "*En-Neel* is the river (lit. the inundation) of Egypt: Es-Saghánee says—'But as to the *neel* [indigo] with which one dyes, it is an Indian word Arabicized'" (*The Misbáh of El-Feiyoomee*).

Water	·11
Carbon	·09
Oxide of iron	·06
Silica	·04
Carbonate of magnesia	·04
Carbonate of lime	·18
Alumen	·48

M. Regnault remarks that the quantities of silica and alumen vary according to the places whence the mud is taken, and that on the banks of the Nile it contains much sand, but when carried by the waters of the inundation to distant tracts it loses a quantity of sand in proportion to the distance, so that, when the distance is very considerable, the argillaceous matter is nearly pure; and thus the soil presents this matter in the different degrees of purity which the arts of pottery and brick-making require (*Descr. de l'Égypte*, xx. 162–164).

The Nile shows the first signs of rising in Egypt about the time of the summer solstice. At Khartoom, where the White and Blue Niles join, the beginning of the increase is observed early in April (Clot-Bey, *Aperçu*, i. p. 36, 37). The slowness of the rise in the earlier stage causes this difference. Usually the regular increase does not begin in Egypt until some days after the summer solstice, and the inundation begins about two months after that solstice. The river attains its greatest height at, or not long after, the autumnal equinox, and then, falling more slowly than it had risen, sinks to its lowest point at the end of nine months, when it remains stationary for a few days, until it begins again to increase. The inundation continues rather longer than it naturally would do, because the waters are retained for some time upon the lands by closing the mouths of the canals (see the table, *Descr. de l'Égypte*, xviii. i. [illegible], for the details of the state of the Nile, from July 2, 1799, to April 10, 1800). The river's banks being a little higher than the rest of the cultivable soil, the water is conveyed by canals or cuttings, and does not pour over the banks.

The inundations vary considerably, and, by either failing or rising to too great a height, cause much damage and distress. In the *Description de l'Égypte* (xviii. i. 626–629) there is a table of [illegible] inundations, of which 11 were very great, [illegible] good, 16 feeble, and 9 insufficient. This table was taken from the official records of the Nilometer on the island of Er-Ródah, near Cairo, and comprehends the inundations of A.H. 1150–1215 (A.D. 1737–1800).

The rise is about 40 feet at the First Cataract, about [illegible] at Thebes, about 25 at Cairo, and about 4 at the Rosetta and Damietta mouths during a good inundation ([illegible] *Egypt*, i. 89; *Descr. de l'Égypte*, xviii. i. [illegible]). When it is said, however, that the river has attained to a certain height in feet or cubits, the height at the Nilometer of Er-Ródah above-mentioned is meant; and by ancient writers, that of the river at Memphis, which was situate on the western bank, a little higher than Er-Ródah. If the river do not attain a greater height than 18 or 20 feet, the rise is scanty; if only 2 or 4 feet more, insufficient; if it attain to 24 feet, or a greater height, not exceeding 27 feet, the inundation is good; but a higher rise must be characterized as a destructive flood (*Descr. de l'Égypte*, xviii. i. 616). Sometimes the inundation has failed altogether; as for seven years (A.H. 457–464) in the reign of the Fátimee caliph El-Mustansir bi-lláh, when there was a seven-years' famine (see below, page 732); and low inundations always cause dearths. Excessive inundations, on the other hand, produce, or at least foster, the plague and murrain; so that a variation of a few feet is productive of the most serious consequences.

The current, when the Nile is low, has been estimated at about 2 miles in the hour, and at about 3 miles an hour when it is high. The volume of water which the Nile pours into the Mediterranean in 24 hours is as follows, according to M. Linant:—

		Cubic Metres.
During the low Nile,	by the Rosetta Branch,	79,532,551,728
	by the Damietta Branch,	71,033,840,640
		150,566,392,368
During the high Nile,	by the Rosetta Branch,	478,317,838,960
	by the Damietta Branch,	227,196,828,480
		705,514,667,440

—(Clot-Bey, *Aperçu*, i. 41).

Although the water is abundantly charged with alluvium throughout the year, and especially during the inundation, the annual deposit by the river, except under extraordinary circumstances, is very much smaller than might be supposed. Various computations have been made as to the exact deposit left in a century on the land, but they have not usually differed above an inch. If, however, we compare the quantity of deposit on certain very ancient structures, of which we know the date, we shall find that the amount has materially differed in various places. Such differences are the natural results of irregularities in the river's course, of the strength or weakness of the current at particular places, of the nature of the country, and many other disturbing causes. The mean ordinary rate of the increase of the soil of Egypt has been calculated by Mr Lane as about 4½ inches in a century. M. Girard, in the *Descr. de l'Égypte*, makes it "very nearly" 126 millimètres, or 4·960 English inches. (For a remarkable instance of rapid deposit, see the *Englishwoman in Egypt*, i. 132–134, and plan, p. 126.)

The cultivable land of Egypt must be regarded as wholly the deposit of the Nile, but it is vain to attempt a calculation of the period at which this process began, since we cannot conclude that the same rate has always obtained, and we must suppose that the causes at first in operation were very different from those which now regulate the phenomenon.

At the time of the French occupation of Egypt it was found that the cultivable soil occupied only 6921 square miles, or somewhat more than two-thirds of the whole space included between the deserts; but the quantity actually under cultivation did not exceed 5500 square miles, or six-elevenths of the entire surface. This proportion has since not materially changed. It was not always so, and the deficiency of the population is the principal cause that so large a proportion of the soil which might possibly be brought into a state of culture is left uncultivated.

Throughout Egypt the cultivable soil does not present any very great difference, being always the deposit of the river; it contains, however, more sand near the river than at a distance from it. Towards the Mediterranean, the is injured by the salt with which the air is im- ed, and therefore it is not so favourable to vegeta- This condition, however, is not usually found far the sea, or the salt-marshes and lakes, which in- for the most part between it and the land. In Egypt we find the greater portion of the neglected rincipally to the east and west of the modern Delta, ts northern portion. In Upper Egypt the narrow- the valley, and the more numerous population, pre- e country in a better state of cultivation, and the omewhat richer. The largest uncultivated tracts ne western bank, where the valley is broadest, and s where the great canal running parallel to the s fallen into a state of neglect.

ition of the Country.—Although some of the s of the classics may be deemed exaggerated when eak of the population and prosperity of Egypt, not accuse them of errors, except in the number s and of the inhabitants of the country; for the ents show us how rich was Egypt under native and indicate to what causes this condition may bly be assigned. From the time at which the yramid was built to the Persian invasion, a period een 2000 and 3000 years, the population of Egypt extent of cultivated land far exceeded what they ne present day. The country does not seem to have er-peopled; and many causes conduced to prevent rticularly the serious wars in which the Pharaohs .. The long and desolating struggles with the ns and Persians inflicted a severe blow on the in- of the country. Under the Macedonians it recovered its former prosperity; and when the Romans held it was one of their most productive provinces, and a of the empire. During the Roman rule various poli- uses contributed to the decline of the population. he Muslim conquest this decay continued almost ruptedly until the time of the Fátimees; but from ne until the Turkish conquest the rulers of the ve independent dynasties generally governed the with a regard for its interests, and cannot be of the systematic tyranny and misrule of the pashas. There was a temporary recovery under ependent or semi-independent Memlook rulers before nch invasion; and in spite of much of the Turkish the country has again made good progress during ernment of the family of Mehemet Ali. To over- n, forced labour, and needless wars,—in other words, nent in a Turkish sense,—must be attributed the misery of the peasant population, and the want of nough to cultivate the soil.

ical causes have had far less to do with the impover- t of Egypt than political ones. The elevation of the orth of the Gulf of Suez, with the depression of the oast of Egypt, has much diminished the cultivable soil Delta, by increasing the salt lakes and marshes which its northern portion. There is, however, no greater than to suppose that the sands of the deserts have jury by encroaching upon the alluvial tracts, and ice fertile regions are buried beneath them. In laces undoubtedly they have encroached upon the ble land, particularly where, as in the case of the the Red Sea, the neglect of the Government had wn the inundation, but no sooner was the Sweet Canal opened than fertility returned. On the other e deposit of the Nile has been constantly, in almost art of the country, encroaching upon the deserts and hing their extent. It is neglect that has permitted d to drift over the soil where there have been no rs to cultivate it. Above Gebel-es-Silsileh, in Upper the change in the level of the river has placed cultivable soil almost wholly beyond the reach of the inundation, and thus made agriculture very laborious, but this is only for the space of about 40 miles in Egypt, where the extent of the cultivable soil must always have been small on account of the narrowness of the valley. The failure of five of the seven branches of the Nile is partly due to the neglect of the Government, as they might all have been retained as constantly running canals; and the decay of the great canal which runs parallel to the Nile throughout the chief part of Upper Egypt is traceable to the same cause.

Under the government of Mehemet Ali a great engineering work was begun with the view of bettering the condition of Egypt. This was the construction of a barrage across both branches of the Nile at the point of the Delta, in order to regulate the inundation, and thus render the country more fertile and easy of cultivation. After being abandoned this work is now to be completed. Its operation will on the whole be beneficial, although undoubtedly the power to be thus acquired by the khedive, of regulating the inundation for the benefit of his lands without reference to small proprietors, will be productive of much injustice. Egypt can never regain her ancient prosperity without a radical reform. The country has been governed under the Turks upon the system of getting the maximum of revenue from a peasantry allowed the minimum of sustenance. This is what is meant by the high-flown phrases one hears about the welfare of Egypt. The welfare of the population has never been contemplated. The frugal peasantry are kept at starvation-point, and no one prospers but the tax-gatherers of all grades, who constitute the richer class. Yet Egypt is better governed than the other provinces of the Turkish empire which enjoy a purely Turkish administration, for it is held not on the uncertain tenure of an ordinary pashalik, but as a copyhold which it is the interest of the tenant to keep in decent repair.

Agriculture.—Under the Pharaohs Egypt was an agricultural country, and both commerce and manufactures were comparatively unimportant. The main energies of the people were expended in turning to the best account a soil of unexcelled richness, annually watered and renewed by the river. This natural policy was the true one for the prosperity of the country. From the sculptures and paintings of the tombs, we form a clear idea of the agriculture of the ancient Egyptians, while the classical writers give us information respecting the tenure of land, and the laws affecting the cultivators.

In the representations of the tombs which picture the daily life of the great proprietors of land, we learn what especial attention they paid to the processes of agriculture. We see them constantly overseeing the labourers, and thus watching the interests of their lands. They were especially anxious to conduct the water of the Nile over those tracts which were not above its level at different periods of the year, and to raise it by manual labour to the higher portions of the land. In their canal-system they displayed mechanical skill, as well as in the construction of dams and dikes to retain the water upon the lands; but for raising water they seem to have been contented with the rudest contrivances. Indeed we know of but two methods that were employed in raising water,—the use of the simple machine called in the present day the shádoof, and buckets carried by men. The ordinary shádoof still employed is of the same form as that used by the ancient Egyptians. It consists of a pole resting upon a beam placed across two columns of brick or mud, and having at one extremity a weight, and at the other a rude bowl-shaped bucket suspended by a stick. A man stands beneath it, and pulling down the bucket to the water raises it again, assisted by the weight. (For the ancient form of the shadoof, see *Anc. Eg.*, ii. 4; for the modern, *Mod. Eg.*, chap. xiv.)

Immediately after the water of the inundation had subsided, the land was ploughed or broken up by the hoe, and sown, the seed being sometimes trodden in by goats driven over the field for the purpose. Wheat being the most important field-produce, we find the various agricultural processes connected with it frequently represented. Besides the ploughing and sowing, the harvest is depicted, the reapers cutting the wheat just below the ear, the ears being carried in nets or baskets by men or on asses to the threshing-floor, where they were thrashed by kine. Sometimes the wheat was bound in sheaves. The same or similar processes with reference to other kinds of grain are portrayed in the tombs, in which we also find curious representations of the vineyards and gardens. The vineyard was not the least valuable part of an estate. Egypt was famous for its wines in the days of the Greeks and Romans; and it is evident that wine must have been prized in earlier times from several kinds being enumerated in the inscriptions, and from its always being seen at the feasts. Besides the vine, other fruit-trees were cultivated, and especially the date palm. The gardens were often extensive, and were laid out with great formality, partly in consequence of their being watered in the same manner as the fields generally, and contained tanks for fish as well as for purposes of inundation. The Egyptians paid great attention to preserving fish, and the produce of the fisheries of one great artificial lake, that of Moeris, formed an important branch of the revenue. There were also tracts left to reeds, which, if not planted, were at least carefully maintained, on account of their value for manufactures, and as covers for wild-fowl.

Diodorus Siculus states that anciently the land was the property of the priests, of the king, and of the military class (i. 73), and the monuments leave little room to doubt that such was generally the case, for though there were no castes, the upper classes consisted of priests and military officers, and the son usually followed his father's profession. It is stated in the Bible that Joseph purchased the whole of the land of the Egyptians for food during the famine, and gave them seed to sow it, claiming a fifth of the produce as the king's right. The land of the priests alone was not purchased.

The agriculture of the modern Egyptians differs little from that of the old inhabitants. In one respect it is the converse: the ancients excelled in the management of dikes and dams, and raised water only by the simplest methods; the moderns, while they have paid less attention to the great canals, and the means by which they were regulated, have employed more ingenious methods of artificial irrigation. The deficiency of population has partly caused the decay of many of the canals and dams and dikes, and has at the same time necessitated the economizing of human labour, for which that of cattle has been in a great measure substituted.

Of the machines the most common is the shádoof, already described, but there are also two kinds of water-wheels. The more usual of these is that called the sákiyeh, which is composed of a horizontal wheel turned by a pair of cows or bulls, or by one, and connected with a vertical wheel which is on the same axis as another around which are earthen pots in which the water is raised and poured into a trough. The tabloot is a similar machine, which differs from the sákiyeh principally in having a hollow wheel instead of the wheel with pots in the joints or fellies of which the water is conveyed. Sometimes a katweh is employed, which is a bucket like that of the shádoof, having four cords by which two men dip it into the river or canal and raise the water. (Mod. Eg., ch. xiv.) Steam-pumps are now largely used.

"The 'rei' lands (or those which are naturally inundated) are, with a few exceptions, cultivated but once during the year. After the water has subsided, about the end of October or beginning of November, they are sown with wheat, barley, lentils, beans, lupins, chick-peas, &c. This is called the 'shitawee' (or winter) season. But the 'sharákee' lands (or those which are too high to be subject to the natural inundation), and some parts of the rei, by artificial irrigation are made to produce three crops every year; though not *all* the sharákee lands are thus cultivated. The lands artificially irrigated produce, first, their shitawee crops, being sown at the same period as the rei lands, generally with wheat or barley. Secondly, in what is called the 'seyfee,' or in the southern part of Egypt the 'keydee' or 'geydee' (that is, the summer) season, commencing about the vernal equinox, or a little later, they are sown with millet ('durah seyfee'), or with indigo or cotton, &c. Thirdly, in the 'demeereh' season, or period of the rise of the Nile, commencing about or soon after the summer solstice, they are sown with millet again, or with maize ('durah shámee'), &c., and thus crowned with a third harvest. Sugar is cultivated throughout a large portion of Upper Egypt; and rice in the low lands near the Mediterranean."—*Mod. Eg.*, *l.c.*

The culture of cotton was introduced by Mehemet Ali with a view to promote his manufacturing schemes, and the Turkish grandees have found it a source of temporary profit. During the American War the profit was at its height, but subsequently it declined. The necessity of constructing dams to exclude the Nile water from the cotton-growing fields has rendered the inundations destructive, and the speculation seems on the whole to have injured the welfare of Egypt.

The agricultural implements of the modern Egyptians are rude in construction, and similar to those anciently employed in the country. One of these, however, was not known to the earlier inhabitants. This is the nórag, a machine "in the form of a chair, which moves upon small iron wheels or thin circular plates, generally eleven, fixed to three thick axle-trees, four to the foremost, the same number to the hindmost, and three to the intermediate axle-tree. This machine is drawn in a circle by a pair of cows or bulls over the corn." It is employed to separate the grain of wheat, barley, &c., and to cut the straw, which is used for fodder. (*Mod. Eg.*, *l.c.*) The ancient Egyptians, as before remarked, generally cut the wheat near the ear.

An Egyptian garden is a miniature Egypt. It is intersected by numerous small channels which are filled by one or more water-wheels. By these channels the water is spread over the garden, divided by them into many square compartments, edged with ridges of earth. This system of course makes it very difficult to keep a garden in good order, and no great variety of flowers is cultivated.

Though Mehemet Ali was very desirous to encourage manufactures, he did not endeavour enough to apply modern science to the improvement of agriculture. Ibrahim Pasha, who succeeded him, always maintained that the country should be agricultural rather than manufacturing, and introduced important improvements during his father's government. This system has been steadily pursued by the present ruler.

Before the time of Mehemet Ali a kind of feudal system prevailed, and much of the land was held by small proprietors under the protection of the great emeers. By the massacre of the Memlooks, the pasha destroyed feudalism, and by arbitrarily seizing almost all the landed property, rendered private tenure of land a most rare condition. He allotted to those whom he thus unjustly dispossessed annual pensions for life, as the only compensation for an act of tyranny to which even the history of Egypt scarcely affords a parallel (*Mod. Eg.*, ch. iv.). Those whose lands were not confiscated yielded them up through fear, and buried their title-deeds, which are yet so concealed. A system of government in which the supreme authority overlooks such acts, and subordinate governors perpetrate them, in defiance of the Muslim code and Arab jurisprudence, demands the most thorough and searching reform.

Lakes.—Egypt has always been famous for its lakes, which have either aided commerce, or supplied the inhabitants of the country with fish and wild fowl, or with valuable vegetable productions, or assisted in regulating the effects of the inundation. All have enriched the land in some one of these ways, and thus they have been important sources of its natural wealth.

Beginning our examination at the north-western extremity of Egypt, we first observe the lake now called Boheyret-Maryoot,[1] and anciently Lake Mareotis. This is an extensive salt marsh rather than a lake, except during the inundation, when its contents are augmented by filtration. Anciently this lake was navigable, and thus contributed to the commercial importance of Alexandria. The country around was cultivated, and produced the famous Mareotic wine. The relations of various travellers show that it was still a lake during the 15th and 16th, and even towards the close of the 17th century; and Villamont in 1590 mentions that in his time the fisheries produced a considerable sum (*Descr. de l'Égypte*, xvi. 201). When, however, the French army conquered and occupied Egypt (1798–1801) they found its basin to be "a sandy plain, of which the lower portion retained the rain-water, which remained there for a great part of winter" (*Id.* 200, 201). On the 4th of April 1801 the English army, which was cooperating with that of the Grand Vizir against the French garrison of Alexandria, cut the dikes of the canal of that city, and admitted the waters of the Lake of Aboo-Keer into the ancient bed of Lake Mareotis, in order to cut off the water supply of the besieged (*Id.* 201, 202). The basin of the lake being partially inhabited, some loss of life and property was the result of this act, which has reasonably been much called in question. The unhealthiness of Alexandria is also traceable to the formation of this marsh. The precedent thus set has been twice imitated, first by the Turks in 1803, and a second time by the English army under General Fraser in 1807. At the present day the lake or marsh is unprofitable, and its shores are uncultivated and uninhabited, the whole wearing the most dreary aspect.

To the north of Lake Mareotis is situate that of Aboo-Keer, Boheyret-Aboo-Keer. It is the northernmost portion of the other lake, from which it is separated by the Mahmoodeeyeh Canal (which here occupies the line of the older Canal of Alexandria), and the embankments or dikes which form its banks. It is very small, nowhere measuring 10 miles across, and extremely shallow, usually not exceeding 3 feet in depth. The water is salt, being chiefly derived from the sea, from which the lake is separated by a narrow strip of land on the western side, and on the eastern by a similar strip of far less breadth, the shore of the memorable Bay of Aboo-Keer.

To the east of the Lake of Aboo-Keer is that of Atkoo, Boheyret-Atkoo. It spreads when full nearly to the town of Rosetta, and is separated from the sea by a narrow neck of land on which stands the large village of Atkoo. Its extent varies according to the quantity of water which it receives from the inundation (*Descr. de l'Égypte*, xvi. 204).

The great Lake of El-Burullus begins a little to the eastward of the Rosetta Branch, and stretches to somewhat beyond where the canal which was anciently the Sebennytic Branch enters it, and passing through it reaches the sea. Like the other northern lakes, it is separated from the Mediterranean by a narrow strip of land, the coast of Egypt. It is throughout very shallow (*Id.* 205). It is chiefly known for its water-melons, which are yellow within instead of being red or pink, and come into season after those grown on the banks of the Nile.

The easternmost of the lakes of Egypt is Boheyret-el-Menzeleh, which greatly exceeds the others in size. It extends from very near the Damietta Branch of the Nile to the mouth of the old Tanitic Branch, now called the canal of El-Mo'izz, which passes through the lake to the sea. It also receives the waters of the canals which were once the Mendesian and Pelusiac Branches. The northern shore is separated from the sea by an extremely narrow strip of land. At its south-eastern extremity is a long marshy creek extending into the desert. Its average length is about 40 miles, and its average breadth about 15. The depth is greater than that of the other lakes, and the water is salt, though mixed with fresh. Upon the surface are numerous islands, and the whole lake abounds in reeds of various kinds. It supports a considerable population of rude fishermen, who dwell in villages on the shore and islands, and live upon the fish of the lake. The reeds are cover for water-fowl of various kinds, which the traveller sees in great numbers, and wild boars are found in the marshes to the south. (*Mod. Eg. and Thebes*, i. 446.)

The Lake Serbonis, well known in former times as having swallowed up those passing over its marshes concealed by shifting sands, is now dry, and cannot be any longer included in the list of the lakes of Egypt.

Besides the lakes above mentioned are those called the Bitter Lakes, which should rather be termed marshes, occupying part of the ancient bed of the Red Sea between Suez and Lake Menzeleh, and also the Natron Lakes. The latter, which are very small, are situate in a valley of the western desert, not very far from the river: they will be noticed below.

In Upper Egypt there is but one lake of importance. It is the Birket-el-Karn, or Lake of El-Karn, at the extremity of the Feiyoom, which is, as already mentioned, an oasis on the western side of the river, to which an opening in the mountains leads. The lake is about 35 miles long, and its widest part a little exceeds 7 miles, according to Sir Gardner Wilkinson, while in several places it is considerably narrower. About the middle is a single island. The depth is not great, for the same author, who "sounded in several places," "found what is considered the deepest part to be only 28½ feet" (*Mod. Egypt and Thebes*, ii. 344–5). Its level is far below that of the Nile, as the bank of the river at Benee-Suweyf, at the entrance of the valley leading to the Feiyoom, is upwards of a hundred feet higher than the water of the lake (*Ibid.* 346). The shores are barren or uncultivated; the northern is desert and bounded by sandy mountains; the southern was in ancient times partly cultivated. The water is brackish and unwholesome, though the fishermen, of whom there are a few, drink it.

The famous Lake Mœris lay between the Feiyoom and the Nile, not far from the river. It was an artificial work executed by Amenemhat III., of Dynasty XII. The irrigation of neighbouring tracts was regulated by it, and its fisheries formed an important part of the revenue. After the subjugation of Egypt by the Romans its dikes were neglected, and by degrees it became ruined. Its position and extent were considered doubtful, until M. Linant's excellent memoir, published by the Egyptian Society of Cairo, established these points most satisfactorily from the remains of its basin, which are yet traceable (*Mémoire sur le Lac Mœris*, Soc. Eg., 1843).

Canals.—The canals of Egypt deserve especial attention from their great importance in extending the beneficial influence of the inundation. In Lower Egypt we find, beginning from the west, first the Mahmoodeeyeh Canal, which connects Alexandria with the Rosetta Branch, taking a similar direction to that of the ancient canal which it has succeeded. It was dug under Mehemet Ali; and although not quite 50 miles in length, and not 100 feet broad, about 12,000 labourers are said to have died in ten months while the work was in progress (*Englishwoman in Egypt*, i. 47, 48). This is well known to be a tolerably accurate statement of the losses experienced by the unfortunate workmen, and is only one of the many instances which the history of our own times affords of that reckless disregard of human life, which is one of the worst traits of Turkish character.[1]

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[1] "Boheyreh," (pronounced "Boheyret" when followed by a genitive) signifies "a little sea," being the diminutive of "bahr," "a sea," and is applied to large lakes, smaller ones receiving the appellation "birkeh." The distinction is not always maintained, for the great lake of the Feiyoom is called Birket-el-Karn.

Between the Rosetta and Damietta Branches are several canals, some of which are of importance, particularly the short canal of Manoof connecting the two branches not far from the point of the Delta. To the east of the Damietta Branch are others, of which the most remarkable occupy the beds of the Tanitic and Pelusiac Branches, which have been cleared to a sufficient extent to form canals. The former of these, which lies to the westward of the other, is called the Canal of El-Mo'izz, the first Fátimee caliph who ruled in Egypt, having been dug by his orders, and the latter bears the name of the Canal of Abu-l-Munegga, a Jew who executed this work, under the caliph El-'Amir, in order to water the province called the Sharkeeyeh. The last mentioned canal is connected with the remains of that which anciently joined the Nile and the Red Sea. Of this important work the greater part was destroyed through neglect, but it has been restored, as the Sweet Water Canal, in order to supply the establishments on the Suez Canal with fresh water. It was of the Pharaonic times, having been begun by Ramses II., or Sesostris, continued by Neku II. and by Darius Hystaspis, and at length finished by Ptolemy Philadelphus.

The extent and character of the great canal called the Bahr-Yoosuf, or River of Joseph, which runs parallel with the Nile on its western side, from a little below Cairo to near Farshoot, a distance by the river of about 350 miles, render it the most important work of the kind in Egypt. It is a continuous series of canals rather than one canal. Although the Joseph whence it takes its name is the celebrated Saladin, or Saláh-ed-deen, yet it is related that he merely repaired it, and it is not doubted to be of a much earlier period. Most probably it was executed under the Pharaohs. In the present day it is not navigable except during the season of the inundation, and at other times is dry in various places. Its restoration would not be a work of extreme difficulty, and would greatly benefit the commerce and agriculture of the country, perhaps more than any other undertaking of the kind.

Vegetable Products.—Egypt differs from most other countries in having neither woods nor forests. Besides the palm groves, we rarely see even a grove of trees, except in Lower Egypt. The largest common trees are acacias, sycamore-fig-trees, and mulberry-trees, all of which are frequently planted on each side of the great roads near Cairo; and the most beautiful trees are the date-palm and the banana. The beauty of the palm is, however, in a great measure owing to art, for its lowest branches are annually cut, which causes it to grow high, and renders its head of elegant form. When wild, this tree has a far inferior appearance, being low, and having long ragged branches reaching to the ground; and its dates are small and poor in flavour. The Theban or dóm-palm is a very different tree, having two great branches, each of which divides into two other branches, a subdivision which continues still farther. The weeping-willow, myrtle, elm, and cypress are found in the gardens and plantations, with various trees bearing the fruits to be next mentioned; and the tamarisk is to be seen everywhere.

The most common of the fruits are dates of various kinds, which are sold half-ripe, ripe, dried, and pressed in their fresh moist state in mats or skins. Many different sorts are enumerated as known in Egypt. The dependencies, however, and not Egypt, produce the finest of these dates. The hotter and drier climates of the Oases and Lower Nubia best suit the date-palm; and the pressed dates of Seewah, the ancient Oasis of Jupiter Ammon, are among the most esteemed. The grape is a common fruit, but wine is not made from it on account of the prohibition of Mohammad. The Feiyoom is celebrated for its grapes, and chiefly supplies the market of Cairo. The most common grape is white, of which there is a small kind far superior to the ordinary sort. The black grapes are large, but comparatively tasteless. The vines are trailed on trelliswork, and form agreeable avenues in the gardens of Cairo; but little attention is paid to their culture, the common fault of Egyptian agriculture and gardening, due to the generosity of nature and the indolence of the inhabitants.

The best known fruits, besides dates and grapes, are figs, sycamore-figs, and pomegranates, apricots and peaches, oranges and citrons, lemons and limes, bananas, which are believed to be of the fruits of Paradise (being always in season), different kinds of melons (including some of aromatic flavour, and the refreshing water-melon), mulberries, Indian figs or prickly pears, the fruit of the lotus, and olives. Many of these are excellent, especially the figs and melons. The trees and plants which produce most of them are chiefly confined to the gardens. The cactus bearing the Indian fig is extremely common, and forms the hedges of gardens and plantations.

The general plan of an Egyptian garden has been already described. Although seldom in good order, such a garden is often picturesque, having a few date-palms and bananas, and perhaps overlooked by one of those houses of the old style of architecture which are rapidly disappearing. No great variety of flowers is cultivated. Among the most usual are the rose (which has ever been a favourite among the Arabs), the jasmine, narcissus, lily, oleander, chrysanthemum, convolvulus, geranium, dahlia, basil, the henna plant (*Lawsonia alba*, or Egyptian privet, which is said to be a flower of Paradise), the helianthus, and the violet.

The vegetables, &c., are very common and of various kinds, so that we cannot wonder that the Children of Israel longed for them in the desert. The principal are beans, pease, vetches, lentils (of which a pottage is made, which is the common food of the Nile boatmen), lupins, chick-pease, the loobiyeh (*Dolichos lubia*), fenugreek, mallows, the bamiyeh (*Hibiscus esculentus*), spinach, purslain, melookheeyeh (*Corchorus olitorius*), leeks, onions, garlic, celery, parsley, chicory, cress, radishes, carrots, turnips, colocasia, lettuce, cabbage, fennel, gourds and cucumbers (both of several kinds), the tomato, the egg-fruit or badingán (black and white), caraway, coriander, cumin, aniseed, and red pepper.

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[1] A note from the eighth edition of this work is here reprinted in substance:—Writers on the East have not generally been careful to distinguish the Turkish and Arab national character, and the former has thus had the advantage of the virtues of the latter, which has received in return the odium of the other's vices. The remarkable characteristics of Arab character are high honour, generous hospitality, and humanity, coupled with much deceit in small matters not considered points of honour, carelessness as to religion, though not irreligion, and a love of plunder. The Turkish character is as strongly marked by treachery, often of the blackest kind, little hospitality, particularly to strangers, cruelty and disregard of human life, bigotry as to their religion, which is now giving way to deism, and the same love of plunder which is so common among the Arabs, as well as darker vices unknown to them, which have rendered the Turkish name a bye word in the East, as well as in the West. The conquests of the Arabs were not marked by desolation; their rule preserved the philosophy of Greece, which was welcome at the court of Baghdád when unknown in Europe. Arab art was due to them, and though long maintained under Turkish rule, at last perished through it. The rule of the Turks is traced by ruined cities, and whole provinces laid waste; literature has forsaken its most famous seats, Constantinople, Athens, Alexandria, and Antioch; the arts have decayed. Until they held Egypt and Mesopotamia, these were the richest countries of the world, now they are half deserts. All these are facts which can be proved.

The chief field-produce is wheat (which is more grown than any other kind of corn), barley, several sorts of millet, maize, rice, oats, clover, pease, the sugar-cane, roses, two species of the tobacco-plant, and cotton, now largely cultivated. The sugar-cane is extensively cultivated, and excellent sugar is manufactured from it. There are fields of roses in the Feiyoom, which supply the market with rose-water. The tobacco produced in Egypt is coarse and strong compared with that which is used by the middle and upper classes and imported from Syria and Turkey. That of Syria is considered the best. Of textile plants, the principal are hemp, cotton, and flax; and of plants used for dyeing, bastard saffron, madder, woad, and the indigo plant. The intoxicating hasheesh, which some smoke in a kind of water-pipe formed of a cocoa-nut, two tubes, and a bowl, seldom used for any other narcotic, is not, as has been erroneously supposed, opium, but hemp. The effect is most baneful. The leaves of the hinnè plant are used to impart a bright red colour to the palms of the hands, the soles of the feet, and the nails of both hands and feet, of women and children, the hair of old ladies, and the tails of horses. Indigo is very extensively employed to dye the shirts of the natives of the poorer classes, and is, when very dark, the colour of mourning; therefore, women at funerals, and generally after a death, smear themselves with it. Oil is extracted from the seeds of the cotton plant, hemp, colewort, the poppy, the castor-oil plant, sesame, and flax. The high coarse grass called halfeh (*Poa cynosuroïdes*) grows in great quantity in waste places and among ancient ruins.

Many kinds of reeds are found in Egypt, though, if we compare the representations in the ancient tombs with what we see in the present day, it is evident that they were formerly much more common. That they should be wasted away was prophesied by Isaiah (xix. 6, 7). The famous byblus, or papyrus, from which paper was manufactured, appears to be nearly, if not quite extinct, since Sir Gardner Wilkinson had never seen it (*Mod. Eg. and Thebes*, i. 441). M. Delile, in his excellent account of the Egyptian flora, merely mentions it by name in his list as the *Cyperus Papyrus*, called in Arabic *berdy*, and found at Damietta,[1] but gives no figure of it. The lotus, greatly prized for its flowers by the ancient inhabitants, is still found in Egypt, though it is not common. The French naturalist above mentioned enumerates three species which formerly grew in that country, one with white flowers, another with blue, and a third with rose-coloured, the last of which is now extinct there. On the botany of Egypt, see Boissier, *Flora Orientalis*, in progress.

Animals.—The zoology of Egypt is not of remarkable interest, although it contains some very curious points. The absence of jungle and of forest, and the little cover thus afforded to beasts of prey, as well as other wild animals, partly causes this; and we observe few birds of beautiful plumage for the same reason.

One of the most characteristic of the beasts is the camel, which is more at home in the dry climate of Egypt than elsewhere out of his native deserts. It has been remarked, however, that the camel, like his master the Arab, degenerates when removed into a city or a cultivated tract, that the former commonly becomes mangy, and the latter experiences a physical and moral degradation. The Egyptian camel is of the one-humped kind, which has been erroneously called the dromedary, whereas the dromedary is merely a swift camel standing in the same relation to the ordinary camel that our saddle-horse does to our cart-horse. Camel's flesh is for the most part eaten only by the peasants and the Arabs of the desert; by the Copts it is considered unlawful food.

It is very remarkable that no representation of the camel has been found in the sculptures and paintings of the Egyptian monuments, among the very numerous figures of the animals of Egypt both tame and wild, and of those brought from foreign lands as presents. It does not appear to have been introduced into other African countries until after the Christian Era (comp. Desmoulins, *Mém. lu à l'Institut*, 28 Juin 1823); but it was known to the Egyptians, although it is by no means certain that it was one of their domestic beasts. Two passages in the Bible which speak of camels in the possession of Pharaohs (Gen. xii. 16; Ex. ix. 3) refer to the time at which foreign tribes had been settled in Egypt; and perhaps the camel was peculiarly the animal of one or all of those tribes, and, as they were hated by the Egyptians, it may have been omitted in the representations of the monuments.

To modern Egypt the camel is very valuable, since the traffic with Syria, Arabia, Western Africa, and Ethiopia is to a great extent carried on by caravans. But the ancient Egyptians appear to have derived their wealth more from tributary presents than from commerce, to have allowed their land commerce to be much in the hands of foreign merchants, like those who brought Joseph into Egypt, and to have left even their sea commerce partly at least to foreigners.

The horse is not known to have been used in Egypt before the time of the Empire. Thenceforward the horses of Egypt were famous, and the armies of the Pharaohs were noted for their war-chariots. From Egypt, Solomon, and in his time the kings of the Hittites and the kings of Syria, had horses and chariots (1 K. x. 28, 29). And long after, when first the kingdom of Israel and then that of Judah endeavoured to throw off the yoke of the great kings of the East, and made alliance with Egypt, they put their trust in Pharaoh's horses (Isa. xxxi. 1). In the representations of battles fought by the kings of the Empire we see no Egyptian cavalry, but only chariots, called "horse" in the inscriptions. At later times they may have had cavalry, properly speaking, of their own, and perhaps at all times among the mercenary or auxiliary forces.

In the present day the horses of Egypt are of a very indifferent breed, and the best that one sees in that country have been brought from Arabia and Syria, but these are seldom of great excellence. It is indeed surprising to find few really good horses in a country bordering on Arabia; and not many years ago this was still more remarkable, though not during the existence of the Memlooks. The finest Arabs, however, are kept in the background by their possessors, partly for fear of the "evil eye," and partly, in the case of all but the highest dignitaries, to avoid their forcible seizure by those of greater rank and power.

The Egyptian ass holds a middle place between that of Great Britain and the wild ass, which is more swift of foot than the horse. It is tall and handsome, docile, and having excellent paces, particularly a quick and easy amble. Thus it is well suited to the narrow streets of the towns of Egypt, and is therefore commonly used for riding by persons of the middle and lower classes. The mules are handsome, but noted for vice, and for not being sure-footed.

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[1] "*Cyperus Papyrus*, Linn.—Arab. *berdy*, Damiatæ." *Description de l'Egypte*, tom. xix. 71. Other *Cyperi* are described at pp. 125-6 and 130-2 of the same volume.

The cattle are short-horned, rather small, and, as of old, very beautiful, speaking artistically. They are exceedingly quiet in disposition, and much valued for agricultural labour by the people, who therefore very rarely slaughter them for meat, and then only for the Franks. Buffaloes of an uncouth appearance and of a dark slaty colour, strikingly contrasting with the neat cattle, abound in Egypt. When voyaging on the Nile, one often sees them standing or lying in the river by herds. They are very docile, and the little children of the villagers often ride them to or from the river. They are sometimes slaughtered, but their flesh is tough and coarse. Sheep (of which the greater number are black) and goats are abundant in Egypt, and mutton is the ordinary butcher's meat. Swine are very rarely kept, and then almost wholly for the Franks, the Copts generally abstaining from eating their meat. It appears that the ancient Egyptians, though not forbidden this flesh, rarely ate it, perhaps because it is extremely unwholesome in a hot climate.

The Muslims consider dogs unclean, and therefore those of Cairo and most of the towns are half-wild and without masters, living upon offal, and upon food thrown to them by humane persons. In the villages, however, and particularly in the Thebaïs, their case is better, for they are kept as guards to protect live stock from thieves, and from hyenas and other wild animals, which come from the deserts by night in quest of prey. The common dog of Egypt is generally of a sandy colour and strong, though not remarkable for courage; but in Upper Egypt, about Thebes, there is a fierce breed of dogs with wiry hair, generally black, and much esteemed for courage by their masters. Cats are as numerous in Cairo as dogs, and many of them are as homeless. They are, however, liked by the natives, who assign as their reason that Mohammad was fond of cats. This may perhaps be regarded as a relic of the veneration in which they were held by the ancient Egyptians. It is not a little curious, that there is at Cairo a royal foundation for the support of destitute cats. The author of this charity was the famous Memlook sultan, Edh-Dhâhir Beybars, whose humane intentions have of late years been sadly neglected by the trustees.

The wolf, fox, jackal, and hyena chiefly inhabit the deserts and waste places of Egypt, and lurk in the ancient tombs and deserted quarries. The wild cat is also found in that country, though it is not common. The weasel abounds in Cairo, and is proverbial for its mischievous and revengeful disposition, and rats and mice are not among the least of the plagues. The ichneumon, jerboa, hare, and hyrax are likewise natives of Egypt or its deserts, and the tame rabbit is kept for food.

The beasts of the chase of the Egyptian deserts are antelopes of various kinds, and the wild ass, esteemed by the Arabs and Persians to be the prince of game, which is found in the southern part of the Eastern Desert. The most beautiful of the antelopes is the gazelle, which is often tamed and kept in the large courts of the houses of Cairo. In Lower Egypt, principally in the desolate marshes near the Mediterranean, the wild boar is found and occasionally hunted. It is, however, a timid animal, so that the sport is not, like boar-hunting elsewhere, exciting and dangerous.

From the representations in the tombs we see that in old times the hippopotamus was one of the wild beasts of the country. It has now retreated above the First Cataract, the southern boundary of Egypt. The crocodile has retreated in the same manner, and instead of being found throughout the Nile in Egypt, is rarely seen even in Lower Nubia. The name of the island of Elephantine, situate a little to the north of the First Cataract, bearing the same signification in hieroglyphics as in Greek, makes it probable that at some remote period elephants were found in Upper Egypt, though now they are not seen north of Abyssinia.

In exploring the tombs and dark parts of the temples the traveller is annoyed by crowds of bats, which extinguish his candle, fly into his face, and cling to his clothes, sometimes rendering examination impossible without a lantern. One species is very large, but the common one is small.

Birds of prey are numerous in Egypt, and of many kinds. Of the most remarkable are three species of large naked-necked vultures—the Arabian, the sociable, and the fulvous; as well as the smaller species called the aquiline vulture. The aquiline vulture has a feathered neck, and when standing is by no means a handsome bird, but it is much to be admired when on the wing from the contrast of the black and white of its plumage, and the steady manner in which it soars in circles. Perhaps the bearded vulture breeds in the most lofty parts of the desolate mountains of the Eastern Desert; for when the French army was in Egypt, one of these birds was killed. It is said to have been of extraordinary size, measuring more than 14 Parisian feet, or more than 15 English, from point to point of its expanded wings. Several species of eagles and falcons, two kinds of hawks, the common buzzard, and the moor-harrier live in Egypt, or visit that country, according as they are migratory, erratic, or sedentary. The common kite abounds at Cairo, and is one of the chief scavengers of the city, the others being the crow, the aquiline vulture, the half-wild dog, and the cat. The ruins and tombs of Egypt, and the modern houses, scarcely ever in perfect repair, shelter owls of various kinds.

The Spanish sparrow, which differs little from that of Britain, the water-wagtail, linnets, and larks are among the birds of Egypt. The kind of kingfisher which is commonly seen on the Nile, perched on some eminence, and darting suddenly to seize a fish, is very inferior in its plumage, which is speckled, black and white, to the common kingfisher, which is also occasionally seen. The beautiful hoopoe is among the least rare birds, and there are also three species of bee-eaters. The hoopoe may be often seen in Cairo, where it is regarded with some reverence, as the bird of Solomon. Crows of the kind which we call the Royston crow are very numerous at Cairo. Birds of the swallow tribe, the woodpecker, and the cuckoo are also known in Egypt.

In the metropolis, in the towns and villages, and in the fields, no bird is more common than the pigeon, tame or wild. Pigeon-fancying is a favourite amusement of all classes at Cairo, and in the villages the pigeon-houses are often loftier than the huts upon which they are raised. Tourists on the Nile inflict great loss on the poor peasantry by recklessly shooting these tame birds. Wild turtle-doves build in the courts of the houses of the capital. These courts often serve for the purpose of poultry-yards, in which fowls wander about without any care being taken of them, except that food is occasionally thrown to them. They are consequently meagre, and produce very small eggs. Turkeys, ducks, and geese are kept in the same manner.

Quails migrate to Egypt in great numbers; and sand-grouse, called by the natives kata, from their cry, are common in the deserts. There also the Arabs, like the ancient Egyptians, hunt the ostrich. A red-legged partridge is likewise found in Egypt.

The islands of the Nile, the sand-banks which appear when the river is low, the lakes and marshes, the sheets of water caused by the inundation, and the mountains near the river, are the favourite resorts of many kinds of wading and of web-footed birds.

Of the waders the most interesting would be the sacred ibis of Egypt, if that bird be now found there. But it does not appear certain that only one species was anciently held sacred, and if so that this is the *Ibis religiosa* of Cuvier now known in Egypt. The Egyptian plover is famous on account of the story, which modern observation has confirmed, related by Herodotus respecting it and the crocodile. Among the most common waders are the spur-winged plover, the snow-white egret, which has been erroneously called the ibis, and the pelican. The cormorant, too, is often seen, as are wild geese and ducks, both of several kinds.

Of the many reptiles the crocodile occupies the first place. It is seldom observed in the present day in Upper Egypt. Some years ago it was usual south of Asyoot to see several crocodiles basking in the sun in the heat of the day on a sand-bank; at the approach of a boat they would quickly plunge into the stream. They rarely attack a human being, but it is unwise to bathe in the river at places where they are reputed to be fierce, and to bathe at any distance from a boat in the part of Upper Egypt where they are found. It is said that the crocodile's common mode of attacking a person on shore, who is near the river's edge, is to approach stealthily and sweep him into the stream by a blow of his tail, the great weapon of all the lizard-tribe. The smaller saurians are found in great numbers: of these a species of chameleon may be mentioned.

Serpents and snakes are among the most common reptiles, and are of various kinds, including the deadly cerastes and cobra di capello. The house snakes, however, which are numerous at Cairo, are harmless.

Fishes abound in the Nile and in the Lake Menzeleh. The modern inhabitants of the country are partial to fish as food, but they say that only those fishes which have scales are wholesome. The fishes of the Nile are generally insipid in comparison to those of the sea; though a few of them, particularly the bulteo (*Labrus niloticus*, Linn.), the kishr (*Perca nilotica*), and the binneo (*Cyprinus bynni*, Arted.), are of a delicate flavour.

One of the commonest insects is the dangerous scorpion. Its sting is very painful, and, if no remedy is applied, sometimes fatal, particularly if a person is stung in the heel.[1] Large spiders are abundant, including more than one species of *solpuga*, incorrectly called tarantulas by the Europeans, and believed by the natives to be very venomous, but this is most likely an error. Egypt has ever been famous for what may be termed insect-plagues, but not to the extent that has been asserted by some modern travellers. Caution will enable one partially to escape the attacks of fleas and bugs, and altogether to avoid the more dreaded insect usually spoken of with them. Beetles of various kinds are found, including that which was anciently held sacred, the scarabæus. Locusts are seldom seen, and very rarely in large numbers. When, however, such is the case, they commit great havoc in the fields and gardens, reminding one of the account of the plague of locusts which preceded the Exodus, and the remarkable passage in the book of Joel (ii. 1–11) describing an invading army as a destructive flight of locusts. Sometimes they merely cross the valley of Upper Egypt, and leave the mark of their passage in desolated fields, entirely stripped of verdure; and at other times they spread themselves for days, or even weeks, over the cultivated lands, committing far more extensive mischief.

Bees are kept in Egypt, and their honey is much prized by the inhabitants, who usually eat it in a clarified state. It is inferior to that of England, and also to the famous Greek honey. Butterflies and moths of many kinds are observed in the fields. There are plantations of mulberry trees in the eastern part of Lower Egypt, for the rearing of silk-worms. The manufacture of silks was a Government monopoly, but has lately ceased to be so. The silks of Egypt are generally inferior to those of Syria and other Eastern countries, though some have been produced of great excellence. Among the other insects may be mentioned the common fly, rightly deserving a place among the plagues of Egypt, as does also the mosquito, which, however, is not found throughout the country.

Ancient Inhabitants.—In the following remarks on the ancient Egyptians great assistance has been derived from the valuable work of Sir Gardner Wilkinson on their Manners and Customs, which has made us better acquainted with them than we are with any other people of antiquity. From the representations of their monuments, and from the mummies which have been unrolled, we can form an accurate idea of the personal characteristics of the ancient Egyptians. In consequence of a misconception of a passage in Herodotus (ii. 104), and confused notions respecting the inhabitants of Africa, it has been often supposed that the Egyptians were very nearly allied to the negro race. A careful examination of the most distinct data in our possession has, however, produced a far different result; and it is now acknowledged that they were more related to the Caucasian than to the negro type. It has also been shown that most of the modern inhabitants have preserved many of the characteristics of their ancient predecessors, and that it is, therefore, erroneous to suppose that they are chiefly of Arab origin, although the intermixture of Arab blood has so much changed the national type that it would not be safe to describe the earlier people from the appearance of the present. Nevertheless, one is often struck, among the remains of ancient monuments, by the similarity of an early representation to some one of the natives standing by, priding himself upon an Arab origin, and repudiating the reproach that he is of the race of Pharaoh.

Judging from the monuments and mummies, the countenance of the ancient Egyptians was oval, and narrower in the case of the men than of the women. The forehead was small and somewhat retiring, but well-shaped; the eyes large, long, and generally black; the nose rather long, and with a slight bridge; the mouth expressive, with rather full lips, and white and regular teeth; the chin small and round, and the cheek-bones a little prominent. The hair was long, full, crisp, somewhat harsh, and almost always black. The beard was worn in so artificial a mode that one cannot judge whether it was full or not. The skin of the men was dark brown; that of the women varied from olive to pink flesh-colour in different persons. The colour of the women was natural, and the darker hue of the men the result of exposure to the sun, and the scantiness of their clothing explains why their faces were not darker than the rest of their bodies.

The dress of the ancient Egyptians did not much vary at different periods. Under Dynasty IV. it was, however, simpler than under the Empire. As most monuments remain of the Empire, the dress of the inhabitants at that time will be described, and this description will apply, in its main particulars, to the earlier and later times of their ancient history.

The men of all classes either had shaven heads, with skull caps, or wore their own hair, or wigs, very full, and in numerous plaits or curls, falling to the shoulders, but sometimes much shorter and in the form of a bag; there

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[1] A little ipecacuanha, made into a paste with water and applied externally to the place stung, has produced, in the many instances in which the writer has known it used, almost instant relief.

indeed, reason to suppose that the practice of shaving
head was universal, except among the soldiers. All
hair of the face was also shaven, except in the cases
kings and great persons, who had a small formal beard,
ossibly artificial, beneath the chin.

The king was distinguished from his subjects by the richness of his apparel. His head-dress was sometimes his own hair, or the wig, alone; and at others he wore the high crowns of Upper and Lower Egypt, the former being a kind of conical helmet, and the latter a short cap with a tall point behind, worn outside the other. He is also occasionally represented with another form of high cap. The figure of an asp, the emblem of royalty, is often tied just above his forehead. His beard was about three inches long, and one inch broad and deep, and formally plaited.

The simplest royal dress was a kilt, usually reaching nearly to the knees, rather full in front, having a girdle above, from which hung before a broad band, richly ornamented, and peculiar to the king, like the lion's tail (natural or artificial) which was attached to it behind, and reached nearly to the ground. Sometimes a large and full shirt was worn over the kilt, descending almost to the ankles, and having wide sleeves reaching to the elbow: this outer dress is occasionally simply a skirt. Both these dresses were usually of white linen, and the outer dress was apparently very fine and transparent. Sandals were worn on the feet, and the ornaments were armlets, bracelets, both flat and broad, and deep necklaces.

The ordinary costume of men of the upper and middle classes was the same as that of the king, the short kilt, with sometimes the long shirt or skirt of fine linen above it, tied in various forms. Their beards were very short, scarcely exceeding an inch in length, and of a formal square shape, and they wore the full hair or wig, or a skull-cap. They generally went barefoot, but sometimes used sandals. The priest was occasionally clad in a leopard's skin, either tied or thrown over the shoulder, or worn as a shirt, the fore-legs forming sleeves. Military personages are often represented with helmets, and sometimes with short coats or corslets of plate-mail. The royal princes were distinguished by a side-lock apparently curiously plaited.

The men of the lower class wore the kilt and girdle alone, or, especially when engaged in laborious work, went altogether naked. They shaved the head and face, and had no head-covering but the skull-cap. The soldiers had kilts of different kinds, and coats or corslets of plate-mail, and either wore full hair or helmets.

The dress of the queen consisted of a tight skirt, descending to the ankles, supported by shoulder-straps, and bound at the waist by a girdle, with long ends falling in front. Over this was usually worn a full shirt of fine linen, with wide sleeves reaching below the elbows, and having a broad skirt falling to the ground. It much resembles the upper dress of the king, or of men of the richer classes. The queen was distinguished by her head-dress, which was in the form of a vulture with outspread wings, the bird's head projecting over the forehead, and the wings falling on either side, while the tail extended behind. Sometimes the queen is also known by the royal asp above her forehead, and at other times she is represented with various forms of head-dress. The queen also wore sandals. (For illustrations of royal dress see COSTUME, vol. vi., p. 457–8.)

The dress of ladies was the same as that of the queen, without the distinguishing ornaments, but they frequently appeared in the under garment or skirt alone. The women of the lower class wore that garment only, and sometimes it was much shorter than that of the ladies, particularly when they were engaged in manual labour. The women's hair was worn in the same manner as the men's, but it was of greater length, usually reaching about half-way from the shoulders to the waist, being rare
and sometimes much shorter. It was ornamented i
ways, but the general form was always the same.

The children of all ranks were very simply
when clad at all, though those of rich persons we
times attired as their elders. Boys were disting
the side-lock, which the princes, as before mention
in a peculiar fashion.

Religion.—The credit which the Egyptian priest
in antiquity for a knowledge of philosophy led
expectation among modern scholars that, when hier
were read, the world would recover a lost body o
speculation. The first results disappointed this ex
but later studies have gone far to justify it. T
ment of what those studies have achieved may b
into the two main subjects—the teaching as to
and that as to man's duties and destinies,
ceremonies coming under both heads.

Had the Egyptians any idea of one God?—in oth
is their religion a complex structure raised
recognized monotheistic foundation? The
religious writings are held by M. de Rougé to
affirmative answer to this question. They spea
supreme being, self-existent, self-producing, the
heaven and earth, called the double god or dou
as the parent of a second manifestation. From th
a supreme deity, at once father and mother, p
second form, probably originated a first triad like
of father, mother, and son frequent in Egyptian m
To the local divinities the attributes of this supr
are given, as though they were mere personificati
they were originally so is, however, not cert
the sun, is indeed spoken of as this supreme b
this appears to have been a later phase of opini
Rougé, "Études sur le Rituel Funéraire," *Rev. Ar*
356 *seqq.*) It was probably an attempt to su
popular materialistic belief for a philosophical
significant instance of this tendency is perhaps
endeavour of a king of Dynasty XVIII. to abol
ship but that of the solar disk—sun-worship
material form.

A very ancient moral tract, the papyrus of
composed under Dynasty V., although a pu
work, mentioning Osiris and a divinity who
of Osiris, yet speaks constantly of God as if th
the idea of one God.[1]

It also appears from one remarkable fact
prevailed in Egypt before the conversion of
Christianity. The Copts took care to elimi
vocabulary all the words connected wit
of their forefathers, substituting for the
valents. Their term for God is, however,
Egyptian, ⲚⲞⲨϮ, the hieroglyphic ne
used it for heathen objects of worship.
These uses must therefore have been
vulgar dialect when it was first written i

Though it cannot reasonably be
Egyptians had a distinct idea of monoth
mixed up with the basest polythei
character which we perceive in the race
both partly Nigritian, partly Semitic,
in the religion. Every town in Eg

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[1] "L'idée abstraite de la Divinité
texte, comme si l'auteur avait la notion de l'
divine. Mais cette manière de parler n'app
à cet antique document. On la rencontre fr
plus modernes et notamment au Rituel. D
celui de Dieu double crocodile suffisent pou
avons affaire à un monument de pure orig
"Le plus ancien livre du monde." *Rev. A*

animal, or fetish, and every town its local divinities. As the animal worship was associated with higher ideas by the union of an animal's head with the body of a man in the figures of divinities, so the local divinities were connected with the monotheistic idea by intermediate forms, principally identifying them with Ra, who thus was the generally received form of the notion of one god. According to this view monotheism was not the parent of polytheism, but in a later phase connected with it.

One great change affected the essential ideas of the Egyptian religion. For many centuries Seth, specially the divinity of Lower Egypt, who seems to have represented then, as certainly afterwards, the destructive power of nature, held a place in the Pantheon, although regarded as the adversary of Osiris and thus of mankind, whom, however, he finally befriends. He seems thus to have a character of necessary evil. At length, after the Empire, he was expelled from the Pantheon. This may have been because the worship of Seth was repugnant to a reigning house of Asiatic origin, which might have held the Persian dualism which identified physical and moral evil. It may have been because Seth had been considered to be the divinity of the eastern neighbours of Egypt, and with their success and the fall of Egyptian supremacy had come to be thought hostile to that country. If this were the cause, the kings who proscribed his worship could have had no relation to the nations supposed to reverence Seth. In effect the change identified physical and moral evil and destroyed the earlier philosophical notions on the subject, besides introducing some confusion into the Pantheon.

Herodotus speaks of orders of gods, Manetho of divine dynasties. The explanation is to be found in the worship at each town of a cycle of gods. This cycle is called "the society of the gods," or "the nine gods." M. de Rougé does not admit the second rendering except as a plural of excellence ("Études," *Rev. Arch.*, n.s., i. 237). The number varies at different places and in different lists at the same place, but is always nearly or exactly nine. The Egyptians themselves explained this cycle as the self-development of Ra; the other gods were in this view his attributes (De Rougé, *l.c.* 236, 237; *Rit.* xvii. 2, 3). Two forms of the cycle acquired the highest importance as representing the systems of the learned men of Memphis and Thebes, the successive great capitals of Egypt.[1]

The two systems are thus given by Professor Lepsius[2]:—

Memphite System.	Theban System.
1. Ptah (Φθᾶ, Ἥφαιστος.)	1. Amen (Ἄμμων, Ζεύς.)
2. Ra (Ἥλιος.)	2. Mentu (Μόνθ.)
	3. Atmu (Τεύμ.)
3. Shu (Σῶς)	4. Shu.
Tefnet.	Tefnet.
4. Seb (Κρόνος)	5. Seb.
Nut (Ῥέα.)	Nut.
5. Hesiri (Ὄσιρις, Διόνυσος), and	6. Hesiri.
(6.) Hes (Ἶσις, Δημήτηρ.)	Hes.
6. (7.) Set (Σήθ, Τυφῶν), and	7. Set.
Nebti (Νέφθυς.)	Nebti.
7. (8.) Har (Ὧρος, Ἀπόλλων), and	8. Har
Hat-har (Ἀθώρ, Ἀφροδίτη.)	Hat-har.
	9. Sebek.
	Tennet [consort of Mentu ?]
	Penit (or Pit ?) [consort of Atmu ?]

The views of Professor Lepsius on the origin and constitution of these systems, with such modifications as later researches have suggested, may now be given. We first observe that the two systems are but variations, and may be treated as one. They consist of male divinities, most of whom are associated with goddesses. These goddesses hold an inferior place, and are not to be counted in reckoning the number of the order, except perhaps Isis, whose importance is much greater than that of the others. An examination of the various forms of the two systems immediately suggests that they increased in course of time, Ptah and Amen, the chief gods of Memphis and Thebes, having been added for state reasons. The order thus reduced consists of two groups, the group of Ra, and that of Osiris. The group of Ra is wholly of solar gods, the group of Osiris begins with Seb and ends with Hathor. Sebek then stands alone, but he is wanting in the older lists, and is only an addition of the Theban system.

The solar group consists of Ra, or else Mentu and Atmu, and Shu. Mentu and Atmu are merely a division of Ra into his two chief phases, the rising and the setting sun, the sun of the upper and of the lower world. Both are solar divinities (Brugsch, *Geogr. Inschr.*, i. 254.) Shu, the solar light, is the son of Ra or of Mentu or Atmu; Tefnet, the goddess associated with him, is the daughter of Ra.

The Osiris group is not genealogically connected with the solar group. The central point of the group is found in Osiris, with his consort Isis and his opponent Seth. Seb and Nut are merely extensions of the group upwards. They are, however, spoken of as parents of the gods, showing that they represent the commencement of a series. Osiris, Isis, Seth, and Nephthys were usually considered their children, and Horus, the child of Osiris and Isis. Hathor is associated with Horus, but her genealogical place is not clear. It is, however, certain that she is of the family of Osiris. The characteristics of this group are predominantly cosmic; this is true of the myth of Osiris, and consequently of the whole group, and is especially evident in the cases of Osiris and Isis, Seth, and Seb and Nut.

How did these two groups come to be united in a single series? Professor Lepsius argues that this was due to the influence of Thinis, the oldest Egyptian royal seat, from which the first historic king Menes came to Lower Egypt and founded Memphis. Thinis at a very early time merged into the more famous Abydos. Abydos was the great seat of the worship of Osiris, which spread all over Egypt, establishing itself in a remarkable manner at Memphis. All the mysteries of the Egyptians and their whole doctrine of the future state attach themselves to this worship. Osiris was identified with the sun, and the union of the two groups was thus not forced. Both had indeed a common origin. Sun-worship was the primitive form of the Egyptian religion, perhaps even pre-Egyptian. The first development was the myth of Osiris, due to the importance of Thinis, just as the rise of Memphis put Ptah, an abstract idea of intellectual power, even before Ra. So the rise of Thebes introduced Amen, who was identified in the form Amen-ra with Ra, and as an intellectual principle placed before the physical solar powers. This argument derives great weight from the relative position given to the two groups, the solar divinities coming first, and from the circumstance that the religious reform under Dynasty XVIII. suppressed everything but material sun-worship, as though this had been the primitive belief of Egypt.[3] M. de Rougé, in his examination of the Egyptian *Ritual*, comes to a similar but more definite result in treating of the mythological elements of the important seventeenth chapter. He traces the solar gods to Heliopolis, and considers the Osiris myth as probably derived from Abydos, and added at a later time.[1] Professor Lepsius does not admit the Heliopolite origin of the solar group, on account of the small political importance of Heliopolis. Yet the circumstance that the chief divinities of that city, which had the sacred name Pe-ra, the abode of Ra, were Atmu, Shu, and Tefnet (*Rit.* xviii. 4, *ap.* Brugsch, *Geogr. Inschr.*, i. 254, *cf.* 255) seems conclusive.[2]

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[1] These have been called the systems of Memphis and Thebes. The local cycle of Memphis was, however, not the system of Manetho which has been called Memphite, and has a distinct local character (Brugsch, *Geogr. Inschr.*, i. 237).

[2] Shu, true spelling since discovered, is here put for Mu.

[3] See Lepsius, *Ueber den ersten Aegyptischen Götterkreis und seine geschichtlich-mythologische Entstehung*," Berl. Akad., 1851.

Some account may now be given of these divinities in the order of the lists, the later additions being noticed last and then lesser divinities. It will be impossible to give more than the simplest particulars, and many names in the Pantheon must be omitted altogether.

Ra, the sun, is usually represented as a hawk-headed man, occasionally as a man, in both cases generally bearing on his head the solar disk, round which the uræus, symbolic of royal power, is sometimes coiled. His symbol is either the solar disk or the hawk. Ra had the most general worship of any Egyptian divinity, except Osiris. The worship of Osiris under his own name was more common than that of Ra under his, but this was in some degree compensated for by the union of Ra with other gods besides solar ones, such as Amen, Num, Sebek, forming the compound divinities Amen-ra, Num-ra, Sebek-ra (Lepsius, *Erst. Aeg. Götterkreis*), and by his being the type of sovereignty, so that each king was a Ra son of Ra. This importance of his worship was due to the adoption of Ra as the leading representative of the supreme being, from whom indeed he is sometimes undistinguishable in the *Ritual*, though as already noticed this does not seem to have been the primitive opinion, for there are evidences of his inferiority to the supreme god and to Osiris (De Rougé, "Études," *Rev. Arch.*, n.s., i. 358). In the religious paintings he is the supreme being, carrying on in his course a constant warfare with and triumph over evil, represented by the great serpent Apap, a wholly evil being, not a divinity. His career resembles that of Osiris, but with notable differences. Ra is purely solar. He is rarely associated with any consort, and if so associated his consort is a female Ra (Lepsius, *Erst. Aeg. Götterkreis*). He is always victorious. He protects mankind, but has nothing in common with them. Osiris on the other hand is only solar because he is the beneficent power of nature. He is constantly associated with Isis. He has a life-long conflict with a maleficent power, his brother or son Seth, who is not wholly evil. Vanquished and killed he recovers his life and wins, but it is rather Horus his son who wins, and Horus, a sun-god, is the direct link with Ra in the Osiris family. Osiris protects mankind because his life resembled theirs: if he did not live on earth, at least his tomb was shown there. At Heliopolis two animals sacred to Ra were reverenced, the black bull Mnevis, sacred to Ra and Atmu, and the Phœnix (Bennu) sacred to Ra. Both are connected with Osiris, the bull by the worship of Apis at Heliopolis, the Phœnix as also representing Osiris (Brugsch, *Geogr. Inschr.*, i. 257, 258). In addition the sacred Persea-tree was reverenced at Heliopolis.

In the attempt under Dynasty XVIII. to establish sun-worship in an original or ideal simplicity, the only representation is the solar disk with the uræus entwined round it, and rays ending in human hands, one of which offers the symbol of life to the worshipper. The great sun-temple then founded contained no statue whatever (Lepsius, *Erst. Aeg. Götterkreis*).

Mentu and Atmu may best be noticed together as merely two phases of Ra, representing, as already stated, the rising and the setting sun, the sun of the upper and the lower world. Their twin-character is seen in the circumstance that Mentu was worshipped at Southern An (Hermonthis) and Atmu at Northern An (Heliopolis, the On of the Bible). Mentu, or Mentu-ra, is represented as Ra with the tall plumes of Amen, Atmu in a human form. Both cannot be distinguished from Ra except that probably their attributes were more restricted, and while Mentu seems to be within limits identical with Ra, the human form of Atmu may perhaps hint a relation to Osiris.[3]

Shu is light, and is a type of celestial force, for he is represented supporting the goddess of heaven. M. de Rougé remarks that it is curious to find in this ancient cosmogony the principle of force identified with the luminous principle ("Études," *Rev. Arch.*, i. 235, 236). His figure is human and he sometimes bears on his head the ostrich-feather, which, though the initial of his name, must here have its symbolical sense of "truth." The relation of light and truth is not less remarkable than that of light and force. Tefnet, associated with Shu in the cycle, is represented with the head of a lioness. This is the most common compound form of Egyptian goddesses, as the hawk-headed of the gods. Both are connected with solar worship. The lioness was probably chosen as the highest form of the family to which the luminous-eyed cat, one of the most popular of the sacred animals, belonged.

Seb stands at the head of the family of Osiris. He is represented in human form like his consort Nut. They are called "father of the gods" and "bearer of the gods." Seb was the god of the earth (De Rougé, *Ibid.* 238), and Nut the goddess of heaven. Her name means the abyss, though curiously the primordial abyss is called, in ch. xvii. of the *Ritual*, *nu*, in the masculine (*Ibid.* 359).

Osiris, in Egyptian Hesiri, is usually represented as a mummy, wearing the royal cap of Upper Egypt, which may indicate the Thinite origin of his worship, or that, as Horus and Seth were the special divinities of Upper and Lower Egypt, so he was particularly connected with the upper country. His cap is usually flanked by ostrich plumes, which probably have a reference to Ma-t the goddess of truth and justice. The myth of Osiris is the most interesting because the most human part of Egyptian mythology. It is impossible to attempt a full account of it: the materials have yet to be gathered. We cannot accept the treatise *On Isis and Osiris* as representing the older form of the myth. In different documents we seem to trace its growth, and notably do we find in those later than Dyn. XXII. the change due to the altered theory of good and evil. Yet the general outlines are the same in what we may reasonably hold to be the earliest documents. It is these that are, as far as possible, used here.

Osiris is essentially the good principle: hence his name Un-nefer, the good being, rather than the revealer of good (Maspero, *Histoire Ancienne*, 38). Like Ra he is the creator, and like him is in perpetual warfare with evil. His brother, or son, Typhon, Seth (Set), is his opponent. They are light and darkness, physical good and evil, the Nile and the desert, Egypt and the foreign land. Osiris is certainly moral good, Seth is to a certain extent moral evil. Throughout the *Ritual* they are in conflict for right and wrong, for the welfare and destruction of the human soul. In ch. xvii., which was preserved intact from a remote age, this conflict appears. Seth is, however, not there distinctly named as the opponent of Osiris, except in the glosses, which may be as old or (like the case of the Mishna and the Gemara) older than the text, and once in the text he appears as joining with Horus his adversary in accomplishing the final condition of the deceased who had reached the abode of happiness (ver. 35); and on the other hand, one gloss explains the executioner of souls to be Seth, but otherwise Horus the elder, brother of Osiris, who is but a variation of the younger Horus (ver. 33). Yet the opposition of Osiris and Seth is a perpetual combat. Osiris is vanquished. He is cut in pieces and submerged in the water. Watched by his sisters, Isis his consort and Nephthys the consort of Seth, he revives. Horus his son avenges him, and with the aid of Thoth, or reason, he destroys the power of Seth, but does not annihilate him. The myth is a picture of the daily life of the sun combating darkness yet at last succumbing to it, to appear again in renewed splendour, as the young Horus a solar god triumphs over Seth. It is also a picture of human life, its perpetual conflict and final seeming destruction, to be restored in the new youth of a brighter existence. In this view suffering is not wholly evil, but has its beneficent aspect in the accomplishment of final good. There are two ways of explaining the origin of this myth. Either we may regard Osiris as the sun of the night, and so the protector of those who pass away into the realm of shades, or we may suppose that once taken as the type and ruler of mankind in the after state, the hidden sun was naturally chosen to represent him, the sun being with the Egyptians the source and governor of all life. Those who make the solar idea the first form of the myth have to explain its specially human aspect, and particularly why we see no such aspect in any deep sense in the case of Atmu the sun of the night in the group of solar divinities.

It will be easily seen how such a story took hold of the affections of the Egyptians. Osiris was the type of humanity, its struggle, its sufferings, its temporary defeat, and its final victory. The living, and still more the dead, were identified with him. Under his name, without distinction of sex, they passed into the hidden place

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[1] [illegible] dans tous ces caractères, les [illegible] [illegible] l'élément primitif d'Abydos, [illegible] (*Rev. Arch.*, n. s., i. 359, 360). M. Maspero, on the other hand, writes "Originairement Osiris est le [illegible] principale [illegible] Ra, [illegible]" (*[illegible]*, 18[illegible], 1[illegible]).

[2] Shu is, however, not mentioned among the divinities of Heliopolis in the great Papyrus of Rameses III. (*Records of the Past*, vi. 32 *seq.*).

[3] In the 17th chapter of the *Ritual* the justified dead is called [illegible] Tum equivalent to Atmu. This may be merely because the word *tum* has the sense man, and may be thus a play upon the name of the divinity (*cf.* De Rougé, "Études," 356, 361), but it is more likely that Tum is here used as Osiris everywhere to indicate the divine quality of the justified.

(Amenti), the divine world below (Ker-neter), to be protected by him in their conflict with Seth and his genii, and to have their final state determined by him as their judge. It was to Osiris that the prayers and offerings for the dead were made, and all sepulchral inscriptions, except those of the oldest period, are directly addressed to him. As Isis is a form of the female principle, Osiris, the sun and the Nile, was considered in one phase to be the male principle. The Osiris of Mendes was the name of this form, which was more especially known by the name of Mendes.

The three most famous of those more sacred animals which were worshipped as individuals, not as a class, were the bulls Apis and Mnevis and the Mendesian goat. Of these Apis and the Mendesian goat were connected with the worship of Osiris. Manetho says that all these animals were first reckoned among the gods under a very early Egyptian Pharaoh, Kaiechôs, in Egyptian Ka-kau, second king of Dyn. II.[1] It is very characteristic of the Egyptian religion that the reverence for Osiris should have taken this grossly-material form.

The bull Apis, who bears in Egyptian the same name as the Nile, Hápi, was worshipped at Memphis. Here M. Mariette discovered a series of the tombs of these bulls, with tablets recording the reigns in which they were buried, and in several cases further exact particulars of date, thus affording important chronological evidence. Apis was considered to be the living emblem of Osiris, and was thus connected with the sun and the Nile, and the chronological aspect of both explains his being also connected with the moon. On the death of an Apis, a successor was sought for and recognized by certain marks. He was then inaugurated and worshipped during his lifetime. (See APIS.)

Sarapis, or Serapis, in Egyptian Hesiri-Hápi, is the defunct Apis, who has become Osiris. The great extension of the worship of Sarapis, after the importation of his statue by Ptolemy I., was merely a development of long existing Egyptian ideas. Hence the rapid spread and great popularity of this worship. (See SERAPIS.)

The Mendesian goat had no special name. He is called the Ram. He was considered an emblem of Ra and Shu as well as of Seb and Osiris, but probably he was chiefly sacred to Osiris, and in his solar aspect, which would thus introduce the relation to the more markedly solar gods. The seat of his worship was Mendes in the eastern part of the Delta, where Dr Brugsch has discovered a very interesting stele of the reign of Ptolemy II., Philadelphus, giving the history of the finding and inauguration of a sacred ram, and of the honour paid to him and to his temple. His worship was similar to that of Apis, but of a grosser form, inasmuch as the goat or ram was a symbol of the productive force of nature.[2]

Isis, or Hes, represented as a woman bearing on her head her emblem the throne, or the solar disk and cow's horns, is the female form of Osiris. Unlike Ra, the Osiris family have consorts; but no one is so distinctly as Isis a counterpart and of equal importance. Though the place of Isis is not as significant as that of Osiris in the myth to which they belong, she is necessary to it, and this is probably the reason why she attained an importance beyond the other Egyptian goddesses except only Hathor, who is but another Isis.

Seth, the Egyptian Set, usually called by the Greeks Typhon, is represented with the head of a fabulous animal, having a pointed snout and high square ears. He was the brother or son[3] and opponent of Osiris, the divinity of the enemies of Egypt, and the chief of the powers which fought with the human soul in the after life. He certainly represents physical evil. It would be easy to account for his worship in Egypt were it not for his appearing as the enemy of gods as well as of men. There is indeed something illogical in his holding a place in the Pantheon, which gains consistency by his expulsion, though the consequent confusion of moral and physical evil was detrimental to ethical ideas. It is remarkable as showing the Egyptian notion of Seth while he was still worshipped, that in the Tombs of the Kings at Thebes, those whose names are composed with his, Setee I. and II., and Set-nekht, use instead the name of Osiris. This seems to have been sometimes done afterwards by a change in the inscriptions, but still at the time when the tombs were first completed, and thus while the reverence of Seth, as is shown by these royal names, was in full bloom (Lepsius *Erst. Aeg. Götterkreis*). The subsequent change of opinion as to Seth, his identification with moral evil, and his consequent expulsion from the Pantheon have been already noticed. In consequence his figure and name are usually effaced on the monuments, and other gods take his place in the cycles in which he had a position. In later times Seth is the enemy of all good, feared and hated, but no longer reverenced. The date of the change is as yet undetermined. It has been usually assigned to the Bubastite kings who composed Dyn. XXII. M. Mariette has discovered the curious fact that one of those kings, a hitherto unknown Osorkon, altered the figure of Seth in the legends of Ramses II. at Tanis to that of a Set-Ra (*Musée Boulak*, p. 273). Was this the beginning of the change?

Nephthys, or Nebti, the sister of Osiris and Isis, and consort of Seth, does not, as far as the Egyptian documents tell us, share his character. It is rather as the sister of Isis that she there appears, aiding her in her labours to recover and revive Osiris. Thus like Isis she is a protector of the dead, and her figure and worship escaped the fate of those of Seth.

Horus, or Har, is in the cycles the son of Osiris and Isis. There is also a Horus the elder, Haroëris, Har-oer, brother of Osiris, and a Horus the child, Harpocrates, Har-pe-khruti, son of Osiris and Isis, and two other forms, Har-Hut, the Horus of Hut or Apollinopolis Magna, and Har-em-akhu, "Horus in the horizon." Horus is generally hawk-headed, and thus a solar god connected with Ra. This connection is perhaps strongest in the form Har-em-akhu, worshipped at Heliopolis sometimes even as Ra-Har-em-akhu. The most interesting form is that of Horus as the son and avenger of Osiris. Osiris being identified with the sun of the night, Horus is naturally the sun of the day. From this identification arose the idea of an infant Horus as the rising sun. As Horus took the place of Osiris in the contest with Seth, he became the elder Horus, to be on an equality with his opponent, who seems oftener the brother than the son of Osiris. Specially Horus is the ruler of Upper Egypt, and the typical king of Egypt as much as Ra. It is indeed so hard to distinguish Horus from Ra that it seems impossible to hold any opinion but that they had their origin in separate religious systems.

Hathor, Athor, or Hat-har, whose name means "the abode of Horus," is hard to distinguish from Isis.[4] She was worshipped with Isis at Dendarah (Dümichen, *Bauurkunde der Tempelanlagen von Dendera*, 3, 4) and Dr Brugsch even supposes the local goddess to have been Isis-Hathor (*Geogr. Inschr.*, i. 202, 203), but this he has not proved, for the representations and titles are different for the two goddesses (*cf.* Dumichen, *l. c.*). The cow was sacred to both Hathor and Isis, and both wear the disk and cow's horns. Hathor in the form of a cow plays an important part in Amenti (*cf.* Dümichen, *ibid.* 21; Mariette, *Musée Boulaq*, 118, 119). Curiously she is more widely reverenced than even Isis. She is really the female counterpart of Osiris. She was, like him, worshipped throughout Egypt, and the great temple of Adfoo contains a list of over three hundred names of the goddess in her local forms (Dümichen, *ibid.* 20). Still more remarkably, in late times, the cow, here the symbol of Hathor, not seldom takes the place of the name of Osiris as applied to women deceased: instead of taking the form of Osiris, they take that of Hathor (*Ibid.* 21). It is characteristic of the Egyptian religion that this irregularity should occur, and we may well hesitate to attempt to define the place of Hathor in the Pantheon (Mariette, *Musée Boulaq*, 118), though M. Dümichen has made this endeavour in a very interesting passage, that could be accepted had he given sufficient authority from the monuments, and not shown traces of the influence of Greek interpretation, besides too great a tendency to reason on the negative evidence of the simple statements of the earlier monuments (*Ibid.* 20, *seqq.*).

Phtha, or Ptah, the Egyptian Hephæstus, is the first to be noticed of the divinities introduced into the chief cycles after their formation. His name is one of the Egyptian words which can be recognized letter for letter in Hebrew (פָּתַח "he opened, began," and (Piel) "carved"); and the sense is similar. Ptah is thus the divine architect (*cf.* Brugsch, *Histoire*, 2d ed., 21). He was the chief god of Memphis, worshipped under a human form, sometimes as a pigmy, supposed to be an embryo. He was the creative force, but seemingly not as the sun. Though when connected with the local form of Osiris worshipped at Memphis under the name Sekeri-Hesiri, and then called Ptah-Sekeri-Hesiri, he is sometimes hawk-headed, this is rather with a reference to Horus than to Ra. Perhaps Professor Lepsius's view that he is put before Ra in the Memphite form of the cycle as an abstract idea of intellectual power is the true one. If so, it seems probable that the worship of Ptah was of foreign origin.

Ammon, the Egyptian Amen, "the hidden," probably owed his importance to the greatness of Thebes, the chief Egyptian seat of his worship. He seems to derive his characteristics from his association with other gods. As Amen-ra he takes the qualities of the sun; as Amen-ra ka-mut-f, "the husband of his mother," he takes these of Min or Khem, the productive principle. Rarely he has the ram-headed form that Greek notions would lead us to expect.

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[1] M. de Rougé has noticed that the name of this king, "the male of males" or "the bull of bulls," may be connected with the cultus of the sacred bulls, while that of Binôthris, his successor, contains a symbol, the ram, interchangeable with the goat, which makes it look like a second commemorative medal (*Six Prem. Dyn.*, 243, 244). If this be so the names of these early Pharaohs must have been taken on their accession or on some remarkable event, like the throne-names after the introduction of that second name. A change of name during a king's reign for a religious reason is seen in the case of the sun-worshipping Amenoph IV., who took the name of Khu-en-aten.

[2] *Records of the Past*, viii. 91 *seqq.*, where the stele of Mendes is translated.

[3] It has been usual to call Seth the brother of Osiris; Dr Brugsch prefers to style him his son (*Hist.*, 2 ed. p. 20, 22). This double relationship is the key to the similar position of Horus, and the identity of Hathor and Isis.

[4] Dümichen considers Hathor as the female principle to be identical with Isis (*Bauurkunde von Dendera*. 20).

Sebek, the crocodile-headed god, seems to have held a similar place to Seth. There may have been a time when he was reverenced throughout Egypt, but in the Græco-Roman period he was a local divinity so disliked in most parts of Egypt that, as already noticed, the Arsinoïte nome where he was worshipped does not appear in the geographical lists. His sacred animal the crocodile was held in abhorrence and hunted wherever Sebek was not reverenced (*cf.* Brugsch, *Hist.*, 2d. ed., 106, 107).

Thoth, or Tauut, is the head of the second cycle in the two principal forms of the cycles. As the chief moon-god he thus takes an inferior place corresponding to that of Ra. He is generally represented as ibis-headed, and frequently bears the disk and crescent of the moon. He is the god of letters and of the reckoning of time, and thus sometimes has solar attributes. The ibis and the cynocephalus were sacred to him. As the deity of wisdom he aids Horus in his conflict with Seth, and records the judgment of the deceased before Osiris. He appears in Phœnician mythology, though not at a period early enough for us to infer that his worship was not borrowed from Egypt. Yet it is not impossible that here, as in the case of Phtha, we have a trace of early Eastern influence. It is at least remarkable that the great seat of his worship, Hermopolis Magna, bearing in ancient Egyptian the civil name Sesennu, also Pe-sesennu and Ha-sesennu, Eight, or the Abode, or House of Eight, is called in Coptic ϢⲘⲞⲨⲚ, or ϢⲘⲞⲨⲚ Ⲃ̄ (-ⲤⲚⲀⲨ, two), where the numeral eight approaches the Semitic form (Brugsch, *Geogr. Inschr.*, i. 219). Was the change in the Coptic numeral due to an ancient form of the name of this celebrated city?

Ma-t, the goddess of truth, succeeds Thoth in a fragment of the list of the dynasties of the gods in the Turin chronological papyrus. She is characterized by the ostrich-feather, the emblem of truth, upon her head. She thus corresponds to Shu, holding the corresponding place. Thoth is called her husband (Lepsius, *Königsbuch*, taf. iii. 22), but she is not his consort at Hermopolis (Brugsch, *Geogr. Inschr.*, i. 220). She is the daughter of the sun. Her place in the myth of Osiris is very important, for it is in her hall, where she is called the Two Truths, that the deceased are judged.

Anubis, or Anup, jackal-headed, probably held in one system the next place to Ma-t. He belongs to the family of Osiris, being called the son of that divinity. He presided over mummification. In the earliest sepulchral inscriptions the divinity addressed is Anubis, not Osiris. No reason has yet been discovered for this. There can be little doubt that Osiris was always intended, and that the earliest inscriptions, for some reason connected with the Egyptian reticence as to this divinity, address Anubis.

The four genii of Amenti were inferior divinities connected with embalming. They were called Amset, Hâpi, Tiu-mut-f, and Kebhsenuf. The vases found in Egyptian tombs which bear covers in the forms of the heads of these genii were intended to contain the viscera of the mummy, as it was held to be of importance that every part of the body should be preserved.

The rest of the principal Egyptian gods may now be noticed as far as possible in the order of their importance. It must, however, be remembered, that we are likely to be misled by the abundant monuments of Upper Egypt, and the scantiness of those of Lower Egypt, and that therefore we cannot yet decide which were insignificant members of the Pantheon.

Chnuphis, or Khnum, represented with a ram's head, and to whom the ram was sacred, is the soul of the universe, and thus is spoken of as the creator (Mariette, *Musée Boulaq*, 113). He was specially worshipped in Nubia, and at the First Cataract, with his consort Sati, the goddess of the inundation (Brugsch, *Geogr. Insch.*, i. 150, *seqq*). He is closely connected with Amen.

The Egyptian Pan, the god of Panopolis, or Chemmis, was Min, or Khem, the productive principle, a form of Osiris. He was worshipped at Panopolis with a form of Isis as his consort (Brugsch, *ibid.*, 212, *seqq.*) It is remarkable that he was connected with Amen at Thebes, for the myth of Amen and that of Osiris are singularly apart.

Mendes, or Ba-neb-tet, is merely a local form of Osiris, lord of Mendes, connected with the worship of the sacred ram, or Mendesian goat (Brugsch, *ibid.*, 267, 268, 271, 272; *Records of the Past*, viii. 91).

Neith, or Nit, worshipped at Sais, identified by the Greeks with Athena, is one of the few goddesses who held the first place in local worship. From the idea of a supreme being, single and self-producing, arose that of a female aspect of this being. Thus Khnum is called, as representing this being, "the father of fathers, the mother of mothers" (Mariette, *Musée Boulaq*, 113). This would suggest the personification of a female principle. This principle seems specially represented by the higher goddesses, like Neith, who is called "the mother who bare the sun, the first born, but not begotten, born" (Brugsch, *Geogr. Inschr.*, i. 247). She wears the crown of Lower Egypt, where she was principally worshipped.

Pakht, or Sekhet, and Bast, are two forms of one goddess difficult to distinguish. They are both usually lioness-headed, though sometimes they have the head of the cat, their sacred animal. Pakht was worshipped at Memphis as the consort of Phtha; Bast seems to have held a place at her city Bubastis like that of Neith at Sais. The monuments identify Hathor with Bast, and Isis with both Pakht and Bast, Hathor being called "Lady of Bubastis," while Isis is spoken of as "bringing misfortune as the goddess Pakht, bringing peace as the goddess Bast" (Champ., *Not. Man.* 192, *ap.* Brugsch, *Geogr. Inschr.*, i. 276). Pakht and Bast thus represent a double nature, not unlike the two principles in the Osiris myth (Mariette, *Musée Boulaq*, 1106; Brugsch, *Geogr. Inschr.*, i. 275, 276). Pakht and Bast were identified with Artemis (Brugsch, *ibid.*, 224, 275).

Mut, the "mother," consort of Amen-ra at Thebes, is, as her name implies, another embodiment of the female principle, though not in so important a form as Neith, so far as our present knowledge goes.

Khuns, worshipped at Thebes as the son of Amen and Mut, is a lunar divinity wearing the disk and crescent of the moon, his hair being plaited in the side-lock of a child. Sometimes he is hawk-headed, and thus connected with the sun. As a divinity mainly lunar his inferior place is accounted for.

The goddess Suben, identified with Eileithyia or Lucina, was worshipped at the town Eilethyia. She was especially the mother-goddess, and the goddess of southern Egypt; her symbol, that of maternity, was the vulture (Mariette, *Musée Boulaq*, 121).

The goddess corresponding to Suben was Uati, or Buto, who was the protector of the north, and whose emblem was the uræus serpent.

Onuris, or Anher, was the local deity of the ancient city of Thinis. His functions are not clearly defined.

Imhotep, identified by the Greeks with *Æsculapius*, was the son of Ptah and Pakht, and with them formed the triad of Memphis. He is probably the god of the sciences, and similar to Thoth (Mariette, *ibid.* 117, 118).

The Nile as a divinity bears the same name as the sacred Memphite bull, Hâpi, probably meaning "the concealed." He is represented as a man with pendent breasts, to indicate the fertility of the river. A hymn to the Nile by Enna, who flourished under Menptah, the successor of Rameses II. (Dyn. XIX.), shows how completely even an inferior Egyptian divinity was identified with the supreme god, and with the principal members of the Pantheon (*Select Papyri*, xx.–xxiii., cxxxiv.–cxxxix.; Maspero, *Hymne au Nil*, a critical edition, and *Records of the Past*, iv. 105, *seqq.*, an elegant translation by the Rev. F. C. Cook).

The Egyptian divinities were frequently associated in triads, temples being dedicated to one of these lesser cycles, consisting of father, mother, and child. The child is almost always a son. It is extremely difficult to make out a local triad in several cases, where there were two chief local divinities, or where the chief divinity was a goddess. At Thebes the triad was Amen-ra, Mut, and Khuns; at Memphis, Ptah, Pakht or Sekhet, and Imhotep; at Ombos there were two triads, Sebak, Hathor, and Khuns, and Haruer, Tasen-nefert, and Pnebto-pkhrut; the triad of Nubia and at Elephantine was Num, Sati, and the goddess Ank-t; at Apollinopolis Magna, Har-Hut, Hat-har, and Har-pkhrut; at Latopolis, Num, Nebuut, and Har-pkhrut; at Hermonthis, Munt, Ra-ta, and Har-pkhrut; and Osiris, Isis, and Horus, throughout Egypt. The third member of the triad always belongs to an inferior rank, and is sometimes a child-god (khrut), as will be observed in the three cases in which Har-pkhrut (Harpocrates) occurs, and the similar instance of Pnebto-pkhrut. Much of our knowledge of the Egyptian triads is founded on late documents of the Ptolemaic and Roman temples, and it is possible that the idea may have not been as much developed in earlier times. The whole subject requires a careful investigation.

The Egyptian notions as to the cosmogony are too closely identified with mythology to be very clearly defined. It seems, however, that they held that the heavenly abyss was the abode of the supreme deity, who there produced the sun and the moon as well as the rest of the Pantheon. Yet it is stated in one gloss in the *Ritual* that the abyss itself was the supreme deity. (*cf.* De Rougé, "Études," *Rev. Arch.*, n.s., i. 235, se[illegible] ane aspect of the passage of the *Ritual* in which [illegible] id[illegible]as are developed some as if due to the [illegible] introduce philosophical ideas into the mytho[illegible] ugh the Egyptians had some notion of the c[illegible] ge independent of that mythology.

The worship of the Egyptian deities was public and private—that of the temples and that of the tombs. Every town had at least one temple dedicated to the chief divinity of the place, with certain associated gods, and usually, if not always, a living symbol in the form of a sacred animal supposed to be animated by the chief local divinity. The services were conducted by priests, and on occasions by the king, and by scribes, who sometimes formed a college and lived at the temples, the various duties of which required the services of learned men. It is probable that the common people had a very small share in the religious services, the most important of which took place in the smaller inner chambers, which could never have admitted many worshippers. The outer courts, and still more the great inclosures containing the whole group of temple-buildings, must, however, have been the chief public resort for business and pleasure. There were no other public buildings, or, apparently, market-places. Like the modern mosque, the temple must have been the chief centre of the population.

The worship in the tombs was not local. It was always connected with Osiris or a divinity of the same group, and had the intention of securing benefits for the deceased in the future state. It took place in the chapel of each tomb of the wealthy; and though properly the function of the family, whose members officiated, the inscriptions invite all passers-by, as they ascend or descend the Nile, overlooked by the sepulchral grottoes, to say a prayer for the welfare of the chief person there buried.

The sacrifices were of animals and vegetables, with libations of wine, and burning of incense. Human sacrifice seems to have been practised in early periods. The monuments do not mention it, but Manetho speaks of its having been abolished, at least at one place, by Amôsis, no doubt the first king of Dynasty XVIII. The reference is probably to some barbarous usage during the great war with the Shepherds.[1]

The origin and destiny of man in the Egyptian religion is now known to us on the authority of its own documents, which in the main confirm what Greek writers had already stated on the subject. The aspect of the Egyptian teaching is either that of a simple theory, which was afterwards mythically interpreted, or of a union of such a theory with a superstition existing side by side with it. In the famous seventeenth chapter of the *Ritual* it is possible, as De Rougé has done with extraordinary skill, to extract from the text a consistent theory which the glosses confuse by the mythological turn they give to the simple statements of the text. Notwithstanding this difficulty, it is sufficiently clear that the Egyptians attributed to the human soul a divine origin, that they held that it was throughout life engaged in the warfare of good and evil, and that after life its final state was determined by judgment according to its doings on earth. Those who were justified before Osiris passed into perpetual happiness, those who were condemned into perpetual misery. The justified took the name of Osiris, the judge, under which they indeed already appeared for judgment.

Had this plain outline been left unfilled by the priests, the Egyptians might have been credited with a lofty philosophy. Unfortunately, however, a thousand superstitions took the place of the attempt to lead an honest life. In the tombs we find every one who could pay for a sculptured record characterized as justified, every mummy already an Osiris. How was this determined? Possibly there was a council held, which decided that the deceased could be treated as one who was certain of future happiness. It is, however, more probable that the learning certain prayers and incantations, the performance of ceremonies, and the whole process of embalming, together with the charms attached to the mummy, and prayers said by those who visited the tomb, were held to secure future happiness. In reading the *Ritual* we are struck by the small space given to man's duties as compared with that filled by incantations and charms. The human mind must have lost sight of the value of good and seized upon the multifarious equivalents which needed nothing to be done by way of either self-restraint from evil or active benevolence. Thus as we look at the documents we see a noble idea lost in a crowd of superstitious fancies; as we look at the Egyptians as they lived, we trace the effect of the indomitable good, and yet find it always greatly alloyed with evil. The Egyptian idea of the future state is the converse of that of Socrates. It is no little incident of human weakness, like the request to sacrifice a cock to Æsculapius, which injures but does not destroy a harmonious whole; a mere glimpse of truth is seen through thick mists peopled with the phantoms of the basest superstition.

In the long course of ages the Egyptian ideas as to the future state seem to have undergone changes, not in themselves, but in the manner in which they were regarded. The vast labour expended on the Pyramids, and their solid simplicity, are in striking contrast with the elaborate religious representations of the tombs of the kings of Dynasties XIX. and XX. So, too, the sculptures on the walls of the tombs of subjects of the earlier kings, representing the everyday life of duty and pleasure, give place to funereal and religious scenes in the later periods. These were fashions, but they show the changed mood of the national mind. It is only in a tablet of the age of the Ptolemies that Greek ideas assert their predominance in a touching lament addressed from the land of shades, which no longer speaks of active happiness, but in its place of purposeless oblivion (Birch, "Two Tablets of the Ptolemaic Period," *Archæologia*, xxxix. 22, 23).

Laws and Government.—We are gradually gaining an insight into the Egyptian laws. This is principally due to M. Chabas, the third volume of whose *Mélanges Égyptologiques* mainly consists of essays, nearly all by himself, on texts relative to the administration of justice under the Pharaohs. His general results confirm the accuracy of what Diodorus Siculus and Plutarch state on the subject. It was to be expected that their evidence would have been good as to matters which could not have been easily misunderstood, and which must in the case of Diodorus have been personally observed. In this matter the two sets of authorities may fairly be combined.

The government of Egypt was monarchical. It was determined as early as the rule of Dynasty II., according to Manetho, that women could reign. Accordingly we find instances of queens regnant. Their rule, however, seems to have been disliked, and they are passed over in the lists made under Dynasty XIX., when, it may be observed, the royal family seems to have been affected by Shemite influences. The royal power can scarcely have been despotic, although under certain kings it became so. It is sufficient to compare Assyrian and Babylonian with Egyptian history and documents to perceive a marked difference. The earliest monuments indicate a powerful local aristocracy holding hereditary functions. Those of the Empire (Dynasties XVIII.-XX.) scarcely indicate any such class. Even the princes are no longer a royal clan, but the children of the reigning sovereign. The whole system of government rests with the king, who appoints all the functionaries and dismisses them at his pleasure. Hence arose a vast and corrupt bureaucracy, to which the decay of Egypt may have been mainly due. At all times the country was governed by nomarchs and lesser officers. In the earliest period these were local magnates whose office was at least sometimes hereditary, and whose interest it was to promote the welfare of their districts. Under the Empire governments seem to have been mere places of profit given by favour and held by force and corruption, according to the Turkish method.

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[1] According to Plutarch, Manetho stated that human sacrifices were anciently practised at Eilethyia (*De Is. et Osir.* i. cap. 73); whereas Porphyry says, on the same authority, that Amôsis abolished them at Heliopolis (*De Abstin.*, p. 199). As, however, according to Porphyry they were sacrificed to Hera, who would well correspond to Suben, goddess of Eilethyia, not to any goddess of Heliopolis, it is probable that Heliopolis is an error for Eilethyia (Ἡλιοῦ πόλει for Εἰληθυίας πόλει, as in the other passage where this is a correction for Ἰδιθυιας πόλει), but the two citations are very different. According to Porphyry, Amôsis substituted waxen figures for the victims. The figure called the "Bride of the Nile," now annually thrown into the river at the cutting of the Canal of Cairo, is said to represent a girl annually sacrificed in former times.

The laws were administered by judges appointed by the king. It is certain that commissions for an occasion were thus formed. We do not know that there were judges appointed for life; but it is probable that such was the case, as it must have been the duty of a class to be thoroughly acquainted with the written laws. A legal scribe may, however, have been attached to each commission.[1] All the particulars of each case, though not necessarily submitted in writing, were recorded, and the decision was written. The process was conducted with great care, and the culprit examined on his oath. The punishments probably were not extremely severe. For murder, but not for manslaughter, death was the penalty. Adultery was severely punished, perhaps rather by custom than by law. Theft was rigorously prosecuted. For sacrilegious theft the criminal was punished with death. The laws relating to debt are not yet well known. They appear to have been complicated by a system of loans and pawning, and to have been subject to modifications. Of the tenure of land we know little. The temple-lands seem to have been held in perpetuity, and this was probably the case with private domains in the earliest period (De Rougé, *Six Prem. Dyn.*, 255, note 1).

Army.—We know little as yet of the organization of the Egyptian army, but much of its arms and mode of conducting warfare. It consisted from very early times of foreigners as well as Egyptians. The Egyptian troops seem to have been a military caste, though not in the strictest sense, and to have had certain lands allotted to them. There were two main divisions of the army,—a chariot-force, in which each chariot contained an archer and a charioteer, and was drawn by two horses; and a force of foot-soldiers variously armed, chiefly heavy infantry, armed with shield and spear, sword, axe, or mace, and light infantry, with bow, and axe or falchion, as well as slingers. It may be noticed that flint-tipped arrows were used in the chase. We know nothing of the military manœuvres, but it is evident that the troops were drilled to move in formations, and that the art of besieging was as well understood as by the Assyrians, in the mode of attacking the enemy's fort as well as in that of protecting the soldiers.

Manners and Customs.—The subjects of the walls of the Egyptian tombs and the hieratic papyri tell us much of the domestic life of the ancient people. The education in the earliest age seems to have been more manly and more simple than in that of the Empire, when the college of a temple or the miniature court of a great officer was the school instead of the estate of the landed proprietor. This system, however, gave almost his only chance of advancement to a poor man's son, for the very highest posts were open to the successful scholar. (*Cf.* Brugsch, *Hist.* 2d ed. 16, 17.) Circumcision was practised from the earliest times, but apparently not as a religious rite, and not until the earlier years of childhood had passed. Of the education of girls there is no indication, but, as they afterwards shared the public life of men, and even held posts of importance in the priesthood, it could not have been neglected. It has not been proved that the Egyptians had any definite marriage law. We find, however, that they married but one wife, who is termed the lady of the house, and shares with her husband the honours paid to the deceased. Concubinage was no doubt allowed, but it is seldom that we find any trace of children more numerous than those of legitimate wives could be. The family of Ramses II. is an instance of an Oriental household, and the fifty-two children of Baba, whose tomb is found at Eilethyia, may also be cited, though the term children may in this case include other descendants (*cf.* Brugsch, *ibid.* 176, 177). Ordinarily the aspect of the family is that which it wears in civilized countries. The women were not secluded, and, if they did not take the place of those of republican Rome, it was due to faults of national character rather than the restraints of custom. There was no separation into castes, although many occupations were usually hereditary. As there was no noble caste, there was nothing to prevent the rise of naturally able persons but the growth of the official class, which gradually absorbed all power and closed the avenues to success. The corruption of this class has been remarkably shown by the researches into the Egyptian administration of justice by M. Chabas, who cites lists of robbers of tombs and houses containing the names of scribes and priests, besides a higher grade of servants (*Mélanges*, iii. i. 144, *seqq.*). There are other indications of the social condition of Egypt under the Empire in the complaints of the lower class against the brigandage to which they were subject on the part of persons who found means to interest the highest functionaries, and so escape merited punishment. At the same time it is to be remembered that they had the right of direct appeal to the king (*Ibid.* 173-216). This part of the picture of Egyptian life is strikingly like that of China, and the dislike of foreigners is consistent with the comparison. The lower class being uneducated, and for the most part very poor, was held in contempt by the higher, and this was especially the case with labourers and herdsmen. All handicrafts were considered unworthy of a gentleman, and even the sculptor and painter were not raised above this general level. The only occupations fit for the upper class were priestly, civil, and military, and the direction of architectural and other works which required scientific knowledge, not skill of hand. The servants were of a higher grade than the labourers: not so the slaves, who were generally captives taken in war.

The everyday life of the ancient Egyptians is abundantly represented in the pictures of the tombs from the earliest monumental age to that of the Empire. The rich passed much of their time in hospitality, giving feasts at which the guests were entertained in various ways. The host and hostess sat together, as did other married people, and the other men and women generally were seated apart. The seats were single or double chairs, but many sat on the ground. Each feaster was decked with a necklace of flowers by the servants, and a lotus-flower was bound to the head, on which was also placed a lump of ointment. Small tables were set before the guests, on which were piled meat, fruits, cakes, and other food, and wine-cups were carried round. Before the repast, hired musicians and dancers entertained the company, and often this seems to have been the sole object of invitation.

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[1] M. Chabas has given the constitution of a tribunal under Dynasty XX. It was held at the great [illegible] of Thebes, and presided over by the [illegible], with nine other judges, including his three assessors, who [illegible], and another royal controller, the first prophet of Amen [illegible] and another prophet, a royal scribe, a captain of cavalry, an ensign of the navy, and the commandant of the city. The last was the prosecutor, and was himself condemned by the other judges on the acquittal of the defendants (*Mélanges*, iii. i. 131, *seq.*).

These two kinds of entertainment are precisely what are customary at the present day in Egypt. Among the amusements of the ancient Egyptians was witnessing the performance of various gymnastic feats. They had several games, one of which probably resembled draughts. Under the old kingdom the chief occupations of the rich seem to have been those of a country life, in its duties, the superintendence of husbandry, of the taking stock of flocks and herds, and of the shipment of produce, and the examination of fisheries, or again in seeing to the efficient work of the people of the estate who were engaged in any craft; and the pleasures of country life filled up the leisure. In ancient times Egypt had far more cover for wild fowl than now. Thus we see from the subjects of the tombs that the rich Egyptian was in the habit of going into the marshes in a canoe, generally with some of his children, to spear the hippopotamus, or more frequently to knock down birds with the curved throw-stick. In fowling, a cat was sometimes used as a retriever. At other times he fished in his pônds, or shot or coursed with hounds various animals of the antelope kind. Every rich man in the age of the Empire had a chariot, generally drawn by two horses, which he usually drove himself, standing up in it. The life of the ladies was not unlike that of the men, except that they only joined in the sports as spectators. They seem to have passed their time in household matters, in visiting, and in the simplest country pleasures. Occasionally they rode in heavy cars drawn by oxen. Their manners appear to have been indolent and luxurious. Among the lower orders the lighter work usually fell to the women. Both men and women led hard lives, having scanty clothing and poor food; yet the genial climate, in which the wants of the labourer must always have been few, rendered their condition not so painful as one might suppose.

Language and Literature.—The language of the people was the Egyptian, the later form of which, after they had become Christians, is called Coptic. Comparative philology has not yet satisfactorily determined its place. There can be no doubt that it is related to the Semitic family, but it has not yet been proved to belong to it. The grammatical structure is distinctly Semitic, and many roots are common to the Semitic languages. On the other hand, the Egyptian has essential characteristics which detach it from this family. It is monosyllabic, and its monosyllabism is not that from which scholars have endeavoured to deduce Semitic, but rather such as would belong to a decayed condition. This monosyllabism is like that of Syriac. Dr Brugsch strongly affirms the affinity of the Egyptian to the Indo-Germanic as well as the Semitic languages (*Hist.*, 2 ed. 6), but the former relation has to be proved. It has been supposed that the monosyllabism of the Egyptian is due to its having in part originated from a Nigritian source (*Genesis of the Earth and of Man*, 2d ed. 255, *seqq.*). Certainly this is a characteristic of some Nigritian languages, and the want of any large agreement in the vocabulary would be sufficiently explained by the changes that the languages of savage nations undergo from the absence of a literature. It can therefore scarcely yet be asserted with Dr Brugsch that the Egyptian has no analogy to the African languages (*l.c.*), by which, no doubt, he intends those which have no Semitic element. The problem will probably be solved either by a careful study of all the African languages which show traces of Semitic structure side by side with those that are without such traces, or by the discovery of the unknown element in Egyptian in the Akkadian or some other primitive language of Western Asia, which cannot be called Semitic in the recognized sense of the term. During its long history the language underwent little change until it became Coptic. It had two dialects—those of Upper and Lower Egypt, (Brugsch, *ibid.*); and by degrees a vulgar dialect was formed which ultimately became the national language not long before the formation of Coptic. One curious innovation in the Egyptian language was the fashion under the Ramses family of introducing Semitic words instead of Egyptian ones. From the manner in which these words are spelt it is evident that the Egyptians at that time had no idea of a Semitic element in Egyptian, for they always treat them as foreign words and retain the long foreign forms. The chief change in Coptic was the introduction of many Greek words, especially to supply the place of religious terms eliminated from the vocabulary. The inscribed and written character of Egyptian was the hieroglyphic, a very complex system, which expressed ideas by symbols or by phonetic signs, syllabic and alphabetic, or else by a combination of the two methods. From this was formed the hieratic, a running hand, or common written form of the hieroglyphic, principally used for documents written on papyrus. Its oldest records are not equal in age to the earliest hieroglyphic inscriptions, but probably it is not much later in origin. The demotic or enchorial writing is merely a form of hieratic used for the vulgar dialect, and employed for legal documents from the time of Dyn. XXVI. downwards. The Coptic is written with the Greek alphabet, with the addition of six new letters and a ligature, these letters being taken from the demotic to express sounds unknown to Greek. For further details see the article HIEROGLYPHICS.

Much ancient Egyptian literature has come down to us, and it must be allowed that from a literary point of view it has disappointed expectation. What it tells is full of interest, but the mode of telling rarely rises to the dignity of style. So unsystematic is this literature that it has not given us the connected history of a single reign, or a really intelligible account of a single campaign. The religious documents are still less orderly than the historical. It is only by the severe work of some of the ablest critics during the last fifty years that from those disjointed materials a consistent whole has been constructed.

The most important religious work is the *Funeral Ritual*, or *Book of the Dead*, a collection of prayers of a magical character referring to the future condition of the disembodied soul, which has already been noticed. It has been published by Dr Lepsius (*Das Todtenbuch der Aegypter*) and M. de Rougé (*Rituel Funéraire*), and translated by Dr Birch (Bunsen's *Egypt's Place*, v.). De Rougé, in his most interesting papers in the *Revue Archéologique* (n.s.), has done the utmost that a splendid critical faculty and an unusual mastery of language could achieve to present parts of the work in the most favourable form. Still it must remain a marvel of confusion and poverty of thought. Similar to the Ritual is the Book of the Lower Hemisphere. The other religious works and inscriptions are of a wider range. The temple inscriptions indeed are singularly stilted and wanting in variety; but the papyri contain some hymns which are of a finer style, particularly that to the Nile by Enna, translated by Canon Cook (*Records of the Past*, iv. 105), and that to Ra-Harmachis, translated by Dr Lushington (*ibid.* viii. 129) and Professor Maspero (*Histoire Ancienne*, 32, *seqq.*). The moral writings have a higher quality than the religious, if we may judge from their scanty remains. The historical writings fall into two classes according to their official or unofficial character. Those that are official present the worst form of the panegyrical style, the others are simple though wanting in method. The letters are of more interest, from their lively portrayal of ancient Egyptian manners. In works of fiction there is a greater degree of skill, and in the "Tale of Setnau" (*Records of the Past*, iv.) we even find touches of humour. Egyptian literature is not without its merits, but it has that want of lofty ideas and of charm which is characteristic of the literature of nations which have written very much and have had no other means of addressing mankind.

Science.—Fresh information is being constantly acquired as to the knowledge of science possessed by the ancient Egyptians. Their progress in astronomy is evident from their observations, and still more from the cycles they formed for the adjustment of different reckonings of time. Their knowledge of geometry is attested by their architecture, and by a document on the lands of the temple of Adfoo; and the annual inundation must have made careful surveys and records necessary for the preservation of landed property. Very great mechanical skill must have been needed to move the vast blocks used in their buildings, sometimes for very long distances, in part by difficult land-routes, and then to place them in position. Considering the want of iron, and of any but the very simplest mechanical appliances, the achievements of the Egyptian architects are an enigma to modern science (Brugsch, *Hist.*, 2d ed. 52). Chemistry and metallurgy had also made great progress. The hardening of the bronze tools with which they cut granite is a proof of this, and the manner in which Moses destroyed the golden calf is another evidence. Medicine and surgery were much studied, and the Egyptians were in those sciences only inferior to the Greeks.

Arts.—Of the arts architecture claims the first place, sculpture and painting being subservient to it among the Egyptians. Temples were not built to contain statues, but statues were set up to adorn temples, of which they were a part, and the walls were covered with sculptures and paintings which had a decorative purpose. The group of these arts may therefore be considered as a whole, and thus the principle they expressed may be best discovered. This principle seems not to have been accidental, but a deliberate choice. The country and climate afforded the best means of symbolizing the leading idea of the Egyptian religion in the material forms of art. Life after death was that idea, and it found expression in the construction of tombs as lasting as the rocks on which they rested. The pyramid is the first form of Egyptian art, and modifications of its form, in truncated pyramids, are seen in the main outlines of all later edifices or excavations. The decorations were subordinated to the idea of commemoration, and thus every building was at once religious and historical in its purpose. To this the Egyptian monuments owe a reserved grandeur that is not affected by the symmetrical qualities of Greek art nor by the use of strongly contrasted colours. The art is always dignified, and the colours, being seen either in strong sunlight outside the monuments, or in the twilight within them, are never glaring. The effect is exactly what was intended, and would probably not have been produced had the art been more advanced. In the whole range of ancient art Egyptian may take its place next after Greek. Indeed in some instances it excels Greek, as when in animal forms the natural is subordinated to the ideal. The lions from Gebel Barkal, presented by the fourth Duke of Northumberland to the [illegible] [illegible], are probably the finest examples of the [illegible] of animal forms that any age has produced.

[illegible] [illegible] monuments we may form some idea of the [illegible] [illegible] ancient Egyptians. They were religious [illegible] [illegible] with great reality, but tyrannical [illegible] [illegible] [illegible]. In dress they were plain, [illegible] [illegible] in their food, but [illegible] [illegible] for family use, they [illegible] [illegible]. The women enjoyed great [illegible] [illegible] does not seem to have been [illegible] [illegible] subject to the [illegible] of the [illegible] [illegible]. Though the chief object of every man's life was the construction of his tomb, and the most costly personal event was the funeral, the Egyptians were singularly mirthful, delighting in music and the dance, and so given to caricature that even in the representation of a funeral ceremony the artist cannot omit a ludicrous incident. The double origin of the race seems as apparent here as in their physical type and their religion. The generous qualities of the Shemite are being perpetually perverted by the inferior impulses of the Nigritian; and again the bright elements of the Nigritian character are strangely darkened by the shadow of the gloomy tendency of the Shemite.

The industrial arts were carried to a high degree of excellence by the ancient Egyptians. In weaving and all the processes connected with the manufacture of linen they have never been surpassed. Their pottery was excellent in quality and suitable to its various purposes, and their glass but slightly inferior to that of the Greeks. In the making of furniture, and instruments of music, vessels of metal, alabaster, and other materials, arms and domestic implements, they showed great taste and skill, and their influence on Greek art through the Phœnicians is undoubted, though they did little more than afford suggestions to more skilled artists of Hellas.

The Egyptians had a great variety of musical instruments, the number of which shows how much attention was paid to the art. Various kinds of harps are represented, played with the hand, and of lyres, played with or without the plectrum, and also a guitar. There are other stringed instruments, for which it is difficult to find a modern name. The Egyptians had also flutes, single and double pipes, the tambourine of various forms, cymbals, cylindrical maces, drums of different kinds beaten with the hands or sticks, the trumpet, and the sacred sistrum. The military music was that of the trumpet, drum, and cylindrical maces; but almost all the instruments were used in the temple services. It is impossible to form any conjecture as to the character of the music, unless we may suppose that with many of the old instruments the modern inhabitants have preserved its tradition. It may therefore be mentioned that they are ignorant of harmony, but have fineness of ear and of execution. The musicians often sang or danced while they played. The dances of both men and girls were of various kinds, from what may be called feats of agility to slow movements. The dancers were chiefly girls, whose performances evidently resembled those of their modern successors, and whose clothing was even more transparent or scanty.

Ceremonies.—We know little of the private festivities of the ancient Egyptians. In particular no representation of a marriage ceremony has yet been discovered on the monuments. The greatest ceremony of each man's life was his funeral. The period of mourning began at the time of death, and lasted seventy-two days or a shorter time. During this time the body was embalmed and swathed in many linen bandages, the outermost of which was covered with a kind of pasteboard, which represented the deceased, in the form we call a mummy, as a labourer in the Elysian fields, carrying the implements of husbandry, the face and hands being alone seen, and the rest of the body being painted with subjects relating to the future state, and bearing a principal inscription giving the name and title of "the Osiris, justified." The viscera were separately preserved in vases having covers in the forms of the heads of the four genii of Amenti. [illegible] mummy was inclosed in a case of wood having the [illegible] [illegible] shape, and this was again inclosed, when the deceased [illegible] rich man, within either another wooden case [illegible] a sarcophagus of stone, sometimes of the [illegible] mummy, but generally rectangular, or as [illegible] [illegible] mummy was then placed on a sledge drawn by [illegible] [illegible] and was frequently taken

of the river, or the shore of a sacred lake, which
:ossed in order to reach the place of burial. A
carrying the mummy, attended by mourners,
y another boat, and followed by others contain-
rs, offerings, and all things necessary for the
ıc. *Eg.*, pl. 83–86). On reaching the tomb the
was placed in a sepulchral chamber, usually
m of a pit, and offerings for the welfare of the
:e made in a chapel in the upper part of the tomb.
ıfficed for each family, and sometimes for some
; and in the case of the less wealthy, many were
he sepulchral chambers of a single pit, above
no structure or grotto. It has been already
, according to Diodorus, every one was judged by
nal before the right of burial was permitted, and
may be a survival in the practice of the modern
which prescribes that a witness must answer for
ıracter of the deceased before his burial (*Modern*
h. xxviii.). After the burial, offerings were made
mes each year by the family, and the chief in-
gged the passer-by to say a prayer for the good
itant of the tomb. These customs led to many
e maintenance of the costly prescribed offerings
ɔeen most inconvenient, and for this and other
ıe burial-grounds were peopled by a tribe of
fessional embalmers and lower priests, who
living not only by their profession but also by
ven theft. Yet we must admire the generosity
the Egyptians lavished their riches upon the
: form of affection. They were repaid not
natural satisfaction, but also by the wholesome
that there are unselfish and unproductive uses

MODERN INHABITANTS.

in 1834 estimated the population of Egypt at
,000,000, and gave the following numbers as
ɘ of the several classes of which it is mainly
—

Egyptians (felláheen or peasants, and towns-le)	1,750,000
ı Egyptians (Copts)	150,800
es, or Turks	10,000
	5,000
	5,000
ɔs	2,000
	5,000

er, exclusive of the Arabs of the desert, num-
t 70,000 (*Mod. Eg.*, Introduction).
official return (1876) estimates the population
us provinces as follows:—

·oper (Upper, Middle, and Lower)	5,252,000
	1,000,000
	5,000,000
&c.	5,700,000

resent population of Egypt, the Muslims con-
ı-eighths, and nearly four-fifths of that of the
and to this class, and more particularly to
of Cairo, the following sketch of personal
cs and customs will relate, save in some few
ı will be distinguished from the rest.

ɔing the personal characteristics of this remark-
Mr Lane, in the first chapter of *The Manners*
s of the Modern Egyptians (which was written
European influence was felt in the country, and
dly ranks as the only book of authority on the
's :—

> ıl the Muslim Egyptians attain the height of about 5
> t 9 inches. Most of the children under 9 or 10 years
> spare limbs and a distended abdomen; but as they
> forms rapidly improve. In mature age most of them
> ly well-proportioned; the men muscular and robust; the women very beautifully formed, and plump; and neither sex is too fat. I have never seen corpulent persons among them, excepting a few in the metropolis and other towns, rendered so by a life of inactivity. In Cairo, and throughout the northern provinces, those who have not been much exposed to the sun have a yellowish but very clear complexion, and soft skin; the rest are of a considerably darker and coarser complexion. The people of Middle Egypt are of a more tawny colour, and those of the more southern provinces are of a deep bronze, or brown complexion—darkest towards Nubia, where the climate is hottest. In general the countenance of the Muslim Egyptians (I here speak of the *men*) is of a fine oval form: the forehead of moderate size, seldom high, but generally prominent; the eyes are deep sunk, black and brilliant; the nose is straight, but rather thick; the mouth well-formed; the lips are rather full than otherwise; the teeth particularly beautiful; the beard is commonly black and curly, but scanty. I have seen very few individuals of this race with grey eyes; or rather, few persons supposed to be of this race; for I am inclined to think them the offspring of Arab women by Turks, or other foreigners. The Felláheen, from constant exposure to the sun, have a habit of half-shutting their eyes; this is also characteristic of the Bedawees. Great numbers of the Egyptians are blind in one or both eyes. They generally shave that part of the cheek which is above the lower jaw, and likewise a small space under the lower lip, leaving, however, the hairs which grow in the middle under the mouth; or, instead of shaving these parts, they pluck out the hair. They also shave a part of the beard under the chin. Very few shave the rest of their beards, and none their moustache. The former they suffer to grow to the length of about a hand's-breadth below the chin (such at least is the general rule, and such was the custom of the Prophet), and their moustache they do not allow to become so long as to incommode them in eating and drinking. The practice of dyeing the beard is not common; for a grey beard is much respected. The Egyptians shave all the rest of the hair, or leave only a small tuft (called 'shoosheh') upon the crown of the head. . . . . From the age of about 14 to that of 18 or 20 [the women], are generally models of beauty in body and limbs; and in countenance most of them are pleasing, and many exceedingly lovely; but soon after they have attained their perfect growth, they rapidly decline." The relaxing nature of the climate, and other predisposing causes, contribute to render many of them absolutely ugly at the age of 40. "In the Egyptian females the forms of womanhood begin to develop themselves about the ninth and tenth year: at the age of 15 or 16 they generally attain their highest degree of perfection. With regard to their complexions, the same remarks apply to them as to the men, with only this difference, that their faces, being generally veiled when they go abroad, are not quite so much tanned as those of the men. They are characterized, like the men, by a fine oval countenance, though in some instances it is rather broad. The eyes, with very few exceptions, are black, large, and of a long almond-form, with long and beautiful lashes, and an exquisitely soft, bewitching expression—eyes more beautiful can hardly be conceived: their charming effect is much heightened by the concealment of the other features (however pleasing the latter may be), and is rendered still more striking by a practice universal among the females of the higher and middle classes, and very common among those of the lower orders, which is that of blackening the edge of the eyelids both above and below the eye, with a black powder called 'kohl.'"

Both sexes, but especially the women, tattoo several parts of the person, and the latter stain their hands and feet with the red dye of the hinnà.

The dress of the men of the upper and middle classes consists of cotton drawers, and a cotton or silk shirt with very wide sleeves. Above these are generally worn a waistcoat without sleeves, and a long vest of silk, called kaftán, which has hanging sleeves, and reaches nearly to the ankles. The kaftán is confined by the girdle, which is a silk scarf, or cashmere or other woollen shawl. Over all is worn a long cloth robe, the gibbeh (or jubbeh) somewhat resembling the kaftán in shape, but having shorter sleeves, and being open in front. The dress of the lower orders is the shirt and drawers, and waistcoat, with an outer shirt of blue cotton or brown woollen stuff; some wear a kaftán. The head-dress of all is the turban wound round a skull-cap. This cap is usually the red cloth fez, or tarboosh, but the very poor wear one of coarse brown felt, and are often without the turban. Many professions and religions, &c., are distinguished by the shape and colour of the turban, and various classes, and particularly servants, are marked by the form and colour of their shoes; but the poor go usually barefoot. The ladies wear a shirt and drawers, a very full pair of silk trousers, and a close-fitting vest with hanging sleeves and skirts, open down the front and at the sides, and long enough to turn up and fasten into the girdle, which is generally a cashmere shawl; a cloth jacket, richly embroidered with gold, and having short sleeves, is commonly worn over the vest. The hair in front is combed down over the forehead and cut across in a straight line; behind it is divided into very many small plaits, which hang down the back, and are lengthened by silken cords, and often adorned with gold coins and ornaments. A small tarboosh is worn on the back of the head, sometimes having a plate of gold fixed on the crown, and a handkerchief is tastefully bound round the temples. The women of the lower orders have trousers of printed or dyed cotton, and a close waistcoat. All wear the long and elegant head-veil. This is a simple "breadth" of muslin, which passes over the head and hangs down behind, one side being drawn forward over the face in the presence of a man. A lady's veil is of white muslin, embroidered at the ends in gold and colours; that of a person of the lower class is simply dyed blue. In going abroad the ladies wear above their indoor dress a loose robe of coloured silk without sleeves, and nearly open at the sides, and above it a large enveloping piece of black silk, which is brought over the head, and gathered round the person by the arms and hands on each side. A face-veil entirely conceals the features, except the eyes; it is a long and narrow piece of thick white muslin, reaching to a little below the knees. The women of the lower orders have the same out-door dress of different materials and colour. Ladies use slippers of yellow morocco, and abroad, inner boots of the same material, above which they wear, in either case, thick shoes, having only toes. The poor wear red shoes, very like those of the men. Among the upper classes, however, the dress is rapidly becoming assimilated to that of Europeans in its most preposterous form.

In religion the Muslim Egyptians are Sunnees, professing the creed which is commonly termed "orthodox," and are principally of the persuasion of the Sháfe'ees, whose celebrated founder, the imám Esh-Sháfe'ee, is buried in the great southern cemetery of Cairo. Many of them are, however, Hanafees (to which persuasion the Turks chiefly belong), and in parts of Lower, and almost universally in Upper, Egypt, Málikees.

The civil administration of justice is conducted in four principal courts of judicature,—that of the Zábit, or chief of the police, where trivial cases are summarily disposed of; the Divan el-Khedivi, in the citadel, in which the khedive or his deputy presides, and where judgment is given in cases which either do not require to be referred to the two other courts yet to be mentioned, or which do not fall within their province; the Divan el-Mahkemeh, the court of the cadi (kádee), or chief judge, who must be a Hanafee, and who was formerly a Turk sent annually from Constantinople, but is now appointed by the khedive, and paid a fixed salary of 4000 napoleons a year; and that of the muftee of the Hanafees, or chief doctor of the law, who decides all cases of difficulty. There are besides five minor mahkemehs, or courts, in Cairo, and one in each of the neighbouring towns of Boolák and Masr El-'Ateekah, from which cases are always referred to the court of the kádee; and each country town has a native kádee, whose authority is generally sufficient for the villages around. The Council of the 'Ulemá, or learned men, consists of the sheykh, or religious chief, of each of the four orthodox persuasions, the sheykh of the great mosque called the Azhar, who is of the persuasion of the Sháfe'ees, and is sometimes its sheykh, the kádee, and the chief (nakeeb) of the Shereefs, or descendants of the Prophet, with several other persons. This body was until lately very powerful, but now has little influence over the khedive. Cairo is divided into quarters (Hárah), each of which has its sheykh, who preserves order among the people; and the whole city is partitioned into eight larger divisions, each having a sheykh called Sheykh et-Tumn. Various trades also have their sheikhs or chiefs, to whom reference is made in disputes respecting the craft; and the servants have similar heads who are responsible for their behaviour. The country is divided into governments, as before stated, each presided over by a Turkish officer, having the title of mudeer, and subdivided into districts under the control of native officers, bearing the titles "Mamoor" and "Názir." A responsible person called Sheykh el-Beled (or "sheykh of the town" or "village") presides over each small town and village, and is a native of the place. It must also be mentioned that the Sa'eed, or Upper Egypt, is governed by a pasha, whose residence is at Asyoot. Notwithstanding the consistent, able, and in many respects commendable, code of laws which has been founded on the Korán and the Traditions, the administration of justice is lamentably faulty. As is the custom throughout the East, judgment in Egypt is usually swayed by bribes, and a poor man's case is generally hopeless when his adversary is rich. To this rule there have been some notable exceptions, and the memory of a few virtuous judges is cherished by the people; but such instances are very rare. The moral and civil laws observed by the Muslim Egyptians, being those of El-Islám, will be noticed elsewhere. A great abuse formerly existed in Egypt in the system of consular jurisdiction. Natives were compelled to sue a foreigner before the latter's consul, and in nine cases out of ten lost their cause. Similarly it was very difficult for a foreigner of one nation to obtain justice against one of another nation at the latter's consulate. This abuse has now been done away. At the instance of Nubar Pasha, and after the deliberations of a European commission, three Courts of First Instance at Alexandria, Cairo, and Ismaïlia, and a Court of Appeal at Alexandria, were established in 1876, presided over by mixed benches of Europeans and natives, the former being the majority, and employing a new code based on the *Code Napoléon*, with such additions from Muslim law as was possible. These courts decide all cases between the Government or native subjects and foreigners, and between foreigners of different nationalities; and there can be no doubt that they will exercise a great influence for good on the administration of justice in Egypt. It is to be hoped that in course of time they may supersede the old native system in all causes. At present they do but supersede the consular system.

It is very worthy of notice, that in Cairo, as in some other Muslim cities, any one may obtain gratuitously an elementary education, and he who desires the fullest attainable education may receive that also without the payment of a single fee, by joining a class of students in a collegiate mosque. The elementary instruction which most boys receive consists chiefly of reading, and learning the Korán by heart; day-schools, as charitable institutions, abound in Cairo, and every town possesses its school; a trifling fee to the fikee (or master) is the only expense incurred by the scholars. Girls are seldom taught anything beyond needle-work. The children of both sexes, except those of the wealthy, have generally a very dirty and slovenly appearance; and often intentional neglect is adopted to avert the effects of the "evil eye," of which the Egyptians entertain great dread. The children of the upper classes are excessively indulged, while the poor entirely neglect their offspring. The leading doctrines of El-Islám, as well as hatred for all religions but their own, and a great reverence for their parents and the aged, are early inculcated.

This deference towards parents cannot fail to strike every foreigner who visits Egypt, and does not cease with the children's growth, presenting an example well worthy of imitation in the West. Circumcision is observed at about the age of five or six years, when the boy is paraded, generally with a bridal procession, on a gaily caparisoned horse, and dressed in woman's clothes. Some parents, however, and most of the learned, prefer a quieter and less expensive ceremony (*Modern Egyptians*, chap. xxvii.).

It is deemed disreputable for a young man not to marry when he has attained a sufficient age; there are therefore few unmarried men. Girls, in like manner, marry very young, some even at ten years of age, and few remain single beyond the age of sixteen; they are generally very prolific. The bridegroom never sees his future wife before the wedding night, an evil which is somewhat mitigated by the facility of divorce. A dowry is always given, and a marriage ceremony performed by a fikee (a schoolmaster, or one who recites the Koran), in the presence of two witnesses, the ceremony is very simple, but constitutes a legal marriage. The bridal of a virgin is attended with great festivity and rejoicing, a grandee's wedding sometimes continuing eleven days and nights. On the last day, which should be that terminating with the eve of Friday, or of Monday, the bride is taken in procession to the bridegroom's house, accompanied by her female friends, and a band of musicians, jugglers, wrestlers, &c. As before stated, a boy about to be circumcised joins in such a procession, or, frequently, a succession of such boys. A Muslim is allowed by his religion four wives; but advantage is rarely taken of this licence, and very few attempt to keep two wives in one house: the expense and discomfort which polygamy entails act, therefore, as a restriction to its general adoption. A man may, however, possess any number of concubine slaves, who, though objects of jealousy to the legal wife, are yet tolerated by her in consideration of her superior position, and conceded power over them, a power which she often uses with great tyranny; but certain privileges are possessed by the concubine, especially if she have born a son to her master. Such slaves are commonly kept only by grandees, the generality of the Muslim Egyptians being content with one wife. A divorce is rendered obligatory by the simple words "Thou art divorced," and a triple divorce is irrevocable under ordinary circumstances. The hareem system of appointing separate apartments to the women, and secluding them from the gaze of men, is observed in Egypt as in other Muslim countries, but less strictly. Mr Lane (*ibid.* ch. vi.) says—"I believe that in Egypt the women are generally under less restraint than in any other country of the Turkish empire; so that it is not uncommon to see females of the lower orders flirting and jesting with men in public, and men laying their hands upon them very freely. Still it might be imagined that the women of the higher and middle classes feel themselves severely oppressed, and are much discontented with the state of seclusion to which they are subjected; but this is not commonly the case; on the contrary, an Egyptian wife who is attached to her husband is apt to think, if he allow her unusual liberty, that he neglects her, and does not sufficiently love her; and to envy those wives who are kept and watched with greater strictness." The females of an Egyptian household never sit in the presence of the master, but attend him at his meals, and are treated in every respect as inferiors. The mother, however, forms a remarkable exception to this rule; in rare instances, also, a wife becomes a companion to her husband. On the other hand, if a pair of women's shoes are placed outside the door of the hareem apartments, they are understood to signify that female visitors are within, and a man is sometimes thus excluded from the upper portion of his own house for many days. Ladies of the upper or middle classes lead a life of extreme inactivity, spending their time at the bath, which is the general place of gossip, or in receiving visits, embroidering, and the like, and in absolute *dolce far niente*. It is therefore no cause for wonder that their tone of morals is generally low. Both sexes are abstemious in their food, though fond of pastry, sweetmeats, and fruit. The principal meals are breakfast, about an hour after sunrise; dinner, or the mid-day meal, at noon; and supper, which is the chief meal of the day, a little after sunset. Coffee is taken at all hours, and is, with a pipe, presented at least once to each guest. Tobacco is the great luxury of the men of all classes in Egypt, who begin and end the day with it, and generally smoke all day with little intermission. Many women, also, especially among the rich, adopt the habit. Men who can afford to keep a horse, mule, or ass, are very seldom seen to walk, and numberless excellent asses are to be hired in Cairo. Ladies always ride asses and sit astride. The poorer classes are of course unable to observe the hareem system, but the women are in general carefully veiled. Some of them keep small shops, and all fetch water, make fuel, and cook for their households. The food of the poor is very meagre; flesh meat is rarely tasted by them, and (besides bread) dates, raw cucumbers, and onions are their common food, with soaked beans, roasted ears of Indian corn, &c.

In their social intercourse the Muslim Egyptians are regular, and observe many forms of salutation and much etiquette; yet they are very affable, entering into conversation with strangers at shops and elsewhere. Their courtesy and dignity of manner are very striking, and are combined with ease and a fluency of discourse. Of their mental qualifications Mr Lane (*ibid.* ch. xiii.) remarks—"The natural or innate character of the modern Egyptians is altered, in a remarkable degree, by their religion, laws, and government, as well as by the climate and other causes; and to form a just opinion of it is therefore very difficult. We may, however, confidently state that they are endowed, in a higher degree than most other people, with some of the more important mental qualities, particularly quickness of apprehension, a ready wit, and a retentive memory. In youth they generally possess these and other intellectual powers; but the causes above alluded to gradually lessen their mental energy." Their principal virtues are piety and strong religious feeling, a strict observance of the injunctions of El-Islám, and a constantly professed sense of God's presence and over-ruling providence, combined, however, with religious pride and hypocrisy. Their common discourse is full of asseverations and expressions respecting sacred things, often, however, used with a levity which it is difficult for a person unacquainted with their feelings easily to reconcile with their respect for God. They entertain an excessive reverence for their Prophet; and the Korán is treated with the utmost respect—never, for example, being placed in a low situation—and this is the case with everything they esteem holy. They are fatalists, and bear calamities with perfect resignation to the Divine will. Their filial piety and respect for the aged have been before mentioned, and benevolence and charity are conspicuous in their character; poverty is therefore not accompanied by the distressing circumstances which too frequently attend it in Europe. Humanity to dumb animals is another virtue, and cruelty is openly discountenanced in their streets, even to unclean animals; this is, however, unfortunately wearing off in consequence of their intercourse with Franks. Their affability, cheerfulness, and hospitality are remarkable, as well as frugality and temperance in food and drink, scrupulous cleanliness, a love of country, and honesty in the payment of debt. It should be added, however, that the Egyptians rarely, if ever, exercise their social virtues but towards persons of their own persuasion and country. Their vices are indolence, obstinacy, and licentiousness, especially among the women, cupidity (mitigated by generosity), envy, a disregard for the truth, and a habit of cursing. Murders, and other grave crimes of this nature, are rarely committed, but petty thefts are very common.

"The Arabic spoken by the middle and higher classes in Cairo is generally inferior, in point of grammatical correctness and pronunciation, to the dialects of the Bedawees of Arabia, and of the inhabitants of the towns in their immediate vicinity, but much to be preferred to those of Syria, and still more to those of the Western Arabs" (Lane, *ibid.* ch. ix.). The language varies in Upper and Lower Egypt, and is more correct inland than near the Mediterranean.

In the decay of Arab literature, Cairo still holds the chief place as a seat of learning, and its university, the Azhar, is undoubtedly the first of the Eastern world. Its professors teach "grammatical inflexion and syntax, rhetoric, versification, logic, theology, the exposition of the Kur-án, the Traditions of the Prophet, the complete science of jurisprudence, or rather of religious, moral, civil, and criminal law, which is chiefly founded on the Kur-án and the Traditions, together with arithmetic as far as it is useful in matters of law. Lectures are also given on algebra, and on the calculations of the Mohammadan calendar, the times of prayer, &c." (Lane, *ibid.*). The students, as already remarked, pay no fees, and the professors receive no salaries. The latter maintain themselves by private teaching, and by copying manuscripts, and the former in the same manner, or by reciting the Korán. The students are now said to amount to the number of 11,000. Except the professors of literature, few Egyptians are taught more than to read and write; and of these, still fewer can read and write well. The women, as before mentioned, are very rarely taught even to read.

Science is but little studied, and barbers generally practise medicine and surgery. Mehemet Ali endeavoured to improve this state of things, by sending young men to Europe for the purpose of scientific study, and by establishing various schools, with the same object, in Egypt. His improvements have been continued by the present khedive, Ismail Pasha, with some success.

In common with other Muslims, those of Egypt have very many superstitions, some of which are peculiar to themselves. Tombs of saints abound, one or more being found in every town and village; and no traveller up the Nile can fail to remark how every prominent mountain has the sepulchre of its patron saint. The great saints of Egypt are the imám Esh-Shafe'ee, founder of the persuasion called after him, the seyyid Ahmad El-Bedawee, and the seyyid Ibraheem Ed-Dasookee, both of whom were founders of orders of dervishes. The former of these two is buried at the town of Tanta, in the Delta, and his tomb attracts many thousands of visitors annually to his principal festival; the latter is also much revered, and his festival draws together, in like manner, great crowds to his birthplace, the town of Ed-Dasook. But, besides the graves of her native saints, Egypt boasts of those of several members of the Prophet's family: the tomb of the seyyideh Zeyneb, daughter of 'Alee, that of the seyyideh Sekeeneh, daughter of El-Hoseyn, and that of the seyyideh Nefeeseh, great grand daughter of El-Hasan, all of which are held in high veneration. The mosque of the Hasaneyn (or that of the "two Hasans") is the most reverenced shrine in the country, and is believed to contain the head of El-Hoseyn. As connected with the superstitious practices of Egypt, dervishes must be mentioned, of whom there are many orders found in that country, the following being the most celebrated:—(1) the Rifá'eeyeh, and their sects the 'Ilwáneeyeh and Saadeeyeh; (2) the Kádireeyeh; (3) the Ahmedeeyeh, or followers of the seyyid Ahmad El-Bedawee, and their sects the Beiyoomeeyeh, Shaaráweeyeh, Shinnáweeyeh, and many others; and (4) the Baráhimeh, or followers of the seyyid Ibraheem Ed-Dasookee. These are all presided over by a direct descendant of the caliph Aboo-Bekr, called the Sheykh El-Bekree. The Saadeeyeh are the most famous for charming and eating live serpents, &c., and the 'Ilwáneeyeh for eating fire, glass, &c. The Egyptians firmly believe in the efficacy of charms, a belief which is associated with that in an omnipresent and overruling Providence. Thus the doors of houses are inscribed with sentences from the Korán, or the like, to preserve from the evil eye, or avert the dangers of an unlucky threshold; similar inscriptions may be observed over most shops, while almost every one carries some charm about his person. Among so superstitious a people, with whom, as we have already seen, science is in a very low state, it is not to be wondered that the so-called sciences of magic, astrology in the place of astronomy, and alchemy in that of chemistry, are in a comparatively flourishing condition.

Since the time of the Turkish conquest, the arts in Egypt have rapidly fallen into decay; this is partly attributable to the deportation of most of the skilled artificers of Cairo to Constantinople by the sultan Selim, but it is mainly owing to the misrule of the Turkish pashas, who have successively domineered over this unfortunate country. Cairo contains the most splendid specimens of Arab architecture of any part of the Arabian empire; but at present new buildings are erected after the Constantinopolitan model, or, what is still worse, the purely European—both styles immeasurably inferior to the Arab, and very ill suited to the requirements of the climate. In like manner, every other kind of native art is gradually perishing; and it is to be feared that even should the people be relieved from oppression and bad government, their industry will be encouraged rather to adopt imaginary improvements imported from Europe, than to cultivate the beautiful taste of their ancestors. The manufactures of the present inhabitants of Egypt are generally inferior to those of other Eastern nations, their handicrafts are clumsy, and the inevitable results of tyranny are everywhere evident; nevertheless, the curious shops, the markets of different trades (the shops of each trade being generally congregated in one street or district), the easy merchant sitting before his shop, the musical and quaint street-cries of the picturesque venders of fruit, sherbet, water, &c., with the ever-changing and many-coloured throng of passengers, all render the streets of Cairo a delightful study for the lover of Arab life, nowhere else to be seen in such perfection, or with so fine a background of magnificent buildings.

Among the luxurious habits of the Egyptians must be classed the immoderate use of tobacco (as before mentioned) and coffee. They are, however, rarely guilty of the vice of drunkenness, wine being prohibited by the Korán. Eaters of opium, and smokers of hemp, called hasheesh, are not uncommon, though they are always of the dregs of the people. The bath is a favourite resort of both sexes and all classes. In Cairo alone are upwards of sixty public baths, and every good house has a private bath. Their amusements are generally not of a violent kind, being rather in keeping with the sedentary habits of the people, and the heat of the climate. They are acquainted with chess, draughts, backgammon, and other games, among which is one peculiar to themselves, called Mankalah, and played with cowries. The game of the gereed requires great bodily exertion; and wrestlers, &c., are found in the country, though not in any number. Music is the most favourite recreation of the people of Egypt; the songs of the boatmen, the religious chants, and the cries in the streets are all musical. There are male and female musical performers; the former are both instrumental and vocal, the latter (called 'Almeh, pl. 'Awálim) generally vocal. The 'Awálim are, as their name ("learned") implies, generally accomplished women, and should not be confounded with the Ghawázee, or dancing-girls. There are many kinds of musical instruments. The music, vocal and instrumental, is generally of little compass, and in the minor key; it is therefore plaintive, and strikes a European ear as somewhat monotonous, though often possessing a simple beauty, and the charm of antiquity, for there is little doubt that favourite airs have been handed down from remote ages. The prophet Mohammad condemned music, and its professors are in consequence lightly esteemed by the generality of Muslims, who nevertheless scruple not to enjoy their performances, and resort to the coffee-shops and to private festivities, where they are almost always to be found.

The Ghawázee (sin Gházeeyeh) form a separate class, very similar to the gypsies. They always intermarry among themselves only, and are all brought up to the venal profession. Their performances are too well known to need a description here, but it should be observed that the religious and learned Egyptians hold them to be improper. They dance in public, at fairs and religious festivals, and at private festivities, but not in respectable houses, whether before the men or the ladies. Mehemet Ali banished them to Isnè, in Upper Egypt; and the few that remained, occasionally dancing in Cairo, called themselves 'Awálim, to avoid punishment. A most objectionable class of male dancers also exists, who imitate the dances of the Ghawázee, and dress in a kind of nondescript female attire. Not the least curious of the public performances are those of the serpent-charmers, who are generally Rifá'ee, or Saadee dervishes. Their power over serpents has been doubted by most European travellers, yet their performances remain unexplained; and apparently they possess means of ascertaining the haunts of these and other reptiles, and of alluring them forth; they, however, always extract the fangs of venomous serpents. Jugglers, rope-dancers, and farce-players must also be mentioned. In the principal coffee-shops of Cairo are to be found reciters of romances, surrounded by interested audiences. They are of three classes, and recite from several works, among which was formerly included the *Thousand and One Nights;* but manuscripts of the latter have become so rare as to render it almost impossible to obtain a copy.

The periodical public festivals are exceedingly interesting, and many of the remarkable observances with which they abound are passing away. The first ten days of the Mohammadan year are held to be blessed, and especially the tenth; and many curious and superstitious practices are observed on these days, particularly by the women. The tenth day, being the anniversary of the martrydom of El-Hoseyn, the mosque of the Hasaneyn is thronged to excess, mostly by women. Following the order of the lunar year, the next festival is that of the Return of the Pilgrims, which is the occasion of great rejoicing, many having friends or relatives in the caravan. The Mahmal, a kind of covered litter, first originated by the celebrated queen Sheger-ed-Durr, is brought into the city in procession, though not with as much pomp as when it leaves with the pilgrims. These and other processions have lost much of their effect since the extinction of the Memlooks, and the gradual disuse of gorgeous dress for the retainers of the officers of state. A regiment of regular infantry makes but a sorry substitute for the splendid cavalcade of former times. The Birth of the Prophet (Moolid en-Nebee), which is celebrated in the beginning of the third month, is the greatest festival of the whole year. During nine days and nights its religious ceremonies are observed at Cairo, in the open space called the Ezbekeeyeh. Next in time, and also in importance, is the Moolid El-Hasaneyn, commemorative of the birth of El-Hoseyn, and lasting fifteen days and nights; and at the same time is kept the Moolid of Es-Sálih Eiyoob, the last king but one of the Eiyoobee dynasty. In the seventh month occur the Moolid of the seyyideh Zeyneb, and the commemoration of the Mearág, or the Prophet's miraculous journey to heaven. Early in the tenth month (Shaabán), the Moolid of the imám Esh-Sháfe'ee is observed; and the night of the middle of that month has its peculiar customs, being held by the Muslims to be that on which the fate of all living is decided for the ensuing year. Then follows Ramadán, the month of abstinence, a severe trial to the faithful; and the Lesser Festival (El-'Eed es-Sagheer), which commences Showwál, is hailed by them with delight. A few days after, the Kisweh, or new covering for the Kaabeh at Mecca, is taken in procession from the citadel, where it is always manufactured, to the mosque of the Hasaneyn to be completed; and, later, the caravan of pilgrims departs, when the grand procession of the Mahmal takes place. On the tenth day of the last month of the year, the Great Festival (El-'Eed el-Kebeer), or that of the Sacrifice, closes the calendar.

The rise of the Nile is naturally the occasion of annual customs, some of which are doubtless relics of antiquity; these are observed according to the Coptic year.[1] The commencement of the rise is fixed to the night of the 11th of Ba-ooneh (Payni), the 17th of June, and is called that of the Drop (Leylet en-Nuktah), because a miraculous drop is then supposed to fall, and cause the swelling of the river. The real rise commences at Cairo about the summer solstice, or a few days later; and on about the 3d of July a crier in each district of the city begins to go his daily rounds, announcing, in a quaint chant, the increase of water in the Nilometer of the island of Er-Ródah. When the river has risen 20 or 21 feet, he proclaims the Wefà en-Neel, "Completion" or "Abundance of the Nile." On the following day, the dam which closes the canal of Cairo is cut with much ceremony, and this is the signal for letting the inundation over the surface of the country. A pillar of earth before the dam is called the "Bride of the Nile," and Arab historians relate that this was substituted, at the Muslim conquest, for a virgin whom it was the custom annually to sacrifice, to ensure a plentiful inundation. A large boat, gaily decked out, representing that in which the victim used to be conveyed, is anchored near, and a gun on board is fired every quarter of an hour during the night. Rockets and other fireworks are also let off, but the best, strangely, after daybreak. The governor of Cairo attends the ceremony of cutting the dam, with the kádee and others. The crier continues his daily rounds, with his former chant, excepting on the Coptic New-Year's Day, when the cry of the Wefà is repeated, until the Saleeb, or Discovery of the Cross, the 26th or 27th of September, at which period, the river having attained its greatest height, he concludes his annual employment with another chant, and presents to each house some limes and other fruit, and dry lumps of Nile mud.

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[1] It may be mentioned here that the period of the hot winds, called the Khamáseen, that is, "The Fifties," is calculated from the day after the Coptic Easter, and terminates on the day of Pentecost, and that the Muslims observe the Wednesday preceding this period, called "Job's Wednesday," as well as its first day, when many go into the country from Cairo, "to smell the air." This day is hence called Shemm en-Neseem, or "the smelling of the zephyr." The 'Ulemá observe the same custom on the first three days of the spring quarter.

This brief account of the modern Egyptians would be incomplete without a few words concerning the rites attendant on death. The corpse is immediately turned towards Mecca, and the females of the household, assisted by hired mourners, commence their peculiar wailing, while fikees recite portions of the Korán. The funeral takes place on the day of the death, if that happen in the morning; otherwise on the next day. The corpse, having been washed and shrouded, is placed in an open bier, covered with a cashmere shawl, in the case of a man; or in a closed bier, having a post in front, on which are placed female ornaments, in that of a woman or child. The funeral procession is headed by men called "Yemeneeyeh," chanting the profession of the faith, followed by male friends of the deceased, and a party of schoolboys, also chanting, generally from a poem descriptive of the latter state. Then follows the bier, borne on the shoulders of friends, who are relieved by the passers-by, such an act being deemed highly meritorious. On the way to the cemetery the corpse is generally, in Cairo, in the case of the northern quarters of the city, carried either to the Hasaneyn, or, if the deceased be one of the 'Ulemà, to the Azhar; or, in the case of the southern quarters, to the seyyideh Zeyneb, or some other revered mosque. Here the funeral service is performed by the imám, or minister of the mosque, and the procession then proceeds to the tomb. In the burials of the rich, water and bread are distributed to the poor at the grave; and sometimes a buffalo or several buffaloes are slaughtered there, and the flesh given away. The tomb is always a vault, surmounted by an oblong stone monument, with a stele at the head and feet; and a cupola, supported by four walls, covers the whole in the case of sheykhs' tombs and those of the wealthy. During the night following the interment, called the Night of Desolation, or that of Solitude, the soul being believed to remain with the body that one night, fikees are engaged at the house of the deceased to recite various portions of the Korán, and, commonly, to repeat the first clause of the profession of the faith, "There is no deity but God," three thousand times. The women alone put on mourning attire, by dyeing their veils, shirts, &c., dark blue, with indigo; and they stain their hands, and smear the walls, with the same colour. Everything in the house is also turned upside down. The latter customs are not, however, observed on the death of an old man. At certain periods after the burial, a khatmeh, or recitation of the whole of the Korán, is performed, and the tomb is visited by the female relations and friends of the deceased. The women of the fellàheen (or peasants) of Upper Egypt observe some strange dances, &c., at funerals, which must be regarded as partly relics of ancient Egyptian customs.

For further information see, in addition to Lane's *Modern Egyptians*, his translation of the *Thousand and One Nights*, and particularly the notes to it, and the *Englishwoman in Egypt*, by Mrs Poole.

The native Christians of Egypt, or Copts, are chiefly descended from the ancient Egyptian race; and, as they rarely marry with other races, they preserve in their countenances a great resemblance to the representations of the tombs and temples. Their dress and customs are very similar to those of the Muslim Egyptians, but their reserve towards persons of another persuasion renders a knowledge of their particular observances exceedingly difficult. The [illegible] and the separation of their church, and [illegible] they suffered, will be noticed in the [illegible] of this article. Under Mohammed Ali they were [illegible] of [illegible] oppression, and the immunities then granted [illegible]. Their [illegible] appearance [illegible] of the [illegible] and their want of personal cleanliness, are in [illegible] to the opposite habits of the Muslims, and European residents generally prefer the latter as domestic servants.

The Jews, of whom there have always been great numbers in Egypt, appear to be even more degraded there than in other countries. They are held in the utmost abhorrence by the dominant race, and often are treated with much cruelty and oppression. Many are bankers and money-changers, &c. The quarter of the Jews in Cairo is exceedingly filthy, and would give a stranger the notion that they labour under great poverty. But such is not the case; the fear of the Muslims induces them to adopt this outward shew of misery, while the interiors of many of their houses are very handsome and luxurious. (E. S. P.—S. L. P.)]

CHRONOLOGY AND HISTORY.

Before giving a sketch of the history of Egypt it is necessary to speak of Egyptian chronology. The difficulty of this subject has increased with the new information of the monuments. The statements of ancient writers were easily reconciled with half knowledge, but better information shows discrepancies which are in most instances beyond all present hope of solution. It may be said that we know something of the outlines of the technical part of Egyptian chronology; but its historical part is in a great measure mere conjecture before the times when we can check the Egyptian lists by their synchronisms with Hebrew and Assyrian history.

Dr Brugsch, in the second edition of his *Histoire d'Égypte*, frankly admits the growing difficulty of Egyptian chronology in terms which account for his not having continued his *Matériaux pour servir à la reconstruction du Calendrier*, the opinions of which are modified in the later work. Baron Bunsen completed his *Egypt's Place*, but in the progress of the work made a great change in his theories. Professor Lepsius alone has maintained his views, as stated in the *Chronologie* and *Königsbuch*, of which the general correctness has not been disproved, although in any new work it would be necessary greatly to modify the details. The words, already referred to, of Dr Brugsch, which close the introduction to his *History* (2d ed.), may be cited in justification of the differences between the present article and that of the last edition of the *Encyclopædia*. "En comparant cette édition avec la première, le lecteur impartial reconnaîtra facilement que nous avons remanié complètement le premier travail, et de plus, que nous nous sommes abstenu de fournir des hypothèses auxquelles seulement le temps et des découvertes futures pourront substituer les faits" (p. 3).

The Egyptians divided the civil day into 24 hours, 12 of the natural day and 12 of the night, counted from 1 to 12 during each period. Ordinarily the civil day began during the night, which was indifferently reckoned as belonging to the preceding or following day. Probably the beginning was at midnight. In the astronomical tables of the Tombs of the Kings the civil day probably begins with the night, and the reckoning is from the first hour, or six hours before midnight. The indication is, however, not conclusive, as the tables are of nights only, but one term used makes it highly probable (Brugsch, *Matériaux*, 103). We also find the so-called heliacal rising of Sothis indicated as marking the beginning of the New Year, but this may merely denote that the phenomenon characterized New Year's day of the original Egyptian year, or of the fixed year, not that the civil day began with the 11th hour of night (cf. Id., 99 *seqq.*; Ideler, *Handbuch der Chronologie*, i. 100-103).

The Egyptian month was of thirty days. The months are usually known by Greek names occurring in Greek documents, which were taken from the cultus connected with the months, and are thus the Egyptian sacred names. They are 1. Thoth, 2. Phaophi, 3. Athyr, 4. Choiak, 5. Tybi, 6. Mechir, 7. Phamenoth, 8. Pharmuthi, 9. Pachons, 10. Payni, 11. Epiphi, 12. Mesori, after which came the five Epagomenæ. The names were applied to the Vague and Alexandrian years. The ancient Egyptians had a different system of names. With them the months were allotted to three great seasons of four months each, of which the months were called 1st, 2d, 3rd, and 4th. These seasons are called "sha," inundation, "per," winter, and "shemu" summer. The second and third are undoubted; the first, which is that of Dr Brugsch, ain. If, however, it was so, we should have a difficulty in o exactly which four months each season applied. It emarked that, according to the Copts, there are four om the supposed beginning of the rise of the Nile, a few e the summer solstice, to the end of the inundation. If the ancient reckoning, and the rendering "inundation" , "winter" would be the cold season, and "summer" respond to spring and early summer. In support of this it may be observed that the so-called heliacal rising of the 20th of July marked the beginning of the Egyptian ough in the year commonly in use this phenomenon passed ll the seasons, and further that in the earliest times of history this phenomenon occurred about the time of the olstice, and the conventional beginning of the rise of the three phenomena probably marking the beginning of the n when the calendar was instituted[1] (*cf.* on the seasons, *Matériaux*, 34 *seqq.*).

nmon year of the ancient Egyptians is that which has d the Vague Year, because on account of its length of 365 l short of a tropical or a sidereal year, and thus passed ll the seasons. That this year was that in which the as are usually dated before the introduction of the Alex- ear under Augustus appears from the Decree of Canopus 18, Greek l. 36, 37).

ptians also used a fixed year dated from the so-called heliacal othis, July 20. It contained 365 days, and was adjusted lition of another day for every four years. It is uncertain ack this year was in use. The Calendar of Medeenet the time of Ramses III., begins with the rising of Sothis, cept Dr Brugsch's explanation, with its festival (*Matériaux*, 'erhaps at the time of this monument the phenomenon 1st Thoth of the vague year, or within the month; or val be intended, it may be used as a conventional indica- w Year's day in a typical form (*Ibid.* p. 84, 85). In the riod, after the Alexandrian year had come into use, there dates in the Alexandrian and Sothiac calendars, but the Egyptian notation of the months does not appear to usually applied to the Sothiac year. An exception is Dr Brugsch (*Ibid.* p. 93), and another instance in which -name Tybi appears to be used for the Sothiac calendar, Alexandrian name is employed for the corresponding the Alexandrian calendar (*Ibid.* p. 92, 17. See on the ject, Brugsch, *Matériaux*).

onvenience of the vague year in relation to the festivals, of their connection with natural phenomena, led Ptolemy getes to reform the calendar by intercalating a day after rth year before the year next following (Decree of Hierog. l. 22, Greek l. 43–45). Obviously this arrest of on year was more convenient than the change to a fixed ly in use beginning at a different season. This new style oned and the old resumed, but how soon we do not know. Augustus a fixed year, called the Alexandrian, beginning –30th August of the Julian year, superseded the vague cording to Lepsius, the Era of Augustus at Alexandria 30, but the first year of the new calendar, prolepti- 26, when the 1st Thoth vague corresponded to 30th the proleptic year of Augustus. The new reckoning, in his opinion could not have been introduced before d was probably introduced A.D. 5. (See Lepsius, *Ueber ührungspunkte der Aegyptischen, Griechischen, und Rö- Chronologie*, Berl. Akad., 1859). Although it is quite hat Augustus adopted a proleptic synchronism of the and Roman years for the official Egyptian year, thus k his reform, yet it is more probable that there was some son for choosing the particular Egyptian year selected, oreover, was not the first of the Era of Augustus. as put forward a theory, which is the more remarkable in g on this question as it is of wholly independent origin. own reasons for supposing that a year beginning on the August was in use in Egypt from the time of Dynasty VI. e admitted that many of his correspondences are of the riod, and therefore probably refer to the Alexandrian year; cannot be so explained, and it seems probable that the h under Augustus superseded the vague year was already g before (*Materiaux*, p. 17 *seq.*). The Alexandrian year the vague year, and has remained in use to our times, ing been wholly supplanted by the lunar year of the Arabs; now given way to the Gregorian calendar.

time of Dynasty XII. the Egyptians used four years. Brugsch holds to be the vague year, a solar year, a , and a lunar year with an intercalation (*Hist.*, 2nd ed. The second of these years no doubt was the Sothiac, the beginning of which had an original connection with the summer solstice, and the duration of which was probably the Egyptian measure of a solar year. The lunar years would seem to be true lunar years, if we are to accept M. Gensler's theory that the Egyptians had discovered a method of adjusting their solar calendar with a lunar year by the intercalation of a month eleven times in thirty years (*Id.* 73). That the Egyptians at a later time used four years is evident from the Calendar of Isnè, in which three beginnings are mentioned, that which stands at the head of the document and is of the Sothiac year, a beginning of the "year of the ancients" on the 9th of Thoth, and another New Year's day on the 26th of Payni (Brugsch, *Matériaux*, 19–22). This calendar is attributed by Lepsius to the reign of Claudius, but Brugsch can only decide that it is of the Roman period (*Id.* 88, *cf.* 22). If it is much later than the time fixed by Lepsius, the second commencement may be of the vague year, which began July 28 in A.D. 101–104. It is not probable that it is earlier than the introduction of the Alexandrian year, which, however, is unnoticed. Thus at least four years were probably in use in Egypt under the Romans.

No Era has been found in the Egyptian inscriptions. They always, if they date at all, date by the year of the reigning sovereign. There is but one instance of a reckoning of the nature of an era. It is the statement of the interval between two distant reigns in the stele in which, under Ramses II., an interval of four hundred years after a Shepherd king is mentioned, or more strictly, following the analogy of ordinary dates, the 400th year of the earlier king, as though he were still living. This, however, is not a strictly Egyptian document (*Records of the Past*, iv. 36). Similarly the coins of the Ptolemies, except one class, present no era; even those bearing the name of Ptolemy Soter, struck in Palestine and Phœnicia under Ptolemy Philadelphus and Ptolemy Euergetes, are dated by the regnal years of the kings who struck them. There are indeed coins dated by an era, probably struck at some town of Phœnicia, but these follow a foreign usage which otherwise is not found in the foreign coinage of the Ptolemies. It is therefore not surprising that the Egyptian cycles mentioned by ancient writers are not traceable on the monuments. One of these, the Sothiac Cycle, consisting of 1460 Sothiac and 1461 vague years, or the period in which the vague year passed through one Sothiac year, was probably used by the astronomers, but we have no indication of its having been known earlier than the first century B.C., when Geminus writes that the Egyptian festivals pass through the whole year in 1460 years (*Isag.*, c. 6, Petav., *Uranologium*, 33). Censorinus fixes the beginning of a Sothiac cycle in A.D. 139 (c. 21), in the third vague year or second Alexandrian of the reign of Antoninus Pius. Curiously the Alexandrian coin commemorating in a symbolic manner this event is of the sixth year of this emperor. Theon, writing during the cycle beginning A.D. 139, speaks of the previous period as the Era of Menophrês (*ap.* Biot, *Rech. sur plus. p. de l'astr.*, p. 181 *seq.*, 303 *seq.*; *Sur la période Soth.* 18, 129 *seqq.*) It is therefore generally supposed that a cycle beginning B.C. 1322 commenced in the reign of a Menptah, usually identified with the king of that name of Dynasty XIX. This is possible but not certain. Other cycles rest on less distinct evidence, and for the present we must be content to accept Brugsch's cautious judgment on the whole subject.[2]

The historical chronology of ancient Egypt if less obscure than the technical is even fuller of difficulty. Our chief authorities are—(1) the Egyptian historian Manetho, who gave a list of thirty dynasties, and the length of each, with in some cases the duration of the individual reigns, (2) the similar list of the Turin Papyrus of Kings, and (3) various data of the monuments. Manetho's list is unhappily in a very corrupt condition. It appears, however, that his method is generally not strictly chronological. As far as we know, he makes up the sum of each dynasty, except Dynasty XII., of the individual reigns, where these are stated, taking no account of the overlapping of some of them. He seems to have given larger sums in three great groups. These again are made up of the sums of dynasties, and if any were in part or wholly contemporary, they are treated as successive. According to Syncellus, he stated the duration of the dynasties to be 3555 years. If this number, which suspiciously enough is given apart from the dynastic list, came down correctly to the Byzantine chronographer, many hundred years must be cut off from the totals of the dynasties as they now stand for contemporary dynasties or kings. The Turin Papyrus is unfortunately in a far worse state than Manetho's list, but it is valuable as confirming and correcting it. The system of reckoning seems, however, to have been more strictly chronological than Manetho's usual method. The various data of the monuments are as yet of little value beyond affording evidence that Manetho's numbers

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reement of the sidereal and tropical phenomena marked the institution a very remote date would be needed, but we cannot tell how nearly earliest observations were, nor do we know where they were made, he case of the rising of Sothis is an additional element of uncertainty.

[2] "Il y a eu des savants qui ont cru decouvrir un autre expédient pour fixer plusieurs dates de l'histoire d'Égypte en se servant du calcul astronomique. Le règne d'un roi Ménophrès sous lequel, d'après une tradition des anciens, une nouvelle période sothiaque a recommencé, après la date du lever de l'étoile Sirius, la Sothis des Égyptiens, rapportée sous trois rois du nom de Ramsès sur des monuments contemporains de leur époque, et à la fin quelques autres indications de nature astronomique, ont donné lieu à des calculs très-compliqués sans que la critique ait dit son dernier mot sur leur valeur historique." (*Hist.*, 2nd ed. 27.)

must be reduced, and as supplying fragments of historical chronology which may ultimately be united into a complete system. It has indeed been supposed that they enable us to construct an approximative chronology on genealogical evidence. This system, however, breaks down where we can test it, and it is therefore dangerous where it must stand alone. The great genealogy of the official architects gives 21 generations from the contemporary of Setee I. (Dynasty XIX. 2), to the contemporary of Darius I. (XXVII. 3); and thus, allowing three generations to a century, we should bring the birth of Setee and the beginning of Dynasty XIX. to about B.C. 1200.[1] It is, however, quite certain that, reckoning from the synchronism of Sheshonk I., or Shishak, with Rehoboam, we must allow for the intervening period at least a century more. The historical events require this. We must therefore suppose that generations, either of heiresses or of other persons who did not hold the office of architect, are dropped. If this method of computing by genealogies thus fails where we have a genealogical list, obviously it cannot be applied to dynastic lists which we do not know to be genealogical. The average length of reigns is usually different from and less than that of generations, and we cannot tell the most probable average length of reigns without knowing the law of succession of the country, and its political conditions in the period under consideration. It is therefore especially hazardous thus to measure the Egyptian chronology before Dynasty XVIII., at which time ascending genealogical evidence fails us. (See, however, Brugsch, *Hist.*, 2 ed. 25–27.)

The preceding observations will prepare the reader to find in the following pages no definite chronological system for the period before the synchronism of Egyptian and Hebrew history at the beginning of Dynasty XXII. The essay would, however, be incomplete without a short account of the chronological views of the leading Egyptologists. M. Mariette accepts Manetho's numbers with some modifications, and makes all the dynasties but one consecutive. He thus dates the beginning of Dynasty I. B.C. 5004. Dr Brugsch, following the genealogical method, proposed by Prof. Lieblein, and treating the reigns of the Tablet of Abydos as generations, but making an exception for the distracted age of the XIII.–XVII. Dynasties, when he adopts a series of years derived from Manetho, places the beginning of Egyptian history cir. B.C. 4400[2] (*Hist.*, 2d ed. 179). Professor Lepsius adopts the 3555 years as the true duration of the thirty dynasties, and thus lowers the date in question to B.C. 3892. He reduces the length of the dynasties by making some in part or in whole contemporary.[3] M. Chabas proposes with much hesitation the 40th century B.C. (*Études sur l'Antiquité Historique*, 2 ed. 15, 16). The following table gives the date of the beginning of each dynasty according to M. Mariette and Professor Lepsius. The less definite schemes of Dr Brugsch and M. Chabas cannot be tabulated in the same manner.

	M. Mariette.	Prof. Lepsius.	
Dynasty I.	B.C. 5004	B.C. 3892	
II.	4751	3639	
III.	4449	3338	
IV.	4235	3124	
V.	3951	2840	
VI.	3703	2744	
VII.	3500	2592	
VIII.	3500	2522	
IX.	3358	2674	
X.	3249	2565	
XI.	3064	2423	
XII.		2380	
XIII.	2851	2136	
XIV.	2398	2167	
XV.	2214	2101	
XVI.		1842	
XVII.		1684	
XVIII.	1703	1591	} XVIII. of Mariette.
XIX.	1462	1443	
XX.	1288	1269	
XXI.	1110	1091	
XXII.	980	961	
XXIII.	810	787	
XXIV.	721	729	
XXV.	715	716	
XXVI.	665	685	
XXVII.	527	525	
XXVIII.	406	525	
XXIX.	399	399	
XXX.	378	378	
Second Persian Conquest	340	340	

There are two weak points in all these systems.
greater or less degree upon numbers either occur
due to a single authority. The sum of 3555 ye
foundation of Professor Lepsius's system, occurs
passage, and the same is the case with the round
years adopted by Dr Brugsch for the doubtful pe
XIII.–XVII.; it is taken from Manetho's 511 year
dominion. How if both these numbers are corru
not their escape is a marvel, considering to w
copyists we owe them. Again, the sums of most ind
rest on Manetho's sole authority, and his lists ar
is at present hopeless. It is equally unfortunate t
dynasties are represented by monuments from
lists can be verified, others have left little or no r
have no monuments of Dynasties I.–III. until the
Then there is an abundance of monuments of Dynas
A blank follows without a monument that w
Dynasties VII., VIII., IX., X. Records reappe
XI.; of Dynasty XII. they are abundant. Unde
they become scanty, and of XIV., XV., XVI., XV
few, which may be of XV., XVI., or XVII.
three blank periods, the age before known monum
of Dynasties VII.–X., and that of Dynasties XII
significant that whereas M. Mariette's reckoning
Professor Lepsius 1112 years in the whole su
dynasties, the excess is no less than 966 years
Dynasties VII.–X. and XIII.–XVII. Such a di
two such great authorities is a proof of the want of
for solving this part of the problem. Dr Brugsch
genealogical method to the lists of the monument
second blanks, while he rejects it for the third, is
The evidence of the Turin Papyrus proves that we
such method to the third blank. How do we kn
applied to the other two? It may be argued
numbers for the reigns of the first blank are prob
his lists nor the monuments throw any light on th
to which, notwithstanding, Dr Brugsch allows no
about 500 years. His system has also the special
on the supposition that the Egyptian reigns are eq
rations, which, as already shewn, is by no means
In the following sketch of Egyptian history n
Christian Era will be given until the beginning of
when approximative chronology becomes possib
ever, we may reasonably conjecture the length of a
history, this will be stated.

The traditional age in Egypt is ext
History begins with the First Dynasty. T
with Manetho, who is supported by the T
mythological, the age of the divine reig
traceable in the monuments which treat
as sovereigns. This age is held to be
monuments as that of the Sheshu-har,
lowers, or successors, of Horus, who, i
him in his combats with Seth (Chabas,
Brugsch, *Hist.*, 2d ed. 23). Manetho
the time of any historical character by
It might be supposed that the Egyptia
records actually dating from this age, if
Chabas's reading of the Ptolemaic inscri
plan of the temple of Dendarah, in w
the original plan was found in the time
VI., in ancient characters on a skin of
har. It appears, however, from the
scription was of the time of Khufu,
consequently the parallel expression is
remote antiquity (Dümichen, *Bauur*
kunde von Dendera, 15, *taf.* xvi.; 18,
other side, Chabas, *Ant. Hist.*, 2d ed
Egyptian mythology has not been
allusion to a deluge, nor to have an
Mosaic narrative in reference to t
early conditions of the human rac
been pointed out, but the leading f
the Egyptian ideas of their prehis
isolation by the side of those of mo
civilization, which agree in one or
narrative of Genesis. Discoveri
this view.

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[1] Dr Brugsch [illegible] by adding to the genealogy the reigns of Dynasty X[illegible] as generations and as these reigns had a shorter [illegible]

[2] This [illegible] gives the result of the genealogical [illegible] in the table cited above [illegible] the beginning of Dynasty [illegible] date for XVII. [illegible] XVIII. [illegible] in the earlier [illegible]

[3] It must be [illegible] of Manetho where they can be [illegible] great [illegible] which that evidence [illegible] as they have come down to us. The system is [illegible] in the *Chronologie der Aegypter* and *Königsbuch der* [illegible]

In Egypt stone implements have been recently discovered. Owing, however, to the abundance of historical monuments, the prehistorical remains have scarcely received due attention. We do not yet know whether these implements were used by the Egyptians or by savage tribes who may have made incursions into their territory. We find, however, the use of flint arrow-heads in the historical period from the paintings at Benee-Hasan (Dynasty XII.).

It is impossible to conjecture the duration of the prehistoric age in Egypt. M. Chabas has proposed a space of 4000 years before the First Dynasty as sufficient for the development of the civilization which had already attained maturity in the time of the Fourth Dynasty (*Ant. Hist.*, 9, 10). We are, however, so entirely ignorant of the causes of this civilization, and so unable to decide how far it was native to the soil of Egypt, that it is safer to abstain from any attempt to compute a period of the length of which the historical Egyptians themselves do not appear to have had any idea.

With Menes, in Egyptian Mena, the "stable," the history of Egypt begins. It is true that Manetho states cautiously of his successors of the Second Dynasty certain things that are evidently legendary. This must be the natural result of a want of monumental evidence, and a consequent dependence on tradition. At present no monuments are known before the time of the last king of Dynasty III., and this may be the limit at which inscribed contemporary records began. It is, however, agreed by all Egyptologists that the founder of the Egyptian state is no legendary personage. All we know of him wears the air of history, and is consistent with the conditions in which a state would have been formed. Menes was of Thinis, in Upper Egypt, and consequently the first two dynasties are called Thinite. Thinis, or This, in Egyptian Teni, was perhaps only a quarter of the more famous Abydos. Certainly it was obscured by the near neighbourhood of the sacred city. Menes, having gained the sovereignty of Egypt, which probably before his time was divided into two states, founded the city of Memphis. In order to gain sufficient room for the site he changed the course of the Nile by constructing a dike, which turned the stream more to the east. M. Linant believes that this dyke is probably represented by that of Kusheysh. The great temple of Ptah, at Memphis, was then founded; and there can be no doubt that the seat of government was, under Menes, or not much later, removed to the new city. Menes made laws and waged a successful war. After a long reign of sixty-two years he was killed by a hippopotamus. All this has a perfectly historical aspect. Only a legislator and warrior, and so a mighty hunter, could have set upon a stable basis the long-lasting fabric of Egyptian polity. The main qualities of the man who did this could not have been forgotten at Memphis, which was great and flourishing, the chief seat of Egyptian learning and wealth, before the close of the Third Dynasty. The reproach that Menes corrupted the primitive simplicity of the Egyptians is probably a perverted tradition, like that which changed the tyranny of Khufu and Khafra to impiety. In later times Menes was reverenced with other kings, but as far as we know had no special worship, a condition suitable to his historical character, now universally admitted.

Athothis, either Tota or Atot, the first or second successor of Menes, is related to have founded the palace at Memphis, and, being a physician, to have written anatomical books. A medical papyrus in the Museum of Berlin, composed under Ramses II. (Dynasty XIX.), curiously illustrates the second statement. It contains a portion said to have been copied from a very ancient papyrus discovered in the time of Hesp-ti, or Usaphaidos, a later king of the First Dynasty, and to have been subsequently taken to Senta, or Sethenes, of the next line (Brugsch, *Hist.*, 2 ed., 42). Under Uenephes, the fourth Thinite king, a great famine, the first recorded, ravaged Egypt. He is also said to have raised the pyramids near Kochome. As Kakem is the monumental name of the part of the Memphite necropolis around the Serapeum, and north of the Pyramid of Steps of Sakkarah, Dr Brugsch and others are disposed to consider that pyramid, which is a very archaic structure among pyramids, to be here intended. The use of the plural "pyramids" by Manetho does not stand in the way of the identification, as we know a case in which a small pyramid was built at the same time as a large one. We do not know the original purpose of the monument. Under the early dynasties it was used as the burial-place of the bulls Apis. As, however, their worship was introduced under Dynasty II., it may have been at first a royal sepulchre, like all other pyramids of which we know the use. Under Semempses, the seventh king of the dynasty, Manetho speaks of many wonders and a very great plague. Thus the two chief scourges of Egypt appear in this remote age, suggesting a large population, and consequently the length of the period preceding the accession of Menes.

With Boethos, or Butau, the Second Dynasty begins. Manetho relates that in his time a great chasm opened at Bubastis and many perished. Frequent as volcanic shocks are in Egypt, it is long since an earthquake has been experienced in that country. There are, however, reasons, from the manner in which monuments have fallen and the records of earthquakes in Palestine in antiquity, for supposing that Egypt was anciently more subject to such calamities than in later times. The next king, Kaiechos, Kakau, introduced the worship of the bulls Apis at Memphis, and Mnevis at Heliopolis, and of the Mendesian goat, and his name appears to commemorate these innovations, probably a necessary step owing to the increase of population, for animals locally worshipped were thus restricted in number. We also notice that already Heliopolis and Mendes, besides Thinis, Memphis, and Bubastis had been founded. Under the next king, whose name, Binothris, Bainnuter, was probably commemorative of the new worship at Mendes, we read that a law was passed that women could hold the sovereign power. This might in a semi-barbarous condition be a relic of polyandry, but in Egypt the civilization of Dynasty IV. forbids such an explanation, and we must rather regard this new law as a proof of advancement. In consequence we find a few reigns of queens in the Egyptian lists, but only one of them, Sebek-neferu-ra (Dynasty XII.), appears in those of the monuments. Succession through an heiress was, however, carefully respected, and it was perhaps for want of a son that Binothris made this edict. It may be chance, but Manetho calls each king of Dynasty I. after Menes, son of his predecessor, whereas under Dynasty II. he drops this characterization. Nothing more is told of this line but two marvels, that under Manetho's seventh king, Nephercheres, the Nile was fabled to have flowed mixed with honey for eleven days, and that the eighth, Sesochris, was said to have had a height of 5 cubits and 3 palms, which is not improbably a confused account of a colossal statue.

The royal house now changed by the accession of Dynasty III., the first of Memphites. Manetho relates how, under its head, Necherophes or Necherochis, the Nebka of the monumental lists, the Libyans revolted from the Egyptians but returned to their allegiance terrified by a sudden increase of the moon. It is useless to speculate on the character of the phenomenon which, unless it be legendary, was probably an eclipse; but the glimpse we thus obtain of an Egyptian dominion beyond the Nile valley at this remote age is most valuable. In Genesis the Lehabim, or Lubim, appear as a race kindred to the Egyptians. In the ptian inscriptions they are called Rebu, or Lebu, and ear on early monuments as a dark people. Under the pire they have Caucasian characteristics. The change s probably due to the great maritime migrations of the lasgic tribes, in which the Libyans had an important are. To the next king, Tosorthros, Manetho assigns the vention of building with hewn stones and cultivation of tters, and says that for his medical knowledge the gyptians called him Æsculapius. If the Pyramid of Steps lates from an earlier king, the first statement must be qualified, though it is to be remarked that the difference of constructive skill between that monument, if so early, and the works of Dynasty IV., would almost justify the historian; and again the discovery of inscriptions of a less accurately ordered kind than those of Dynasty IV. may support the second statement; the third seems at variance with the Memphite worship of the Egyptian Æsculapius, Imhotep. On the monuments contemporary history begins with the last king the lists assign to this dynasty, Senoferu, probably Manetho's last but one, Sephuris. We may now take a retrospect of the age. It is in some respects curiously primitive in comparison with that which immediately follows it. Dr Brugsch has remarked the general absence in the kings' names of the name of Ra, afterwards essential to throne-names, which from the medallic character of some of these they seem to have been, and the equally general absence of the names of other gods, Ra occurring once in the three dynasties and Sekeri once. Again he has observed the somewhat plebeian aspect of these names, as proper to men who sternly ruled the masses. Mena is "the stable," he who resists; Tota, "he who strikes;" Senta, "the terrible;" Huni, "he who strikes." Senoferu is "the betterer." As "the striker of the peoples," for so he is called in his inscription at Wadee Magharah, in the Sinaitic peninsula, he is a foreign conqueror.[1]

From Senoferu, at the close of Dynasty III., to the end of Dynasty VI., we have a succession of contemporary monuments by which history can be reconstructed, not only in its political events, but in those details of the condition of the population which make an essential part of all real history. Under Senoferu we find great material prosperity, and the arts already in that condition of excellence which makes the Pyramid age in some respects the most remarkable in the annals of Egypt. We also find foreign conquest, not as in the time of the Empire for glory, but with the view of extending the Egyptian rule to countries whose products were valuable for the arts. It is thus that this Pharaoh is the earliest who has left a tablet in the Sinaitic peninsula, where perhaps he, as Dr Brugsch thinks, was the first to plant military colonies to protect the workers in the mines of copper and the valuable blue stone called "mafkat," and this idea is supported by his being afterwards worshipped there. He is also the first king whose pyramid is found with its special name on the monuments. Dr Brugsch thinks it is that now called the Pyramid of Meydoom, near which chapels of tombs bearing his name have been discovered, and a group consisting of two statues, remarkable as a splendid specimen of Egyptian archaic art. The subjects, it may be remarked, were usually buried near the pyramid of the reigning king. Senoferu the betterer left a good name as a beneficent king, and his worship was maintained until the Ptolemaic period.

Khufu, the Suphis I. of Manetho and Cheops of Herodotus, immediately succeeds Senoferu in the lists of the monuments, so that he may be regarded as the legitimate head of Dynasty IV. The list of that dynasty is as follows:—Khufu, Ratatf, Khafra, Menkaura, Shepseskaf, corresponding to eight kings in Manetho, in whom also the order is different, Ratatf (Ratoises) following Menkaura (Mencheres), a natural consequence of the association in fame of the builders of the three most celebrated pyramids, Khufu, Khafra, and Menkaura.[2]

The age of the pyramid-builders is the most brilliant before the Empire. We can judge from the royal tombs of the magnificence of the kings, and from the sepulchres around of the wealth of the subjects. The construction of the pyramids has perhaps been unduly marvelled at: we should know in what other manner the kings employed the vast amount of manual labour at their disposal, if we would estimate how much they could have effected by it in pyramid-building in the long period of time for which they ruled. If the two reigns of Khufu and Khafra extended over more than a century and a quarter, we may measure what we know them to have done against the works of other states during a like interval, and the comparison reduces our wonder.

The regal power at this time seems to have been very strong. So at least may we infer from the phraseology of the inscriptions, and from the fact that the kings threw much, if not all, of the force of the nation into personal monuments for their own memorial. Never in later times is the royal tomb the chief object of the king's reign, or is he so completely detached from the welfare of Egypt. The pyramids with their priesthoods are proofs that then the Pharaoh was more positively worshipped than ever afterwards.

It must, however, be admitted that the great men whose tombs are planned around the pyramids enjoyed abundant wealth and ease. Their time was passed not in war or in state affairs, but in the management of large estates, probably royal gifts, and in superintending the handicrafts of their people, and giving no small share of their leisure to the pleasures of the chase, to hospitality, and to the enjoym of musical performances. In the chapels of their tomb these occupations of everyday life are portrayed. The is no sign of war, no great military class. It is true th the common folk seem to have been very poor, but th life in that land of abundance is at least represented as happ On the other hand, it is significant that the nobility inc a large number of the royal family, and that the kin not represented in the tombs, and when he is spoken of it is in terms of the most distant respect. Similarly there is an extraordinary reserve as to worship. Religious subjects are wanting, and the religious inscriptions are usually limited to the formula of dedication. The priesthood is already numerous, but it is connected with the service of the chapels of the pyramids. In the vast court a baneful bureaucratic class is already growing, in future to destroy the welfare of the people.

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[1] [illegible] length of this first unknown period in the [illegible] In the Turin Papyrus three [illegible] They are each less than Manetho's [illegible] are preserved. [illegible] however we [illegible] the two lists [illegible] Dynasty I. [illegible] the length of [illegible] at of [illegible] Afr. +9 = 55 5; It is [illegible] nearly a [illegible] almost exactly this average 602, [illegible] Dynasty II [illegible] Syn. [illegible] +8 = 53)

[2] The numbers of Manetho are irreconcilable with those of the T Papyrus assigned by scholars to this period. There is evidence they cannot be considered to be consecutive. In the inscription mentions a lady, a Queen Mertitefs, as a great favourite of and Khufu and attached to Khafra. M. de Rougé remarks that she have been very old at the time of Khafra (Six Prem. Dyn., [illegible] but in the list of Manetho the intervening reigns (Ratoises 25, [II.] 66) amount to 91 years. If we allow her to have been old at the end of the reign of Senoferu and to have lived a that of Khafra, her age would not be less than 106 years very near the extreme limit of human life in the Egyptian 110 years, and it is based on the minimum of time possible in The length of early kings' lives in the Turin Papyrus supports Probably the reigns overlapped one another. This idea is by the two chief chambers in the Great Pyramid, which made M. de Rougé suspect that it was the tomb of two 261, note 1). A sound argument for the chronology of might be found in the size of the three chief pyramids. was the great work of a king's reign, and it was so constr might be continually increased in size and yet easily comp time. The Great Pyramid would indicate a reign of man tion; so, too, the Second; whereas the Third would, in size, mark a shorter time. By this method we should b accept Manetho's numbers for Khufu, 63 years, and but to doubt the long reign of Menkaura, 63. It would in the other evidence to make Ratatf contemporary w Khafra.

The reign of Khufu is principally marked by the building of the Great Pyramid. We learn from a curious inscription of a later date that he rebuilt the temple of Isis, near the Sphinx, carved out of the rock by some earlier king, and that he made a pyramid for the Princess Hent-sen in the same neighbourhood. The charge of impiety which the local tradition reported by Herodotus brings against Khufu thus fails, and the charge of tyranny associated with it, may be equally groundless. The cost of life in building the Great Pyramid can scarcely be compared with that of a long war under conditions resembling those of modern China. It should be noted that Khufu, as well as Khafra and Ratatf, were still objects of worship under Dynasty XXVI. (Brugsch, *Hist.*, 2d ed. 57, 58). The only record of foreign conquest is a tablet in the peninsula of Sinai, commemorating what was probably no more than a successful maintenance of the posts already there established to guard the mines.

The reign of Khafra is commemorated, like that of Khufu, by the royal sepulchre and the tombs of subjects. From the latter we are able to contradict the tradition of his hostility to the national religion, in which Herodotus associates him with Khufu. The most interesting remains of the time are the statues of this king found in a well near the Sphinx, into which they were probably thrown either by a foreign invader or by early Christians or by Arabs, rather than in a popular revolt after his death (*cf.*, however, Maspero, *Histoire Ancienne*, 73). A statue and a bust of Khafra from this find have been published by M. de Rougé (*Six Prem. Dyn.*, pl. iv. v.). Both are remarkable works, showing a naturalistic style that makes them far superior to later statues. The king's head is evidently a portrait, and the type is more Caucasian than the generality of later subjects.

Menkaura, or Mencheres, the Mycerinus of Herodotus, and the founder of the Third Pyramid, does not seem to have been specially reverenced in later times, in contradiction to the report of Herodotus. It is, however, interesting, in connection with the tradition of his support of religion, that the Egyptian *Ritual* speaks of its 64th chapter as found by Har-tot-ef, son of Mencheres, at Hermopolis Magna, when he made an inspection of the temples of Egypt, and brought as a precious document to the king (Brugsch, *Hist.*, 2d ed. p. 59, 60). It would thus appear that the *Ritual* was not then completed, and Manetho's statement that Suphis I., Khufu, wrote the sacred book may be another hint as to its date. It may also be noticed that the queen of Khafra was priestess of Thoth (*Six Prem. Dyn.*, 277 *seqq.*), and a noble, probably son of Khafra, was high-priest of Thoth at Hermopolis, a dignity held by another prince in the same reign (*Id.* 280, 281).

The most interesting record of Menkaura is his wooden mummy-case, found by General Howard Vyse in the Third Pyramid. In the disappointing silence of those vast monuments, without a single ancient Egyptian writing save the graffiti of workmen and the inscriptions of native visitors, this solitary record of the time is the one authoritative voice from the royal sepulchres, and it tells us in its short archaic formula that the whole myth of Osiris in its relations to human destiny was already matured. The king as Osiris has become divine and has vanquished his enemies (Brugsch, *Hist.*, 2d ed., 58, 59).

The next family, Dynasty V., continued to rule at Memphis.[1] Of its sovereigns we know but little. The last but one, Assa, is the first Pharaoh whom we know to have had two names, the throne-name as well as the ordinary one. To his son Ptah-hotep is assigned the ancient moral treatise already noticed in speaking of Egyptian literature, which is on the whole the best fruit of Egyptian thought that time has spared. The last king, Unas, varied the form of royal tombs, by constructing the great truncated pyramid now called Mastabat-Faraoon, or Pharaoh's Seat, north of the Pyramids of Dahshoor. (*Id.* 67.)

The Sixth Dynasty was probably a family of a different part of Egypt.[2] It has left many records which indicate less centralization at Memphis than those of the earlier sovereigns, and mark the beginning of wars for predatory purposes and extension of territory. This change is accompanied by a less careful style of sculpture, and less pains in the excavation of the tombs, as though the Egyptians were gaining a larger horizon, or, it may be, exchanging religion for ambition. The interest of the dynasty centres in the undoubtedly long reign of Pepi, second or third king of the line, and the inscription of Una. In this inscription we first read of great wars, and foreign conquered nations are spoken of by name. A military system had already begun, for we read how the king sent with Una an officer and soldiers to transport a sarcophagus for the royal tomb from the quarries of Turk. A war is then undertaken against the nomads of the eastern desert—the Amu (Shemites?) and the Herusha, "those who are on the sand." An army is levied from the whole population of Upper and Lower Egypt, as though there were no military caste. Negroes are also enrolled from several countries mentioned by name, which must have been subject to Egypt, and are drilled by Egyptian officers, including priests. Una is appointed general in chief. Five separate expeditions are conducted by him into the country of the Herusha. It seems an error to suppose that this nation were Arabs of the desert, for the Egyptian general cut down their vines and their fig-trees (?) Another expedition was conducted by water against the same nation in a country called Takheba? (De Rougé) or Terehba? (Brugsch), which M. de Rougé conjectures may be Arabia Petræa, or a part of Syria, remarking that it was near Egypt, for the expeditions seem to have been annual. The external activity of the reign of Pepi is also attested by a tablet at Wádee Maghárah, and his public works by many inscriptions, among which we must not omit the occurrence of his name at Tanis, and in the inscription relating to the building of the temple of Dendarah. He founded a city called the "City of Pepi" in Middle Egypt, which has wholly disappeared, and tombs of his time are found in various parts of the Nile valley. His pyramid, which, like Memphis, was called the "good station," Men-nofer, was probably at the ancient capital, and may be one of the two great pyramids of Dahshoor, which are of later date than Dynasty IV., if we may judge from their structure, and both of which from their size imply reigns of the greatest prosperity and of long duration.

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[1] This Dynasty appears to have consisted of nine kings, who probably reigned nearly 200 years (Brugsch, *Hist.*, 1 ed., 288).

[2] Manetho assigns to Dynasty VI. a duration of 203 years. The monumental lists, themselves in disaccord, the Turin Papyrus, and the contemporary inscription of Una, show that Manetho's list is here hopelessly corrupted. Una was in office under the immediate or second predecessor as well as under the immediate successor of Pepi, usually identified with Phiops, to whom the Egyptian historian assigns a reign of 100 or possibly 94 years. M. de Rougé has seen this difficulty, and discussed without finally resolving it (*Six Prem. Dyn.*, 361 *seqq.*). M. Maspero has proposed a most ingenious restoration of the dynasty, on the idea that Neferkara is the long-lived Phiops, and that his family-name must therefore have been Pepi (*Hist. Anc.*, 96). This conjecture seems to us to be confirmed by the name of the later Neferkara Pepi of the Tablet of Abydos being qualified by the title "seneb," as if to distinguish him from an earlier king of otherwise identical name.

Pepi was succeeded by his son Merenra. The new king made Una governor of Upper Egypt, and employed him to bring blocks of granite from Elephantine for his pyramid, and in various other works of which the inscription already referred to gives most curious details. He was charged to obtain wood, which was provided by the prince of four Ethiopian nations already mentioned among those furnishing negroes to the great army of Pepi. We thus learn that tributary Ethiopia was ruled by a native prince or princes under the governor of Upper Egypt, who also had the power of establishing posts in the dependency. Una made four docks and timber-yards in Ethiopia for building boats, and attached a chapel to each. We may thus expect to find some record of Egyptian rule at this early time, long before the complete reduction of Lower Nubia, in territories far south; for the timber-growing country does not begin for some distance within the tropics.

Merenra was followed by his younger brother Neferkara, and, according to Manetho, the dynasty ended with the beautiful Queen Nitocris, whose name appears in the Turin Papyrus, but whose exact historical place is not certain. If she was buried in the Third Pyramid, of which Manetho, according to the copyists, makes her the builder, she enlarged the original work of Mencheres, and certainly no pyramid is so evidently not merely a double structure but one of double design. Nitocris is almost the only Egyptian whose historical character has been lost in a succession of legends. One version of her story is the most ancient form of that of Cinderella; in another, she still bewitched the Arab of the Middle Ages when he approached her pyramid (*cf.* Maspero, *Hist. Anc.*, 94).

With the later part of Dynasty VI. the second great chasm in Egyptian history begins, and we have no monuments to guide us until the time of Dynasty XI. According to Manetho, Dynasties VII. and VIII. were of Memphites, and IX. and X. of Heracleopolites, the Diospolite or Theban line comprising Dynasties XI., XII., and XIII. Whether the dynasties which intervened between the VIth and XIIth were contemporary or successive, and how much time they occupied, cannot yet be proved. In the Tablet of Abydos, a series of kings unknown from other monuments follows Dynasty VI., and precedes two kings of Dynasty XI. In the Chamber of Kings of El-Karnak other and earlier kings of Dynasty XI. are named, with various indications that it was first but a local line. To the period of the earlier kings of Dynasty XI. belongs Entef-aa, who reigned at least fifty years. It would appear that the Memphite kingdom waned, and that another line rose at Thebes, the house of the Entefs and Mentuhoteps. The power of these kings gradually increased, and at last one of them reunited under a single rule the whole of Egypt. (Maspero, *Hist. Anc.*, 98, 99.) Probably the Heracleopolite line, Dynasties IX., X., was a local house contemporary with the Memphites or Thebans, or both.

With Dynasty XII.[1] the Theban line was firmly established over all Egypt. In the circumstances referred to in the "Instructions" of Amenemhat I., its first king, to his son Usurtesen I., we have a glimpse into the unquiet condition of the country when the line arose (*Id.*, 101). Similarly the custom of associating the heir apparent as king with his father, the peculiarity of this dynasty, indicates the dangers that then surrounded the throne (*cf.* *Id.* 105).

It is to the grottoes of Benee-Hasan that we owe most of our knowledge of the manners and arts of Egypt under Dynasty XII., and much of its history is there told in the memoirs of a family of governors under the first five kings of this house. No one can have examined these beautiful tombs without being struck by the advance in architecture which they show, and the evidence of prosperity and cultivation afforded by their paintings. The subjects resemble those of the tombs of the earlier dynasties, but there is a greater variety, partly due to a more luxurious condition of society, partly to a more flexible art. It is sufficiently evident that the preceding dynasty (XI.) cannot have been weak, and the country under its rule distracted. A time of prosperity must have preceded this bright period of Egyptian history.

Amenemhat I., probably a successful minister of an earlier king (Brugsch, *Hist.*, 2d ed., 79, 80, 84), had an active and prosperous reign, ruling like Pepi beyond Egypt to the south, and occupying himself in the construction of various monuments. As the head of a new line he paid special attention to the boundaries of territories, to the regulation of the inundation, and to the confirmation of hereditary governors (Benee-Hasan inscr.; Brugsch, *Hist.*, 2d ed., 94, 95). A very curious view of the state of Egypt in his time is given us by the story of Saneha in a hieratic papyrus of the Berlin Museum (translated by M. Goodwin in *Records of the Past*, vi. 131, *seqq.*). It is the history of an Egyptian who fled from the king and took refuge with a neighbouring prince, whose territory unhappily we cannot as yet determine, and after a long sojourn sought his sovereign's pardon and returned home to be taken into the favour of Amenemhat. The reception of the fugitive abroad, his home-sickness, and the kindness of the Pharaoh, who at the same time is described in terms of the most abject respect, form an interesting picture, and one remarkably illustrating several events in the history of Egypt.

Under Usurtesen I., the co-regent and successor of Amenemhat I., Egypt had reached its highest prosperity after the age of the pyramid-builders of Dynasty IV. The obelisk which still marks the site of Heliopolis, a fragment of a statue at Tanis, inscriptions on the rocks of the Sinaitic peninsula, and a stele from Wâdee Halfeh, recording foreign conquests in the south, now in the Naples Museum, attest the splendour of this reign. The records of private individuals are, however, its most instructive memorials. Mentuhotep has given us a picture of the power and status of an Egyptian prime minister, holding all or nearly all the functions of the members of a modern cabinet, a position singularly parallel to that of Joseph, to the detail that even great men bowed before him. To his stele we owe the information that he gained successes against the Asiatics, the Herusha, and the negroes. (Brugsch, *Hist.*, 2d ed., 91, *seqq.*)

Of Amenemhat II. and Usurtesen II., the next kings, there is little to relate but that Egypt continued to prosper. It was under Usurtesen III. that a great step in advance was made by the fixing of the boundaries of the Egyptian dominion beyond the Second Cataract, at Semneh and Kummeh, where this king built sanctuaries and fortresses, and placed great boundary-marks in the form of tablets. These in their inscriptions define the limits of the kingdom, and regulate the passage of negroes by the river (*Id.*, 102). Here and throughout Nubia, Usurtesen was worshipped in subsequent times. He had introduced a settled government into the country, which long after was virtually a part of Egypt rather than a dependency. His successor Amenemhat III. is chiefly famous for his great engineering works. That care which the first Amenemhat bestowed on the regulation of the inundation seems to have been the great object of his reign. The rocks of Semneh and Kummeh bear registers of the height of the Nile in several years of his reign. His great enterprise, the most successful of its kind ever carried out in Egypt, was the construction of a vast artificial reservoir, Lake Mœris, in the province now called the Feiyoom, which received the waters of the Nile by a canal, and after the inundation spread them over the country. Its fisheries were also very valuable. Through the neglect of ages the site of Lake Mœris was forgotten until, in our time, M. Linant traced it. Near the lake, Amenemhat III. built the famous Labyrinth, of which the remains were discovered by Dr Lepsius during the Prussian Expedition to Egypt, and there raised a pyramid. The use of the Labyrinth is unknown; the pyramid was no doubt the royal tomb. Its moderate dimensions and the vast size of the lake show a remarkable contrast to the earlier great pyramids, with apparently no corresponding work of public usefulness. At the time which produced the Lake Mœris civilization had reached a point far above that of the age of Khufu, perhaps the highest Egypt has ever known. Of the short reigns of Amenemhat IV. and Queen Sebek-nefru-ra we know nothing, but that with the latter the dynasty came to a close.

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[1] The length of Dynasty XII. appears to have been 213 years 1 m. [illegible] (Lepsius, *Ueber die Zwölfte Aegyptische Königsdynastie*, Akad. Berl. 1853.)

With the accession of Dynasty XIII. we reach the third chasm in the Egyptian monumental records. This line, Theban like its predecessor, but with a special favour for Middle Egypt (*cf.* Brugsch, *Hist.*, 2d ed. 115), seems to have ruled all Egypt. Its power, however, was evidently weakened, either by external war or by internal dissension. Many monuments may have been lost or may yet lie hid in the mounds of towns of Middle Egypt, but the scantiness of records of public works is a proof of its weakness. Where are its tablets in the quarries? In the Turin Papyrus are preserved the lengths of several of the reigns of its kings, who generally bore the names Sebek-hotep or Nefer-hotep. The longest reign is 13 years, and but one other reaches 10, the total of 13 reigns being but 48 years 22 days, and 6 sums of months and 7 of days effaced. Putting the total at 50 years, the allowance for each reign is under 4 years. This must have been a time of disturbance, but not necessarily of disastrous wars; for if we compare the rule of the second line of Memlook sultans we obtain an average reign of 5 years each. This we know to have been the consequence of domestic disturbance, and not of great public disasters at home or abroad. Dynasty XIV., of Xoites, the next in Manetho's list, is the first which had certainly its capital in the Delta. Beyond this fact we can only conjecture its importance and chronological place.

The invasion and conquest, at least in part, of Egypt by the Hyksos, or Shepherd Kings, is undoubtedly the chief cause of the obscurity of this age. The event did not happen until at least some time after the beginning of Dynasty XIII., for the eighteenth king of that line in the Turin Papyrus, who bears the significant name Mer-mesha, "the general," has left a record at Tanis near the eastern frontier, which was probably the chief city of at least one dynasty of the invaders.

Manetho, as cited by Josephus, allows for the stay of the foreigners in Egypt a period of 511 years, which has been supposed to be about the interval beween Dynasty XII. and Dynasty XVIII., by which they were expelled. This number, however, rests upon the single evidence of Josephus, and is moreover probably made up of sums of dynasties, which would render its evidence doubtful. A better means of measuring the period would be afforded by the monumental evidence that a Shepherd king ruled 400 years before Ramses II. could we place this foreign sovereign. All that can be said as to the chronology is that Dynasty XV. and XVI. were probably of Shepherds, and Dynasty XVII. was certainly Theban. Judging from the numbering, it is probable that there was a break in the Theban succession, and that the two Shepherd dynasties were successive, the Xoïtes perhaps being but a provincial line.[1]

The story of the Hyksos is thus told by Manetho. Under a king called Timaios, or Timaos (not recognized in the list or on the monuments), certain invaders from the East conquered Egypt without a battle, destroying the temples and slaying or enslaving the people. At length they made one of themselves, Salatis by name, king, who ruled at Memphis, and made all Egypt tributary. For the better protection of the eastern border he rebuilt and fortified the city Avaris, in the Sethroïte nome in Lower Egypt, where he kept a great force of soldiers. He was succeeded by other kings mentioned by name, who, and their descendants, held Egypt for 511 years. After this the kings of the Thebaïs and of the rest of Egypt rose against the Shepherd rule, and a great and long war was waged, until Misphragmuthosis drove the Shepherds out of all Egypt except Avaris, where his son Tuthmosis besieged them, and failing to take the place agreed to a capitulation, on the condition that they should be allowed to leave the country. Accordingly they went through the desert to Judæa and founded Jerusalem. They were called Hyksos, or Shepherd kings, and, according to some, they were Arabs.

This narrative, notwithstanding a general confirmation from the monuments, is evidently not wholly correct. In particular it is inconsistent with all other evidence in attributing the foundation of Jerusalem to the Shepherds, which is evidently the result of an endeavour to connect their departure with the Exodus. Manetho seems to have preserved two Egyptian theories of the Exodus, which both explained that event as the retreat of eastern invaders. M. Mariette's researches in the ruins of Tanis have brought to light monuments of the Shepherds, and led to the discovery of others elsewhere, while M. de Rougé and other scholars have explained Egyptian documents connected with the war of independence. From these different sources we learn that the foreigners were of the Shemite or a kindred type, resembling the modern inhabitants of the north-east of Lower Egypt, who still retains the peculiarities already noticed by Greek writers. Though their conquest may have been marked by violence, we find them in their own monuments using and cultivating the manners and civilization of Egypt, and even giving a new and characteristic development to its art in their costly monoliths of granite, which show from their material that their rule extended to the southern boundary of Egypt. The war of independence arose between Apepee, one of their later kings, who is described as worshipping Seth only, and one of the three Theban kings called on the monuments Ra-skenen Taa, at this time apparently a tributary prince. The war, contrary to Manetho's statement, does not seem to have been of long continuance, having been brought to a successful end by Aahmes, first king of Dynasty XVIII., between whom and Ra-skenen Taa no great length of time can have elapsed. Manetho's text is again erroneous in making the conqueror Tuthmosis (Thothmes IV.), son (grandson) of Misphragmuthosis (Thothmes III.), sixth and fifth sovereigns of Dynasty XVIII. in his list; but this may be a confusion due to copyists, as there is other evidence that he placed the conquest of the Shepherds under Amosis, or Aahmes. The expulsion of the foreigners was not so complete as Manetho would have us imagine. Several names in their territory remained Shemite, or the population non-Egyptian, and under Dynasty XIX. the prejudice that appears in Dynasty XVIII. seems almost removed.

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[1] The Tablet of 400 Years states that this period elapsed from some point in the reign of the Shepherd king Set-aa-pehti Nub to some point in that of Ramses II., and again Apepee, whose name corresponds to the Apophis of Manetho, almost immediately preceded Dynasty XVIII. Apophis is mentioned among the only Shepherd kings Manetho names. In the passage preserved by Josephus these are called the first Shepherd rulers, who very properly compose the first Shepherd dynasty, the XVth, in the epitome of Africanus; though Eusebius transfers them to Dynasty XVII., perhaps knowing they immediately preceded Dynasty XVIII. In Africanus, Dynasty XVI. is of Shepherds and XVII. of Shepherds and Thebans. If the identification of Apepee with the Apophis of Dynasty XV. were certain we might have a rough measure of the time of the Shepherd rule, but this is not proved.

It must be here noticed that Dr Brugsch has copied a remarkable inscription, from the tomb at Eilethyia of Baba, whom he assigns to the latter part of Dynasty XVII., in which mention is made of a famine of successive years. "A famine having broken out during many years, I gave corn to the town during each famine." There are but two known instances in history of a famine in Egypt lasting several years, the seven years' famine of Joseph and the seven years' famine of the Fátimee caliph El-Mustansir. Dr Brugsch has, therefore, argued with high probability that Baba records the famine of Joseph, and that the old tradition that Joseph governed Egypt under the Shepherd King Apophis is a true one (*cf. supra*, p 735, note 1). To this we shall recur in speaking of the Exodus. (See Brugsch, *Hist.*, 2 ed. 174, *seqq.*)

The beginning of Dynasty XVIII. (B.C. 1600–1500?) is marked by two great events, the union of divided Egypt under one head, and the victorious end of the great war with the Shepherds.[1] Aahmes, probably a Theban prince, appears to have secured the supreme rule over the various princes of Egypt, without abolishing their rights, and to have gained Ethiopian support by his marriage with Nefru-ari, daughter of a king of Ethiopia. He then directed his whole power to the final liberation of Egypt. The tomb at Eilethyia of Aahmes son of Abuna, an officer of the Egyptian flotillas, in an inscription relating his services, throws light on the events of this war. He passed his early youth in the fortress of Eilethyia, one of the strong positions where the kings of Dynasty XVII. rallied their subjects. In the reign of Aahmes he was made officer of the ship called the "Calf." Later he went to the flotilla of the north to fight. It was during the siege of the fortress of Avaris. He served in the vessel "Ruling in Memphis," a name no doubt given to commemorate the addition of the ancient capital to the dominions of Aahmes. An engagement took place on the water near Avaris. Subsequently Avaris was taken, and the young officer carried off three captives, whom the king granted him as slaves. This was in the fifth year of Aahmes; in the next we read of the conquest of Sharuhan, the Sharuhen of the book of Joshua, in the south-west of Palestine. The memoir then adds that, after having slain the Shepherds of [illegible], the king undertook a successful expedition against an Ethiopian country. (See Brugsch, *Hist.*, 1 ed. 80, 81.)

This narrative, while generally confirming Manetho's story, corrects it in some particulars. It states that Avaris was taken, not that it capitulated, and indicates a pursuit of the enemy within the territory of Palestine, where they [illegible] conquered in a city which they attempted to hold. The Ethiopian expedition was a reassertion of the Egyptian dominion to the south. Two tablets in the Turah quarries record how, in the twenty-second year of his reign, [illegible] the temples which had fallen into decay, the blocks being removed by bulls under the charge of Phœnicians? (Fenkhu) (Brugsch, *Hist.*, 2 ed. 173, 174). It may be recollected that the Phœnicians appear as skilled smiths and masons in the time of Solomon, and that as early as the Exodus they were already great metal-workers.

From the time of Aahmes till the close of Dynasty XX. we may reckon the rise, fulness, and decay of the Egyptian Empire. It is a period of abundant monuments, sculptured and painted, and of many papyri, rich in records of the history, manners, and religion of Egypt. The state of the country may be glanced at in this place, where the Shepherd period closes, so as not to break the continuity of the subsequent history.

The sudden growth of prosperity at home and power abroad which marks the early reigns of Dynasty XVIII. is truly surprising. The Egypt of Dynasty XVII. is broken up and only slowly reuniting; that of Dynasty XVIII. is at once solidly bound together, and soon to engage in designs of world-dominion never hinted at in earlier times. These conditions were the result of a great national war, in which the country discovered her hidden force, and was not content to use it only so far as was needful to make a strong Egypt like that of Dynasty XII. Having conquered her foreign rulers at home, she desired to add their native lands to her own dominions. The first effects of these designs were the enrichment of Egypt. In the early reigns of this house the wealth of the subjects as of the king rapidly grew. From the simple monuments of Dynasty XVII. and the first kings of Dynasty XVIII. there is a sudden advance to richness and splendour. Egypt was, however, becoming a military state. The king is constantly more powerful, and his public works more magnificent; the subjects, notwithstanding the luxury of individuals, have not that solid princely strength that we admire in those of the Pyramid kings and Dynasty XII. The appearance of the horse under this dynasty is most significant. The beasts of burden, the ox and ass, now yield in importance to the war-horse, and the landed proprietor journeys in his car whose ancestor went afoot staff in hand. Thus the military man succeeds the farmer. The priest is no longer a great man who has assumed sacerdotal functions, but one of a class immensely extended, reaching from the highest dignitaries, one of whom, strengthened by hereditary power, could at last seize the throne, down to the menial class who lived upon the superstitions of the people. To carry on the government there grew side by side with soldiers and priests a vast official body, clever, ambitious, and unscrupulous, which rapidly on the true bureaucratic principle involved the administration in an entanglement which must have mainly led to the decline of the Empire. Justice, which was difficult at home, must have been almost impossible abroad. We now cease to hear of hereditary nomarchs studying the welfare of provinces to which they were attached by ancestral connection. All posts went by the royal favour. The common people fared ill in this age. Their function was to supply soldiers for the army and navy, and at first to take their share in the construction of public works; their only hope was to rise in the official class. Handicrafts and all labour were beneath a gentleman; hence no one could rise to his grade but through success at the schools, which were open to every one, and where a boy of talent had his chance of a career (*cf.* Brugsch, *Hist.*, 1 ed. 16, 17).

Of the administration of provinces and conquered states we know little. Lower Ethiopia had always been ruled as a part of Egypt; this system was extended southward. At first the eastern states only paid tribute. Ultimately garrisons were placed in Palestine and Phœnicia (Brugsch, *Hist.*, 1 ed. 135). Compared with the Assyrians the

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[1] [illegible] Dynasty XVIII. is not yet fixed. Manetho's [illegible] can be corrected [illegible] and if we provisionally accept the [illegible] over two hundred years for the [illegible] of Ramses I. It must, however, [illegible] which are provisionally [illegible] may be more nearly determined [illegible] the place of the Shepherd king Nub, whose reign [illegible] that of Ramses II.

Egyptians were civilized conquerors, and the sculptures of their battles do not represent any scenes of extreme cruelty. They do not, however, seem to have known the art of effectually holding their acquisitions, which had to be reconquered over and over again, until the inevitable tide of conquest on the other side set in, and the Empire fell.

On examining the earliest monuments of Dynasty XVIII. we are startled by their astonishing resemblance to those of Dynasty XI., a resemblance which would, had we no historical evidence on the other side, justify the leap of the Tablet of Abydos from Dynasty XII. to XVIII. This may be partly explained as a renaissance of art due to a royal descent traced rather to Dynasty XI. than Dynasty XII. Similarly under Dynasty XXVI. there was a renaissance of the art of the age of the early Memphite Dynasties. We must also not lose sight of the local character of Egyptian art and its intense conservatism, which may have preserved an ancient type through many centuries. The early art of Dynasty XVIII. has this character of a survival; that of Dynasty XXVI. is clearly a modern imitation.

The art of this age is in some respects the finest Egypt produced; it is, perhaps, best about the time of Thothmes III. and Amenophis II., the middle of Dynasty XVIII. It is inferior in naturalism to the art of Dynasty IV., and in delicacy to that of Dynasty XII., but it has a certain splendour before wanting. After it had attained its highest point it slowly declined, partly from a decay in the vigour of the national character, perhaps more from the vast size of the later monuments, which must have led to a neglect of finish in the details, though this neglect can only be seen by one who is thoroughly acquainted with the Egyptian styles. At all times there is an invincible patience in the mastery of material and the execution of detail. The temples, not the kings' tombs, are now the largest and most costly edifices; though a compromise with the old idea is effected by making grand temples as sepulchral chapels in religious connection with the royal tombs, commemorating in their sculptures the events of the reigns. The tombs of subjects do not maintain the proportion the earlier ones hold to the royal sepulchres. Their paintings have less of daily life, and religion takes a greater and growing place on the walls. We have, however, a multitude of interesting scenes, which show us a life more luxurious in the many than that of earlier times, but not as splendid in the few. There is more of feasting, of music, and the dance, less of country life and the welfare of the retainers. The royal tombs are now grottoes deeply cut in the rock, and the pictures of their walls are religious, the historical part being left to the funereal temples.

Amenhotep or Amenophis I., son of Aahmes and his Ethiopian queen, carried on the Ethiopian wars. It is of his son, the next king, Thothmes I., that the great eastern campaigns are first recorded. He advanced as far as the Euphrates, and must therefore have subdued, or at least marched through, the greatest part of Phœnicia and Syria. The prosperity of Egypt at this time is shown by the splendid works he executed in the great temple of Amen-ra at Thebes, the earliest of their kind that we can trace, and apparently the beginning of the series which was only to cease with the fall of the Empire. The employment of captives in public works was the main means by which they could be carried out. Probably after a time all that Egypt could do was to furnish men for the army, and in even this she failed when the dynasty came to an end. Before his death Thothmes I. had associated with him on the throne his daughter Hatshepu, or Hatasu (Maspero, *Hist. Anc.*, 201), who succeeded him with her elder brother and husband Thothmes II. Her power is an evidence of the importance the Egyptians attached to the female line. At the same time their dislike to be governed by a queen is evident in the attempt she subsequently made to assume the character of a king, being represented in male attire, a circumstance to which the monuments present no parallel.

After the seemingly uneventful reign of Thothmes II., Hatshepu was associated, apparently as regent, with her younger brother Thothmes III., and usurped the sole power. It is in this time that she appears as a king. She continued the works of the temple of Amen-ra, where the great obelisk and its fallen fellow bear her name. Her most interesting achievement was an expedition to Punt, either the Somâlee country or Arabia Felix. She collected a fleet on the Red Sea, and herself commanded it. The people accepted her rule, and she brought back great tribute, including small spice-trees, which she planted at Thebes. The glimpse we thus gain into the state of the civilization of the spice-growing countries at this remote age is most valuable, and explains the facility with which the southern dominions of Egypt were held. The nations in this direction were not masses of barbarous tribes, but their civilization did not take the direction of the pursuits of war.

Hatshepu had reigned about twenty-one years when Thothmes III. succeeded her. He carefully effaced her name on the monuments, substituting that of his brother and his own, and reckoned his reign from her accession. Whether he thus included his brother's reign or not we do not know. With the sole reign of Thothmes III. a series of great expeditions begins, from the records of which we have great insight into the condition of Syria and Palestine about the 15th century B.C.

It will be well here to glance for a moment at the Egyptian geography of this territory. There is great difficulty in explaining it, probably due to the different names apparently given to the same countries and peoples at one and the same time or at different times. We may, however, gain somewhat in clearness by observing that more than one important geographical name can only be an Egyptian appellative. Thus the Shasu, who were wandering Arabs of the desert, who moved up as now into Palestine for pasturage or on predatory excursions, are nothing but "robbers." Most other names may be probably identified with Semitic equivalents. Syria is called Khal: this word is connected with Syria by the late equivalent Asher (*cf.* Maspero, *Hist. Anc.*, 181, note 1), which shows that the Egyptians then identified Syria and Assyria. The great nation of Syria in the time of Thothmes III. was the Ruten. These may be the Shemites of the stock of Lud, and may be also the Lydians in a primitive seat. Under Ramses II. the Kheta, a northern division of the Hittites, held the political position of the Ruten, as though the Ruten had migrated. As the Ruten probably represent the Aramæans, so the Hittites represent the Canaanites. The Phœnicians appear to be the Kefa; in the time of Thothmes III. they held an insular position in the Mediterranean, probably Cyprus; under Ptolemy III., they give their name to Phœnicia. They are clearly the Biblical Caphtorim. The Philistines do not appear until the time of Ramses III. None of the primitive nations whom the Bible mentions as supplanted in the period before Joshua have been traced on the monuments, nor is there any clear notice before the time of Sheshonk I. (Shishak) of the Terahites. The period of Thothmes III. is one of Aramæan supremacy, that of Ramses II. of Canaanite; together they well correspond to the age before the Israelite conquest, while the condition of the time of Ramses III. suits the latest age of the Judges. The names of towns present less difficulty. Many are traceable in Biblical geography, and here but one indication occurs which may point to Israelite occupation.

The Egyptian conquests on the east being tributary, there were constant revolts on the accession of new sovereigns. It was thus that Thothmes III., on becoming sole ruler, had immediately to reduce the Ruten and their neighbours. This caused the series of eastern campaigns, which began in the twenty-second year, very early in his sole reign, and certainly extended to the forty-second, during which whole time there was seldom a year of repose. The history of these wars is told in the Annals of Thothmes III., which contrast favourably with those of the Assyrian kings.

If they were marked by barbarity, there is no trace of aught but conquest and the levying of tribute. The tribute no less than a contemporary painting shows the great material civilization of the Asiatic states. Throughout the Ruten are the most formidable enemies; the Kheta only appear. The first great achievement was the defeat before Megiddo of a confederacy led by the prince of Kadesh, or Katesh on the Orontes. In the battle only 83 of the enemy were killed, and 340 taken prisoners; but the magnitude of the success is proved by the capture of 2132 horses, 924 chariots, and the speedy surrender of Megiddo. This town, as in Josiah's time, was the key of the route to the Euphrates, and on its capture the king of the Ruten and the king of Asshur are mentioned as becoming tributaries. In the course of the wars Kadesh was captured twice, and the king of Egypt marched as far as Nineveh, and the name of Babel is mentioned. The reign of Thothmes was also marked by expeditions in Ethiopia, and then we first meet with the supposed Egyptian name of the Danai, with whom he came in contact during some expedition in the Mediterranean. Great buildings commemorate this active reign, and we have a glimpse of the personal character of the king in the eccentric architecture of one of his additions to the temple of Amen-ra at Thebes. After a reign of 54 years 11 months, reckoning from the accession of Hatshepu, Thothmes III. was succeeded by his son Amenophis II.

The accession of the new king was marked by a war in Assyria, in which he captured Nineveh. An incident of his eastern campaigns is remarkable for its Oriental barbarism. He brought back to Egypt the bodies of seven kings whom he had slain with his own hands. The heads of six were placed on the walls of Thebes; the seventh was sent to remote Napata in Ethiopia to be hung on the walls to strike terror into the negroes. After a prosperous but probably short reign, Amenophis II. was succeeded by his son Thothmes IV., of whom we only know that he maintained his father's empire during a reign that probably did not exceed the nine years assigned to him by Manetho.

Amenophis III. succeeded his father, and, during a long and it seems mainly pacific reign, occupied himself in great architectural works. Two temples at Thebes owe their origin to him, that on the western bank, which was the funereal temple of his tomb in the western valley beyond, and of which little now remains but the two great statues in the plain, the Vocal Memnon and its fellow, and also the temple of El-Uksur on the eastern bank. In his time the dimensions of the structures of the earlier kings are surpassed, and the proportions of the greatest monuments of the Empire are almost attained. Probably he was the first of the family after Aahmes who took a foreigner to wife. On the great scarabæi which commemorate his marriage with Queen Taï, we are informed that his rule extended from Mesopotamia to Southern Ethiopia.

Amenophis IV., the son of this foreign marriage, is the most perplexing character in ancient Egyptian history. Under his mother's influence he introduced a new religion, the worship of Aten, the solar disk, and after a time wholly suppressed the national religion, even changing his name to Khu-n-aten. Abandoning Thebes as the capital, he founded a new city in Middle Egypt, where he constructed a chief temple to Aten, and near which his officials excavated their tombs in the mountain. The type under which the king and his family and subjects are represented is unknown elsewhere in Egyptian art. They are all of emaciated and distended figure, and surpassing ugliness. The king is treated with a servile respect nowhere else seen on the monuments. His troops are mixed with foreign mercenaries. We do not hear of foreign expeditions; every one [illegible] to the duties of the new religion, without polytheism [illegible]. Flowers are the chief offerings and adorn the temple throughout; hymns chanted to the sound of harps are the form of worship. Was this a foreign religion, or an Egyptian restoration of primitive belief? If it were Egyptian why was the sun called Aten, not Ra? The king was the son of a foreigner, and his type and that which marks his court, probably because some were of his mother's race, and art assumed the fashionable type for the rest, is not recognizable in any of the characteristic representations of foreign races. It is neither Ethiopian nor Shemite nor Libyan. The names of his mother and of her parents, the name of the sun-god, which is Egyptian, and the character of the worship, do not as far as we know point to any of these races. Certainly they are not Semitic. For race and religion we must probably look beyond the horizon of the Egyptian conquests. The type is not without an Indian aspect, and the religion has in its simplicity and the character of its worship a striking likeness to Vedism.

Khu-n-aten had seven daughters and no son. His successor Ai was his foster-brother and the husband of his eldest daughter. Under him the national religion was tolerated. Two other sons-in-law succeeded. Their line then or soon after came to an end, on the accession of Har-em-heb, or Horus, who claimed to be the legitimate successor of Amenophis III., either by descent or on account of the innovations of Khu-n-aten, who with the kindred kings does not appear in the monumental lists, in which Har-em-heb is seen as the immediate successor of Amenophis III. The same order is followed in Manetho's list, in which the house of Khu-n-aten follows Horus. What time this line lasted we do not know. Probably it did not exceed a generation. Horus occupied himself in destroying the monuments of Khu-n-aten and his successors, and no doubt in fully restoring the national religion.

Another family gained the throne after the reign of Horus, that of the Ramessides, forming Dynasties XIX. and XX.[1] Ramses I., who seems to have been of Lower Egyptian extraction, and not impossibly connected by ancestry with the Shepherd kings, seized the royal power, maintained his authority abroad by campaigns in the south and the east, and concluded a treaty of peace with the king of the Hittites. After a very short reign he left the crown to his son Setee I., or Sethos, who strengthened his rights by marrying Taï, a granddaughter of Amenophis III. Ramses II., the son of this marriage, thus became legitimate king, and Setee made him his colleague at a very early age, no doubt to conciliate the Egyptians, a position at first ignored, evidently owing to the difficulty of defining it, but which ended in the virtual abdication of Setee (Maspero, *Hist. Anc.*, 215–217). The troubles that preceded the reign of Ramses I. must have weakened the foreign dominion of Egypt. Wars in the east occupied the earliest years of Setee. The Kheta had now succeeded to the Ruten in the supremacy of Northern Syria. Although Setee conquered the Kheta and captured Kadesh, now their chief town, the war ended by the conclusion of a second treaty between the Egyptian and Hittite kings. It is not necessary to suppose, with M. Maspero (*Hist. Anc.*, 215), that the Egyptian Empire was already waning, because it was then barred off from Further Asia and obliged to meet the Hittite king on equal terms. The conditions were no doubt changed from those of the time of Thothmes III., but the list of the confederacy which the next king of the Kheta led against Ramses II., compared with that which Thothmes defeated at Megiddo, shows that the Kheta could bring into the field much more formidable allies than did the Ruten. Moreover there was a change in the foreign policy of Egypt. Phœnicia and Palestine were ruled by means of a chain of fortresses held by Egyptian garrisons. (Brugsch, *Hist.*, 1 ed. 135; Maspero, *Hist. Anc.*, 215.) If the Empire was narrowed in its limits, it was more solidly ruled; and this is quite consistent with the conclusion of a treaty with the Kheta. As a builder Setee I. is only equalled by Ramses II. He constructed the great hall of columns of El-Karnak, on the outside of the north wall of which he commemorated his victories in a series of most interesting sculptures. His splendid tomb is in the Valley of the Tombs of the Kings.

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[1] The chronology of Dynasty XIX. presents one great difficulty. We cannot determine the length of the reign of Setee I. Manetho assigns him more than 50 years, which is most improbable, as Ramses reigned 67 years, and his father and mother were married before his father's succession. Ramses dates from his accession as sole king, and therefore we cannot include a period of co-regency in the Manethonian numbers for Sethos. The size and beauty of Setee's tomb would imply a reign of not under 30 years. The length of the Dynasty cannot have been less than 130 years, and was perhaps as much as 180. It comprised three generations and the rest of the probably long life of the king (Setee II.) whose birth marked the third, which would give (100 + 40 ?) about 140 years for the total duration.

Ramses II. is without doubt the greatest figure in the long line of the Pharaohs, and at the same time he is the one of whose character we have the best idea. His early training was in war and in government, for it cannot be a pure figure of speech by which the tablet found near Dakkeh in Nubia says that when he was but ten years old no monuments were executed without his orders (Brugsch, *Hist.*, 1 ed. 137). This position was due to his superior right to the throne. Before the death of Setee I. the maritime nations of the Mediterranean made a descent on Egypt. The Shardana, or Sardones, and the Tuirsha, or Tyrseni, allied with the Libyans in this enterprise. Ramses defeated them so effectually that they do not seem to have again attacked Egypt till the reign of his son Menptah, about seventy years or more later. The captives of the Shardana instead of being employed in public works were enrolled in the king's guard. After an expedition against Ethiopia, Ramses, on the death of Setee, returned to Egypt. Early in his sole reign the peace between the Egyptians and the Hittites was broken. The king of the Hittites formed a great confederacy. The nations of Asia Minor, the Mysians, the Lycians, the Dardans, the people of Ilium, are found in the list of the poem of Pentaur, the Egyptian Ramesseid, which appropriately records the oldest war in which Troy had a part. To bring together the army of the confederates time must have been needed. Probably the war was determined on by the Hittites on the accession of the new king. The great campaign was that of the fifth year of Ramses. The decisive battle was preceded by a repulse, when the Egyptian army, deceived by the Arabs (Shasu), were suddenly, while on the march, attacked and routed by the enemy, who numbered no less than 2500 war-chariots. It was only by the personal bravery of Ramses that the Egyptians escaped destruction. This incident is the main subject of the poem of Pentaur. But on the next day the great battle was fought; the confederates were beaten and retreated into Kadesh. The Hittite king now sued for peace, which was granted. It was speedily broken. In his eighth year Ramses took Shalam, probably Salem or Jerusalem, Maram (Merom), and Tapur (Dabir? near Mount Tabor), Bethanath, and Kamon. In his eleventh year he captured Ascalon. The war does not seem to have been ended until the Hittite king Khetasar proposed conditions of peace which he brought to Ramses written on a silver tablet. The treaty concluded on these bases in the twenty-first year of Ramses is sculptured at El-Karnak. It is a most interesting document, being an alliance offensive and defensive, with articles of extradition, remarkable for their humanity, and others for the protection of commerce (Maspero, *Hist. Anc.*, 222, 223). Both kings swore to observe the compact, which was a renewal of the previous treaties. It is remarkable that in this document the Hittite prince, instead of being called the "vile chief of the Kheta," is now the "great king," the style given to Ramses also. The eldest daughter of the Hittite king was taken in marriage as queen by Ramses, in whose twenty-third year Khetasar visited his son-in-law in Egypt. This alliance does not seem to have been broken for full a century, and then by conquerors who overcame the resistance of the Kheta and carried them with them. The remainder of the reign of Ramses appears to have been undisturbed by great wars, and given up to those vast buildings which are found throughout Egypt and Nubia, and which give him the first place among the architect Pharaohs. About the thirtieth year of his reign, his fourth son, the eldest surviving, was made regent, and on the death of this prince in the fifty-fifth year, Menptah the thirteenth son, now heir, took this post, holding it for the rest of his father's reign, which ended in the sixty-seventh year. Ramses must then have been at least near a hundred years old, perhaps more.[1] He married three queens, and apparently had by them 23 sons and at least 13 daughters. The whole number of his children was 170, of whom 111 were sons and 59 daughters. All are styled princes or princesses, but probably only the children of queens had the right of succession.

Menptah succeeded Ramses II. There are but few monuments of his reign. The principal event they relate is a great incursion into the Delta of the maritime nations of the Mediterranean allied with the Libyans. By this time the Pelasgic tribes had wrested the dominion of the sea from the Phœnicians. Some causes, perhaps famines, had already disposed them to move from Asia Minor and the Greek islands, seeking new establishments in Egypt. The attempt that Ramses II. defeated in the lifetime of Setee I. was now renewed, apparently on a more formidable scale. The king of the Rebu (Libyans), with the warriors of several tribes joined the Shardana (Sardones), the Shakalasha (Sikels), the Leku (Lycians), the Tuirsha (Tyrseni), and the Akaiusha (Achæans). They had already entered Egypt and spread themselves over the west of the Delta, where they intended to settle, when the Egyptian forces attacked them and put them to rout after a battle of six hours' duration. It is remarkable that in this confederacy the Shakalasha and Akaiusha are added to the former list, and the Leku, who were in the Hittite confederacy against Ramses II., now appear on the west. Everything indicates the growing strength of the maritime nations and that power of united action which marked the period of the Trojan War. For the time the invasion was checked, but the Empire was evidently failing. The Hittites, indeed, were true to the treaty, and during famine were supplied with corn from Egypt, and the external provinces seem to have continued quiet. But side by side with the kingly power that of the high priests of Amen-ra had grown to formidable dimensions, owing probably to the interest Ramses II. and Menptah showed for Lower Egypt, which put the weight of Thebes on the side of the highest local functionary. Menptah was not immediately followed by his son Setee II. There intervened two reigns, those of Amenmeses and Siptah, the first of the Ramses family by descent, the second, apparently, by marriage. They appear to have been of a branch holding a local principality. Setee II. succeeded them and restored the legitimate line. His reign closed in anarchy. There was no longer one king: the chiefs of the nomes ruled and engaged in civil war. A worse period followed. A Syrian, Arisu by name, became chief of the nomarchs, society was dissolved, and the temple-services neglected. We are as yet unable to say how this revolution began. It seems to have had nothing to do with foreign wars, but to have been brought about by internal weakness. The time it lasted must have been long, according to the Papyrus of Ramses III., from which alone we know of it. There "many years" are assigned to the period of the nomarchs and "years" to the rule of the Syrian.

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[1] M. Maspero thinks Ramses II. was at least 50 in the 21st year of his reign (*Hist. Anc.*, 250). This would make him at least 96 at the time of his death, and 30 at his accession. The latter age is barely reconcilable with the fact of three of his sons of the restricted class, which is evidently composed of the children of successive queens, being engaged in the campaign of the 5th year. Putting his marriage at 16, we must allow at least 4 years for the birth of these three sons, and cannot suppose the youngest to have gone to war in his chariot under the age of 14. If so (16 + 4 + 14 =) 34 is the lowest age for the fifth year, and 29 for the accession, or 49 for the 21st year. But it is obvious that probability is against these extreme limits, and the fact that Ramses outlived twelve of his sons of the shorter list is in favour of a greater age.

As the Exodus is now generally held to have occurred in the later years of Dynasty XIX., its place in Egyptian history may best be here noticed. The view referred to was first carefully worked out by Prof. Lepsius. It rests upon chronological and historical grounds. Manetho, apparently adopting a tradition, placed the Exodus in the reign of Menptah. The number of generations assigned in the Bible to the interval from the Exodus to Solomon would bring the former event to about the same time. This approximative date is in accordance with that of the Rabbinical chronology, B.C. 1314–13. The coincidence is, however, valueless, for the interval from the Exodus to the building of Solomon's Temple, in the Rabbinical chronology, is that of the Hebrew text, 480 years. The date of the Exodus should therefore be about B.C. 1480. The difference between 1480 and 1314–13 is caused by an error in the date of the building of the Second Temple, which is put B.C. 354, only 46 years before the date of Alexander's death, which is dated B.C. 308, or 15 years too late. There is thus a mistake of more than a century in so cardinal a date as the building of the Second Temple. If an event of this importance, occurring only 800 years before the drawing up of the chronology, is thus incorrectly dated, and a period of Jewish history obliterated, surely the date of the Exodus cannot rest upon any accurate information. The historical grounds are far stronger than the chronological. Manetho, relating, if we may trust Josephus, a current tradition (ὑπὲρ ὧν δ' ὁ Μανεθὼν οὐκ ἐκ τῶν παρ' Αἰγυπτίοις γραμμάτων, ἀλλ', ὡς αὐτὸς ὡμολόγηκεν, ἐκ τῶν ἀδεσπότως μυθολογουμένων προστέθεικεν, ὕστερον ἐξελέγξω κατὰ μέρος, κ. τ. λ., *Contr. Ap.*, 16), and Josephus is here confirmed by the evidence which the narrative shows of historical inaccuracy, has given an account of the Exodus from an Egyptian point of view. This story is the fullest version of one current in various forms in antiquity. As Manetho tells it, the chief points are these. King Amenophis, identified by him with Menptah, who occurs in his lists as Amenophis and Ammenephthis, determined, under the advice of a priest of the same name as himself, Amenophis the son of Papis, to cleanse Egypt of all lepers and other unclean persons, whom, accordingly, he set to work in the quarries. On their petition he gave them the city Avaris, left in ruins by the Shepherds. Having occupied the city, they chose one of themselves, a priest of Heliopolis, by name Osarsiph, as their ruler, who changed his name to Moyses. He made laws particularly directed against the Egyptian religion, and sent messengers to Jerusalem to the Shepherds, who had been expelled by the Egyptians, asking their aid and promising to give them their old territory Avaris, and to assist them to subdue Egypt. Accordingly the Shepherds invaded Egypt, when Amenophis came against them, but for superstitious reasons did not fight them, and withdrew to the friendly king of Ethiopia, in whose country he remained thirteen years, his ally protecting the southern Egyptian border. Meanwhile the people of Jerusalem and the unclean Egyptians ravaged Egypt, and destroyed everything connected with the national religion. Afterwards Amenophis and his son Sethos, also called Ramesses, returned and expelled the Shepherds and the unclean people. Chæremon gives a similar account with the same name for the king. Lysimachus and Tacitus vary in calling the king Bocchoris.

The Egyptian evidence for the date of the Exodus would place it about this time. The geographical inquiries of Lepsius have been carried on by Brugsch, who, in a paper read before the Oriental Congress, has identified the principal geographical names of the narrative of the oppression and of the Exodus (Brugsch, *L'Exode*). In particular, Rameses is shown to have been another name of Tanis. The occurrence of this name in Genesis and Exodus is most important as bearing on the date of the Exodus, for it is almost certain that it was given by Ramses II., who rebuilt the great temple of the town. Another cardinal piece of evidence is the mention of the 'Aperiu, or 'Apuriu, as engaged in public works under Ramses II. and later kings, but not after Dynasty XX. In this name that of the Hebrews has been recognized. If the identification were certain we should have much reason for dating the oppression under Ramses II., which would accord with the Exodus under Menptah.

The difficulties of this theory are not slight. On the chronological side Manetho's date is only dependent on a tradition, and we cannot fix the chronology of the dynasty, B.C. 1300 for Menptah being about the middle point in a doubtful two centuries. The evidence of the Hebrew genealogies therefore is not conclusive for a date identical with that of Menptah, which we cannot yet say is irreconcilable with the chronology founded on the interval of 480 years from the Exodus to the building of Solomon's Temple. If, however, the genealogies are to be taken as a guide for the chronology up to the Exodus, Egyptologists prefer for the period of the sojourn the longer intervals stated in the Hebrew text to the very short ones that would result from the genealogical method. Still greater difficulties arise when we give a critical examination to Manetho's story. It reads like a perverted narrative of the calamities which closed Dynasty XIX., for we cannot suppose two conquests by Asiatics and two expulsions, one by Menptah and Setee II., the other by Set-nekht, who subdued the Syrian, nor resort to the violent hypothesis that the Papyrus of Ramses III. attributes to Set-nekht that which Setes II. achieved. The name of Amenophis is suspicious, the two names of his son Sethos, "who is Ramesses," still more so; the recall of the Shepherds from Jerusalem, and the easy conquest of Egypt without a battle, all read like a legend founded on a fusion of the two periods of Eastern occupation. There is, moreover, another suspicious circumstance in the occurrence of the name of Bocchoris in two versions of the story. This would either point to Bocchoris of Dynasty XXIV., in whose time it is quite possible that there was a large number of Israelite fugitives in Egypt, or to some other king of the same or a similar name; we do not, however, know of any earlier Bocchoris. It may be reasonably asked whether this story has anything to do with the Exodus. Those who hold that it has yet, in common with all Egyptologists, argue, when they examine the Biblical data, on the ground of the minute accuracy of many of these data. If, then, the two narratives, that of Manetho and that of the Papyrus of Ramses III., relate to the Exodus, it may reasonably be inferred that the Manethonian is a faulty and distorted one. It is, however, quite possible that Manetho may have known when the Exodus happened, and yet may have confused it with an event of the same period. The argument from the Biblical data that Rameses II. ruled during the oppression of the Israelites is very strong, though it may be conjectured that a redacter has substituted the later name Rameses for the earlier Zoan.

The name of the 'Aperiu, if certainly that of the Hebrews, would be decisive, but it is not a proper Egyptian equivalent, and so exact are the transcriptions of Semitic geographical names into Egyptian, that upon them mainly depends the theory of the sounds of the Egyptian alphabet developed by M. de Rougé and adopted by Dr Brugsch. Here, again, the evidence is inconclusive.

The arguments which would place the Exodus in any other period of Egyptian history are but slight. There is indeed the remarkable occurrence of a name similar to that of Jacob, or identical with it, in a record of the conquests of Thothmes III.[1] This may only be a reminiscence of Jacob, as M. de Rougé suggests, but it would be more natural to take it to indicate that the Exodus was anterior to the time of Thothmes, and there are other names in the list which may possibly point to the same conclusion.[1] Yet the preponderance of evidence is at present greatly in favour of the occurrence of the Exodus towards the close of Dynasty XIX. It is not, however, necessary to accept the date of Prof. Lepsius, in our present state of uncertainty as to the chronology of Dynasty XIX. It is also not a necessary consequence of accepting this historical synchronism, that we should take Manetho's narrative of the Exodus as more than his identification with it of an event of the same period. These may seem but unsatisfactory results of the great erudition which has been bestowed on this question. We refrain from speaking more positively when a discovery may at any moment render speculation needless.

If the Exodus took place towards the close of Dynasty XIX., when did the period of oppression and the government of Joseph fall? The reckoning by generations would place Joseph in the later part of Dynasty XVIII., and the oppression under Ramses II. downwards. It is, however, very generally acknowledged that this method of computation is not consistent with the growth of the Israelites from a family to a nation during the sojourn in Egypt. Scholars are therefore disposed to choose a reckoning by years. Here the Biblical data give either 430 years exactly for the sojourn and 400 for the oppression, or else 215 years for the sojourn. The longer periods are those generally preferred. If we reckon by them, the government of Joseph would have fallen under the last Shepherd king, and the oppression would have probably begun under Aahmes, to be greatly increased in intensity under Ramses II.

Set-nekht, a chief probably of the line of Ramses II., overthrew the Syrian intruder and again restored the Egyptian monarchy. His short reign, which begins Dynasty XX.,[2] was probably entirely occupied in reorganizing the administration of Egypt. Ramses III., whom his father had already made his colleague (Maspero, *Hist. Anc.*, 262), succeeded to a united Egypt but a distracted Empire. Evidently in the time of anarchy every province and tributary state had fallen away. The new king was equal to the effort of repelling invasion at home and reconquering lost territory abroad. In his fifth year he defeated the Libyan tribes who had invaded the west of Lower Egypt. In his eighth, he met another attack from the opposite quarter. The Taanau (Danai?) and the Takkaru (Teucrians), who now first appear, forming with the Tuirsha (Tyrseni), Washasha (Oscans?), Shakalasha (Sikels), Leka (Lycians), and Peleста (Philistines), a great confederation, which attacked the east of Egypt by sea and land. Their army conquered and carried with it the Kheta and neighbouring tribes. Their fleet, manned by the Takkaru and Shardana, reached Egypt at the same time. The Egyptian army and fleet encountered and defeated them. This campaign, and particularly the sea-fight, form the subjects of interesting reliefs in the great sepulchral temple built by Ramses III. in western Thebes. In his eleventh year a second invasion of the west of Egypt, by the Libyans, aided by the Tuirsha and the Leka, was equally unsuccessful. The eastern provinces and tributary states were recovered, and an expedition was sent to the Somálee country on the eastern coast of Africa or Arabia Felix. This last great conqueror finally preserved Egypt from the maritime nations. The course of their migrations seems to have been changed. All that remained of their invasions were the Philistine settlement in Palestine and one of the Mashuasha, a Libyan tribe, in the Delta, from whose race the Egyptians drew mercenaries (Maspero, *Hist. Anc.*, 266). The importance of these forces is evident in the Biblical notices of Egypt of the time of the Hebrew kings.

The historical value of the Egyptian notices of the primitive populations of the Mediterranean is being more and more perceived. It is at first perplexing that we find the nations afterwards settled in well-known seats either far to the east or in constant movement. Yet the key thus afforded to the earliest Greek colonization is most valuable, and it is significant of the historical character of the documents that new names appear, as we should expect, in such a manner as to explain the confusion of the Greek terms, which speak of Achæans and Danai, Dardans and Teucri, at the same time indifferently, whereas the Egyptian documents show that they are not interchangeable. Ramses III., besides constructing the magnificent temple at Medeenet Haboo, enriched the temples of Egypt with splendid gifts, during a prosperous reign of thirty-two years. The later kings of the dynasty do not appear to have achieved any thing remarkable. They maintained the Empire, but their authority at home waned, while that of the high-priests of Amen grew until, towards the close of the dynasty, Her-har, one of these high-priests, gained the royal power. Probably the close of the dynasty was occupied by a struggle between the last Ramesside kings and the high-priests, as well as by the additional distraction caused by the rise of another line, Dynasty XXI., of Tanite kings. Probably the Tanites ultimately gained the sole authority. The high-priests of Amen-ra, about this time, certainly not later than the rise of Dynasty XXII., retreated to Ethiopia, where they founded a kingdom, of which the capital was Napata. The Pharaoh whose daughter Solomon married was, if Manetho's numbers are correct, Psusennes II., Har-Psiunkha, last king of Dynasty XXI. He seems to have endeavoured to restore the military power of Egypt, for he made an expedition into Canaan and captured the town of Gezer, which he gave to his daughter, Solomon's queen.

During the later period of the Empire, partly through marriages of the Pharaohs, partly in consequence of the large employment of mercenaries, chiefly Libyans, great settlements of foreigners, Asiatic as well as African, were established in Egypt. So far from the Shemites being then disliked, a multitude of Semitic words were introduced into Egyptian, and it even became the fashion to give a Semitic form to native words (Maspero, *Hist. Anc.*, 337, 338). A Shemite family, settled at Bubastis, or in the Bubastite nome, succeeded by the command of mercenaries and by alliances with the Tanite family in establishing a new royal line, Dynasty XXII., which is remarkable for its foreign names. The royal names Sheshonk, Osorkon, Takelot are all either Assyrian or Babylonian. Still more striking is the name Nemrut, or Nimrod, borne by non-kingly members of the family. Probably it came from the further East.

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[1] In this list Iákab-aar is read by M. de Rougé as representing Jacob-el, a form like Nathaniel for Nathan (*Rev. Arch.*, n.s. iv., 370).

[2] The chronology of Dynasties XX. and XXI. is extremely obscure. We know that Ramses III. reigned 32 years, and Ramses XI. or XII. upwards of 32 years. The six successors of Ramses III. probably had very short reigns, as all but the second and sixth were certainly sons of that king, and the sixth probably. The other kings are represented by few monuments. Her-har, however, may have had a longer reign, the sculptures of the temple of Khons at Thebes giving this impression. There does not seem, however, to be any ground for a duration of more than a century until the Tanites of Dynasty XXI. rose into power. The latest Theban kings probably held a local and constantly diminishing authority for part of the time of the Tanites, of whom the records are extremely scanty and the chronology consequently obscure. Two centuries is a probable measure of the whole interval.

Sheshonk I., the Shishak of the Bible, may have gained the royal power peaceably. His son Osorkon married the daughter of the last king of the Tanite Dynasty, to whom Sheshonk succeeded. He seems early to have entertained the design of restoring the Egyptian rule in the East, for he received Jeroboam when he fled from Solomon. The revolt of the Ten Tribes enabled him to carry out this project, and late in his reign he marched against Rehoboam, and returned with the treasures of the Temple and the palace. A remarkable sculpture at the temple of El-Karnak gives a list of 130 names of towns and peoples conquered by Shishak in this expedition. Long as is the list, it is not like the rolls of the conquerors of the Empire. The items are far less important, and the Hagarenes recur several times, as if to record the subjugation of a series of small Bedawee tribes. Cities of Judah and Israel appear in the list, but the towns in the kingdom of Jeroboam seem to be Levite and Canaanite, and it is probable that the Israelite king was not averse to their overthrow. With this occurrence we gain the first good chronological footing in Egyptian history. The Hebrew chronology is indeed not as yet fixed. The Assyrian monuments seem to indicate a reduction of at least twenty-three years in the ordinary dates. The invasion of Shishak is ordinarily dated B.C. 971, but may thus have to be lowered to about B.C. 948; and as it probably took place in about the twentieth year of the Egyptian king's reign, his accession may be dated approximately B.C. 967.

The government of Egypt under the kings of Dynasty XXII. underwent an important change. They made the high-priesthood of Amen-ra an office of a prince of the family, usually the eldest son, and gave high governments to other princes. Thus the power of the Pharaoh ultimately became merely nominal, and Egypt resolved itself into an aggregate of principalities. A further cause of decay was the importance of the Libyan mercenaries which each of the princes commanded. Under a new dynasty, XXIII., said to be of Tanites, but probably kindred to the Bubastites, Egypt was, for a time at least, reunited under a single rule, but towards its close the process of disintegration had already again set in, and the country was divided among nearly twenty princes, at least four of whom took the royal insignia (Maspero, *Hist. Anc.*, 378 *seqq.*).

Among these small princes but one was capable of attempting to reunite Egypt under his rule. This was Tafnekht, Tnephachthos, prince of Sais, who reduced great part of the country, and would probably have achieved complete success, had not the yet unconquered princes called in the priest-king of Napata, Piankhi Meriamen. While Egypt had declined, Ethiopia had constantly risen, and at this time part of the Thebais owed it allegiance. Piankhi, the descendant of the priest-kings of Thebes, was not unwilling to recover his ancient dominions. In one brilliant campaign he defeated Tafnekht and his allies, captured their strongholds, and obtained the sovereignty of Egypt, leaving the small princes to rule as his vassals. The ancient Empire was thus in part restored, but as it was ruled from Ethiopia, and the little princes constantly strove for independence, it had no real durability. Piankhi was succeeded by Kashta, who was probably an Ethiopian, owing his throne to his intermarriage with a princess of the Theban line.

Bokenranf, or Bocchoris, son and successor of Tafnekht, no doubt seizing this occasion, was able to carry out the project of his father and make himself king of Egypt. After a short reign marked by energy and prudence he perished in a fresh Ethiopian invasion. Shabak, or Sabakon, conquered Egypt, and having taken Bokenranf in his capital, Sais, put him to a cruel death. It was no longer an Egyptian prince who ruled at Napata; all the circumstances we know of Shabak and his dynasty indicate an Ethiopian line, governing Egypt as a conquered country, not as their ancient territory. Still Shabak's connection with the priestly line was not forgotten. His sister, Queen Ameniritis, governed Thebes, and the power of the local rulers was limited, not destroyed. Hoshea, king of Israel, sent presents to Shabak,[1] who was subsequently drawn into a confederacy of Syrian and other princes against Sargon king of Assyria, but, as in all these wars, the Ethiopian king was a tardy ally. His capital lay too far south, and in crossing the eastern border of Egypt he left the ill-affected princes of the Delta in the line of his communications. He therefore came into the field too late, and it was but little east of Egypt that he met the Assyrians and experienced a disastrous defeat at Raphia. He lost great part of Egypt, in which the small princes again established themselves, now as vassals of Assyria, Shabak only retaining Ethiopia and part of Upper Egypt.

Shabatok, or Sebichus, was the son and successor of Shabak. He made himself supreme king in Egypt, but appears to have lost Ethiopia to Tahraka. Towards the close of his reign the Egyptian dynasts joined in an alliance against Sennacherib, who had recently succeeded Sargon. The confederates were defeated, or made their submission one by one. The Egyptian princes lost a battle in southern Palestine, in the territory of their ally Hezekiah, who was the last in the East to submit. But the Egyptians again advanced, encouraged by Tahraka, king of Ethiopia, who marched to their support. No battle was fought. The Assyrians moved against the Egyptians, but in one night the invading army perished, and Sennacherib fled to Nineveh. The tradition of the Egyptians agrees with Biblical history in relating the destruction of the Assyrians as miraculous; and it should be noted that for the rest of his reign Sennacherib never ventured again to invade Palestine. During this interval of respite Tahraka entered Egypt, slew Shabatok, and made himself master of the whole country (B.C. 693).

After twenty years of what seems to have been a peaceful reign, the Assyrian war began afresh, Esarhaddon, son and successor of Sennacherib, resolving on the subjugation of Egypt. Tahraka was vanquished and fled to Napata, and Memphis and Thebes were taken. The country was divided between twenty princes, with Neku I. of Sais as their chief. The fortresses were garrisoned with Assyrian troops (B.C. 672). In a few years, however, Tahraka returned, defeated the Assyrians, and captured Memphis. In commemoration of the earlier subjugation or of this one, the Ethiopian king puts the name of Egypt among those of conquered nations not only at Napata but also at Thebes (Maspero, *Hist. Anc.*, 427; Brugsch, *Hist.*, 1 ed., 244, 245). Soon after Esarhaddon abdicated in favour of his son Asshur-bani-pal, who speedily invaded and reconquered Egypt, driving out Tahraka and restoring the tributary princes. As soon, however, as he had left, a conspiracy broke out, and these chiefs sent emissaries to Tahraka. They were overcome by the Assyrians, and Neku and two others sent in chains to Nineveh, before Tahraka could come to their aid. But he again reconquered Thebes and Memphis. Asshur-bani-pal now made a politic use of the Egyptian party, treated Neku with honour, and sent him back to Egypt as ruler of Sais, giving a second principality to his son Psametik. Neku returned to find that Tahraka had left Egypt (B.C. 666). Urdamen, Tahraka's son-in-law and successor, held Upper Egypt, and at once attacked the Assyrians, captured Memphis from them, and took Neku, whom he put to death, while Psametik fled into Syria. Asshur-bani-pal now invaded Egypt, defeated Urdamen, and sacked Thebes, carrying the whole population captive. The twenty principalities were again set up, but Psametik was not the chief.

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[1] With this transaction Shabak's record at El-Karnak of the tribute of Syria has been connected (Maspero, *Hist. Anc.*, [illegible]).

After a time the Egyptian princes became independent of Assyria, but they had once more to submit to an Ethiopian invader, Nouat-Meiamen, who reconquered the country without much difficulty, but does not seem to have long held it. The Saïte prince Psametik, whose ambition excited the jealousy of the other dynasts, at last achieved the object for which his predecessors had pertinaciously fought. By the aid of Carian and Ionian mercenaries he put down his rivals, and by a marriage with the niece of Shabak rendered his line legitimate. This alliance with a princess only a generation younger than the first Ethiopian king brings into striking relief the vicissitudes which Egypt underwent during the Assyrian wars. Calamities were crowded into those years which usually occupy centuries. Yet under the new king, who was the real founder of Dynasty XXVI., Egypt rapidly recovered, and during the rule of his successors it was for the first time since the Empire strong and united, enjoying a true national existence. Public works of all kinds were carried on with energy. Art, which had fallen under the Bubastites and their followers, now suddenly revived, and with its recovery the ideas of the primitive dynasties came into fashion. The style of the age may be best compared with that of Dynasties IV. and V. It is, however, wanting in vigour, using elongated forms and abundant details. Still it has an elegance and a mastery of material which show that Egypt had not lost the true feeling of its art, in spite of the disastrous wars which had threatened the overthrow of all the institutions of the country.

Psametik I., or Psammetichus, employed his long reign in strengthening Egypt and in restoring the temples and making additional monuments. He recovered from Ethiopia a part of Lower Nubia, and made a successful expedition into Philistia. His designs of conquest were, however, frustrated by a wholesale desertion of Egyptian troops, caused by jealousy of the Ionian and Carian mercenaries to whom Psametik owed his throne. The mutineers, whose number Herodotus puts at 240,000 men, were too strong to be resisted, and deaf to the king's intreaties marched to Ethiopia and received lands from the king of that country. All that the Egyptian sovereign could do was to form a new army and build a fleet. He thus missed the opportunity afforded by the decline of Nineveh of winning back the influence Egypt had long lost in the East. An interesting memorial of his reign is the Greek inscription on one of the colossi of Aboosimbel, in Nubia, recording the visit of mercenary and Egyptian troops.

Neku II., B.C. 611, son and successor of Psametik, inherited his father's energy but not his prudence. He attempted to complete an enterprise of the Empire and connect the Red Sea with the Nile, and so with the Mediterranean, by a canal. Under his orders Phœnician seamen circumnavigated Africa. Less fortunate was his attempt to recover the eastern rule of Egypt. He marched against Megiddo, still the key to the route to the Euphrates. Here he was met by the forces of Josiah, king of Judah, with whom he unwillingly fought. Josiah was slain, and the king of Egypt advanced to Carchemish on the Euphrates. Thus the Egyptian Empire was for a moment restored. There was no great eastern rival to contest its supremacy. Assyria had fallen, Babylon was not yet firmly established. After about three years Nabopolassar, the king of Babylon, sent his son Nebuchadnezzar against the Egyptians. At Carchemish the armies met. Neku was defeated, and the Egyptian rule in the East finally destroyed. Soon after the king of Egypt died, leaving his throne to his son Psametik II., B.C. 595, whose short reign was only marked by an expedition against the king of Ethiopia. The next king, Psametik's son, Uahabra, or Apries, the Pharaoh Hophra of Scripture, B.C. 590, inherited the energy and ambition of the Saïte house. His accession was the signal for a general confederation of Palestine and Phœnicia against the king of Babylon. The war was speedily ended by the capture of Jerusalem, which Uahabra in vain endeavoured to prevent. He was, however, successful at sea. His Greek ships beat the Phœnician fleet of Nebuchadnezzar, and for a time he held the Phœnician coast, and aided Tyre in a resistance of thirteen years against the Babylonian besiegers. A great disaster lost Uahabra his throne. He engaged in a war with the Greeks of Cyrene. His Egyptian troops were defeated. The native soldiers believed that he had planned their destruction that he might put mercenaries in their place. They revolted and chose Aahmes, or Amasis, king. Amasis defeated the mercenary troops of Uahabra and dethroned him, B.C. 571. It is to this time that the conquest of Egypt by Nebuchadnezzar is assigned by Josephus. The silence of Herodotus and the other Greek historians, and the prosperity of Egypt under Amasis, have induced modern scholars to suppose that Josephus based his statement on the prophecies of Jeremiah and Ezekiel. If, however, we read between the lines of the story of Herodotus, we need some other cause than the disaffection of the Egyptian troops to account for the sudden success of Amasis, and especially for his easy defeat of the mercenaries with a discouraged native force. Again, the conquests of Egypt by the Assyrians, though predicted by Isaiah and noticed as past by Nahum, are unrecorded by Herodotus and the Greeks. The prosperity of the country in the reign of Amasis might as easily follow a Babylonian conquest as that under Psametik I. followed the terrible Assyrian wars. The scantiness of the native records of Nebuchadnezzar's reign leaves us without Babylonian evidence.

Amasis took to wife a grand-daughter of Psametik I. and his heiress-queen Shapentap, thus legitimatizing his pretensions. He greatly embellished the temples of Egypt. It may be that, as in the time of Psametik I., they needed restoration. His foreign policy was marked by energy and caution. He transferred the Ionian and Carian mercenaries to Memphis itself as a force of guards. He granted the Greeks the free use of Naucratis as a Hellenic settlement and trading port. He conquered Cyprus, and kept up the influence of Egypt in Phœnicia. He had friendly relations with the Greek states, and instead of conducting an expedition against the Babylonians during their Empire or against the rapidly rising power of the Persians, he joined in an alliance of which Crœsus, king of Lydia, was the head, and agreed to furnish him with an Egyptian contingent in his war with Cyrus. After the fall of Crœsus other wars kept Cyrus from any designs on Egypt, and it was not until the accession of his son Cambyses that the Persians could attempt its reduction. Meanwhile Amasis died, leaving the crown to his son Psametik III., the Psammenitus of Herodotus, who, after a single well-fought battle near Pelusium, and the capture of Pelusium and Memphis, lost his kingdom, B.C. 525.

Cambyses, as we learn from the narrative of the Egyptian priest Uta-har-sun of Saïs, at first adopted the style of a Pharaoh, and was initiated into the mysteries of Neith at Saïs. It was not until the failure of an expedition against the Oasis of Ammon, and of another directed by himself against the Ethiopian kingdom of Napata, that Cambyses, probably aware of the satisfaction the Egyptians must have felt at these reverses, changed his policy, and vented his rage upon the monuments and objects of worship in Egypt. The Saite priest, in general terms, describes this as a time of calamity such as had never before befallen his country. Cambyses left Egypt, which was so completely crushed that the subsequent usurpation of the Magian was marked by no revolt. One of the first cares of Darius I. was to charge Utahar-sun with the restoration of the disordered country. In a visit to Egypt at the moment when a revolt had broken out, he pacified the people by supporting their religion, in the most marked contrast to Cambyses. For the rest of his reign he endeavoured to promote the commercial welfare of Egypt, in particular opening the canal from the Nile to the Red Sea. In the Great Oasis he built a temple to Ammon. It was not until the very close of his reign that the Egyptians rose against his rule, and expelled the Persians, choosing as king Khabbash, whose name has been discovered in the Sarapeum. The revolt lasted but three years, and Xerxes I. suppressed it with severity. Achæmenes, the brother of Xerxes, was made satrap. Egypt did not again rise until the troubles which marked the accession of Artaxerxes I. The insurrection was led by Inaros, prince of Marea, who immediately concluded an alliance with the Athenians. Supported by 200 Athenian triremes, he defeated and slew the satrap Achæmenes, and besieged in the citadel of Memphis the remnant of the Persian army, which, though it included Egyptian soldiers, held out until the attacking force was drawn off by a fresh Persian army. The Egyptians and their allies were now driven to the island of Prosopitis, and there besieged for eighteen months. At last Inaros was taken and put to death; Amyrtæus, an Egyptian who reigned with him, fled to the marshes, where he long maintained himself. Artaxerxes, after this serious revolt of six years, modified the administration of Egypt, recognizing Thannyras, son of Inaros, and Pausiris, of Amyrtæus, as vassal kings. The government was, however, held by a Persian satrap; these were merely local princes.

An Amyrtæus, probably son of Pausiris (Maspero, *Hist. Anc.*, 562), revolted, and on the death of Darius II., B.C. 404, made Egypt virtually independent. He is the one king of Dynasty XXVIII., Saite. His successor, Naifaaurut I., founded Dynasty XXIX. of Mendesians, B.C. 399. With him the monuments, silent since the rising of Khabbash, again give us information, and under the next dynasty show that the Saite art still lived in spite of the misfortunes the country had undergone. The Mendesians Naifaaurut and Hakor are chiefly known for the part they took in aiding the enemies of Persia. Hakor was followed by Naifaaurut II., and then the sovereignty passed to Dynasty XXX. of Mendesians, the last native Egyptian line. The first of these kings, Nekht-har-heb, or Nectanebes I., came to the throne when a Persian invasion was imminent, B.C. 378. Hakor had already formed a powerful army, largely composed of Greek mercenaries. This army Nekht-har-heb intrusted to the Athenian Chabrias. The Persians, however, succeeded in causing his recall and in gaining the services of his fellow-countryman Iphicrates. The invading army consisted of 200,000 barbarians under Pharnabazus and 20,000 Greeks under Iphicrates. After the Egyptians had experienced a reverse, Iphicrates counselled an immediate advance on Memphis. His advice was not followed by Pharnabazus; the Egyptian king collected his forces and won a pitched battle near Mendes. Pharnabazus retreated, and Egypt was free.

Nekht-har-heb was succeeded by Tachos or Teos, whose short reign was occupied by a war with Persia, in which the king of Egypt secured the services of a body of Greek mercenaries under the Spartan king Agesilaus and a fleet under the Athenian general Chabrias. He entered Phœnicia with every prospect of success but having offended Agesilaus, he was dethroned in a military revolt which gave the crown to Nekht-nebf, or Nectanebes II., the last native king of Egypt. At this moment a revolt broke out. The prince of Mendes almost succeeded in overthrowing the new king. Agesilaus defeated the rival pretender, and left Nekht-nebf established on the throne. But the opportunity of a decisive blow against Persia was lost. The new king, Artaxerxes III. Ochus, determined to reduce Egypt. A first expedition was defeated by the Greek mercenaries of Nekht-nebf, but a second, commanded by Ochus himself, subdued Egypt with no further resistance than that of the Greek garrison of Pelusium. Nekht-nebf, instead of endeavouring to relieve them, retreated to Memphis and fled thence to Ethiopia, B.C. 340! Thus miserably fell the monarchy of the Pharaohs after an unexampled duration of nearly 3000 years, or as some think far longer. More than 2000 years have since passed, and though Egypt has from time to time been independent, not one native prince has sat on the throne of the Pharaohs. "There shall be no more a prince of the land of Egypt" (Ezek. xxx. 13) was prophesied in the days of Apries as the final state of the land.

The causes of the downfall of Egypt are sufficiently evident in the previous history. The weakness of the later Thebans fostered divisions. The Bubastites aided the natural tendency of the country to break up into small principalities. The Ethiopians, while they brought a new force to resist the Assyrians, increased the divisions of Egypt, which had to choose to which of two foreign empires it would submit. The Saites restored nationality, but they maintained it at the cost of alienating the native troops, and thus could not effectually resist Persia. Although their gallant struggles brought out the fighting qualities of the Egyptians, these Pharaohs could never venture on a great war without Greek mercenaries. Hence constant discontent and an inharmonious military system. At length the native energy was worn out.

The barbarian Ochus used his success mercilessly, rivalling the worst acts of Cambyses. Under him and his successors Egypt made no movement, and when Alexander entered the country as the conqueror of Persia he was welcomed as a deliverer. The Persian governor had not forces enough to oppose him, and he experienced nowhere even the show of resistance. He visited Memphis, founded Alexandria, and went on pilgrimage to the oracle of Jupiter Ammon. He then organized the government under two officers, who from their names appear to have been a Greek and an Egyptian. He left the Egyptians satisfied with his reverence for their religion, and for the rest of his reign the country remained a peaceful province of his great empire. With Alexander, the Macedonian dominion began. It lasted for 302 years, after the Empire the brightest period of Egyptian history, during the whole of which no general native revolt broke out. From this time the Egyptian local princes, who for five centuries, except only during the rule of Psametik and his house, had caused all the divisions of Egypt, disappear from the scene. This final settlement was probably due to the policy of Alexander, under whose successors we see the real government of the country, with its centre in the Greek city he had founded, and the control of the army and navy, intrusted to Greeks; whereas the native religion was protected, but wholly left to the Egyptian priests, except so far as the king himself acted as one of the priesthood. Thus the foreigners had all the true power, while the natives were satisfied with a semblance of it, and the local importance this semblance gave to their functionaries. Routes of trade were actively pushed, and works of public benefit carried out, and the Egyptians grew more and more wealthy, in Egyptian towns, where a Greek was rarely seen, and the king only appeared in the character of a Pharaoh to show respect to the religion of the country. The learned men of both races drew nearer together, and Greek speculation had its effect on Egyptian thought. The less cultivated settlers were attracted by the native superstitions, and at last the Alexandrian was far more an Egyptian than even a Macedonian.

On the division of Alexander's dominions, Egypt fell to the share of Ptolemy, son of Lagus and Arsinoë, a concubine of Philip's, whose son he was supposed to have been. Of all Alexander's generals he was the most far-sighted. Instead of aiming at the rule of the empire, he secured the least exposed province and employed its resources rather for defence than offence. One of his first acts was to divert the burial of Alexander from Macedon to Egypt. The body was taken to Memphis, but under Ptolemy's successor it was removed to Alexandria, so that the conqueror rested in the city he had founded. His first conquest was the Cyrenaïca (B.C. 322), a valuable province outside the field of the contests of his rivals, yet greatly useful for naval enterprises against them. Yet he did not declare himself independent; as a subject of the phantom kings Philip Aridæus and Alexander Ægus, he inscribed their names in his restorations of Egyptian temples, and alone of all the generals struck money in the name of Ægus so long as that last heir of Alexander lived. He was not long left in undisturbed occupation of his government. The regent Perdiccas, finding that Ptolemy was engaged in a league against his authority, marched into Egypt, B.C. 321; but the resistance of Ptolemy and a mutiny in the invader's army, which resulted in his death, delivered Egypt from this danger. The succeeding years were occupied in attempts to add Cœle-Syria and Phœnicia to the Egyptian dominions, which can scarcely be considered rash when we remember the importance of these provinces to the security of Egypt against invasion, and for winning of the maritime supremacy of the eastern Mediterranean. During this time Cyprus was made a dependency, and the Cyrenaïca, which had revolted, was finally reduced by Ptolemy's step-son Magas. A great calamity now arrested the growing power of Egypt, when Demetrius, son of Antigonus, defeated Ptolemy in a sea-fight off Salamis of Cyprus (B.C. 306). Antigonus then assumed the royal diadem, and Ptolemy followed his example. Antigonus and Demetrius immediately attacked Egypt, but without success; and Ptolemy, rapidly recovering his strength, aided the Rhodians when besieged by Demetrius (B.C. 305–4). It is related that when the siege was raised the Rhodians gave Ptolemy, as their "preserver," the title of Σωτήρ. This appears in his hieroglyphic inscriptions as his distinctive title, and upon the coins of his successors struck in his name in Phœnicia. After this Ptolemy again attempted without success the conquest of Cœle-Syria and Phœnicia, but ultimately seized and held Cyprus, B.C. 295, which thus became a part of the Egyptian monarchy for nearly its whole duration. His later years were passed in consolidating his power. Seleucus was master of a Syrian empire, too firmly ruled to be attacked with any chance of success, and stretching too far eastwards to make its master aggressive on the Egyptian border. The government of Egypt was assured by the care taken to maintain and increase the Greek element in the country. Alexandria was made a seat of Hellenic culture, and if it is not absolutely certain that Ptolemy founded the Library and the Museum, he undoubtedly gathered the necessary intellectual materials. The great Greek colony of Ptolemaïs, in the Thebaïs, was established. Thus the native and foreign elements were kept apart, conflicts avoided, and strong Hellenic centres secured. The Egyptians were flattered by the arrival of the image of Sarapis from Sinope and the spread over Egypt, under the king's influence, of a Hellenic form of their religion. The king's portrait on his coins shows us him in old age, and is distinguished by resolution, keenness, and craft.

Having ruled thirty-eight years, the old king abdicated in favour of his young son Philadelphus, chosen to the prejudice of his elder brothers (B.C. 285), and died two years later (B.C. 283).

Ptolemy Philadelphus ruled for thirty-eight years of almost undisturbed peace. His half-brother Magas, probably soon after the death of Ptolemy Soter, declared himself king in Cyrenaïca, and attempted to invade Egypt. Ptolemy remained on the defensive, and at last a treaty was signed by which Ptolemy, heir of the Egyptian crown, and Berenice, heiress of Cyrenaïca, were betrothed, Magas retaining the power if not the name of king. Philadelphus was also fortunate in recovering Phœnicia and Cœle-Syria. This probably took place not much before B.C. 266, for that is the earliest date in the series of coins struck at Tyre during his reign. He secured the friendship of the Phœnician and Palestinian coast-towns, by granting them a degree of autonomy, for their coins, though dated in his reign, were struck at each town, and bear not his name but that of his father. In Egypt he paid great attention to the extension of commerce. He reopened the canal of the Red Sea and established a desert route from Coptos to Berenice on the coast which he had founded. He made war in Ethiopia, but according to his custom he was content to be on friendly terms with the Ethiopian king Ergamenes. His Ethiopian expedition led to his establishing a station for the purpose of securing a supply of elephants for war. An ambassador was sent to India. Thus the trade of Ethiopia, Arabia, and India was secured for Egypt, and continued to enrich it for eighteen centuries. Not less wisely Philadelphus made Alexandria, with the Museum and Library, the heart of the learning of Greece. Many cities were founded by him, or like Ptolemaïs in Galilee, refounded. In his long reign there was little expenditure but such as was calculated to enrich his empire. At his death his dominions equalled those of his father. He held Cyprus, much of the coast of Asia Minor, the Cyclades, and part of Ethiopia and Arabia. The Cyrenaica was only to be separated for the life of Magas. He twice married. His second wife was Arsinoë II., his full sister, whom he married in accordance with Egyptian rather than Greek notions. She was a woman of great beauty and force of character, and much loved by her husband. The character of Philadelphus is marked by the craft rather than the force of his father's; but he inherited to the full his love of literature and his love of pleasure, both undisturbed by warlike ambition. He is the last representative of the old Greek "tyrannos," whom Pindar has made known to us, rather than one of the restless "diadochoi."

Ptolemy Euergetes, son of Philadelphus and Arsinoë I., by his accession, B.C. 247, reunited the Cyrenaïca to the Egyptian empire. A quarrel between Egypt and Syria immediately broke out. The Syrian king Antiochus II. had married a daughter of Philadelphus. She was now put away, and, as well as Antiochus, murdered by her rival, his first wife Laodice, who set up her son Seleucus II. Ptolemy invaded Syria, which he speedily subdued, and then following the traditions of Egyptian conquest, he passed the Euphrates and reduced the whole of the eastern dominions of Seleucus. He returned to Egypt with vast treasures, including the statues of the gods which Cambyses had carried away, and which he restored to the temples. At sea he was equally fortunate, and the maritime territories of Egypt in the eastern Mediterranean were greatly enlarged. For a moment the old Egyptian Empire was again revived in larger proportions, extending from the Thracian coast to Ethiopia, from Cyrene to the border of India. The eastern provinces speedily returned to the Syrian rule, and Ptolemy was content with a moderate accession of territory on that side. He, however, retained his Greek conquests and pushed far south in Abyssinia. Euergetes was not merely a warlike king. He cared for literature, and more than his predecessors laboured to please the Egyptians. He is the first Ptolemy whose Egyptian structures are worthy of the wealth of the country. Art had lost its ancient delicacy, yet the sumptuous architecture of this age merits admiration as showing a new though somewhat false development of the ancient style. His reform of the native calendar, as recorded in the Decree of Canopus, is another mark of his wise interest in Egypt. He was fortunate in his marriage with Berenice II., who as queen of Cyrene is the first Egyptian queen who has the same regal style as her husband. Having reigned twenty-five years he left his kingdom to his son.

Ptolemy Philopator, who began to reign B.C. 222, immediately on his accession put his mother Berenice and others of his nearest kindred to death, and, leaving the management of the state to Sosibius, abandoned himself to luxury. Antiochus III., king of Syria, seized the opportunity to wrest from Egypt all the eastern provinces. Ptolemy at length took the field himself in defence of Egypt, and defeated Antiochus at Raphia, where his success was greatly due to the courage of Arsinoë III., his sister and wife (B.C. 217). By this victory Cœle-Syria and Phœnicia were recovered. Ptolemy returned to his former life, and Arsinoë was put to death. He left his kingdom, greatly weakened by bad administration and growing disaffection, to a child, Ptolemy Epiphanes. The other two Macedonian kings, Philip V. and Antiochus III., now allied themselves to despoil Egypt of the provinces. Everything but Cyprus and Cyrene was taken, and the Egyptian ministers only saved the country by having called in the aid of Rome. The Republic had long been friendly to the Ptolemies, and nothing suited her policy better than a protectorate of Egypt. Accordingly M. Æmilius Lepidus was sent as regent to Alexandria, and Antiochus was commanded to restore what he had conquered. It was finally settled that Ptolemy should marry Cleopatra, daughter of the Syrian king, and that she should take back Cœle-Syria and Phœnicia. From this time Rome ruled Egypt with reference to her own eastern policy. The kingdom of the Ptolemies was not allowed to fall, but it was kept within the most moderate limits. Consequently the weak kings were supported and the strong kings thwarted in every way. Egypt could not rid herself of a bad ruler or enjoy the full advantage of a good one. The rest of the minority of Ptolemy was marked by a serious revolt in Lower Egypt, put down with great difficulty. In B.C. 196, when but thirteen or fourteen years old, the young king was crowned at Memphis, when the decree of the Rosetta Stone was issued. The place of coronation and the terms of the decree show a policy of conciliation towards the Egyptians which the revolt probably rendered especially necessary. The marriage of Ptolemy and Cleopatra I. took place B.C. 193-2, but the dowry was not handed over. Ptolemy continued true to the Romans in their war with Antiochus, but was not allowed to act as their ally, and gained nothing in the subsequent treaty. Another revolt broke out in Lower Egypt, and was cruelly suppressed, B.C. 185. Ptolemy perished by poison in B.C. 181, leaving two sons surnamed Philometor and Euergetes, who ruled Egypt in succession. Epiphanes inherited the weakness and cruelty of his father, and with him Egypt lost for a time her influence in the affairs of the world.

Cleopatra I., who like Berenice II. was queen as heiress,
now became regent for Ptolemy Philometor, and ruled we
until her death, about B.C. 174. The ministers then made wa
on Antiochus IV. (Epiphanes) for the disputed provinces.
The Egyptian forces were defeated, Egypt invaded, an
Ptolemy seized (B.C. 170). His younger brother, Euerget
II., with an audacious courage that marks his whole caree
declared himself king at Alexandria, where Antiochus be
sieged him in vain, and Roman ambassadors interfered for h
protection. Antiochus retired, leaving Philometor as king a
Memphis. The two brothers now made terms, agreeing t
a joint rule. Antiochus again invaded Egypt, and marche
to Alexandria, but was forced to retire by the resolution o
a Roman ambassador, M. Popillius Lænas (B.C. 168). Fr
this time Egypt was more than ever in the hands of th
Romans, and in consequence of the manner in whic
Philometor had yielded to Antiochus while Euergetes ha
resisted his pretensions and depended on their suppor
we find them constantly aiding Euergetes, whose ab
ties, if equal to those of Philometor, were weighted by
a perfidious and cruel disposition. It was not long befor
Euergetes succeeded in driving Philometor from Alexandri
The fugitive went to Rome B.C. 164, and the senate agree
to reinstate him. Euergetes was spared by his brother, and
the Roman deputies obtained for him the kingdom of
Cyrene, where he occupied himself in ceaseless plots to obtain Cyprus, assisted by the active support of Demetrius I
of Syria and the unjust diplomatic aid of the Roman senate
Philometor had the courage to oppose his brother, who invaded Cyprus with Roman ambassadors ordered to settl
him in the government of the island. Philometor defeate
and took him prisoner, but again spared his life, and lef
him the kingdom of Cyrene (B.C. 154). The Romans d
not interfere with this settlement.

The part Demetrius I. had played in the war in Cypr
led Philometor to take the side of the usurper Alexander
(Balas), to whom he gave his daughter Cleopatra to wi
(B.C. 150). When Demetrius II. endeavoured to reco
his father's kingdom Ptolemy advanced to the support
Alexander, but thinking him treacherous, he turned
arms to the aid of the legitimate king. Rapidly subd
the country, Ptolemy entered Antioch and was hailed
of Syria, to the crown of which he had a claim as desce
maternally from the Seleucid line; but he admitte
higher right of Demetrius, whom he aided in resist
invasion by Alexander. In a decisive victory Ptolem
thrown by his horse and mortally injured (B.C. 146).

It was in the reign of Philometor that Onias f
the temple at Onion in Egypt, which tended to i
the importance of the Jewish colonies and to sepa
Alexandrian from the Palestinian school.

With this king the power of Egypt finally fell.
the last Ptolemy who had the capacity to rule a
growing difficulties of the time. In his wars h
courage and generalship, in his dealings with Rom
and decision, in his rejection of the Seleucid
moderation and justice, in his treatment of his br
his subjects an extraordinary clemency and hum

Cleopatra II., the sister and widow of Philo
their son on the throne.[1] Euergetes at onc
from Cyrene to Alexandria. The Romans a
his part, and stopped the war on the co
Euergetes should marry his brother's widow.
king was instantly put to death. Ptolemy reign
begun: Alexandria was depopulated by his crue
the rest of Egypt seems to have fared better in
of his want of ambition. He divorced Cle

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[1] There is difficulty as to his name. In Egyptian
pator precedes or follows Philometor (Lepsius, Berl
[illegible]; but in a Greek inscription in Cyprus the lat
(Hogg, J., "Inscr. from Cyprus," *R. S. Lit.*, 2 ser

marry her daughter, his niece, Cleopatra III. In B.C. 130 he was driven out of Egypt by a revolt, and Cleopatra II. became queen. In revenge he put to death their son. Cleopatra having asked the aid of Demetrius II., Ptolemy was recalled, B.C. 127, and for the rest of his reign adopted a more conciliatory policy. He engaged in war against Demetrius II., and supported the usurper Alexander II., against whom he subsequently turned, apparently with reason. The reconciliation with the Seleucids led to the recall of Cleopatra II., with whom Ptolemy now reigned. He died B.C. 117, in the fifty-fourth year from his first accession. This king, the worst of the Ptolemies, as Philometor was the best, is significantly known by the nickname Physcon, or Fat-paunch, but he was also called by his subjects the Ill-doer, Kakergetes, instead of the Well-doer, Euergetes. Some of his latest coins present, instead of the idealized head of Ptolemy, the founder of the line, bloated and cruel features which can only be those of Physcon. His one good quality was a hereditary love of letters.

Cleopatra III., surnamed Cocce, widow of Euergetes and heiress of Philometor, succeeded, and, in deference to the popular will of the Alexandrians, associated with her Ptolemy Soter II., surnamed Lathyrus, or Lathurus, her elder son, instead of Ptolemy Alexander I., the younger, whom she preferred. They ruled together with little concord, and at length Cleopatra expelled her colleague, who had been the real sovereign, and recalled Alexander from Cyprus, where he had already ruled independently for seven years (B.C. 107). Cyrene was probably lost to Egypt about this time. Physcon had left this kingdom to his base son Ptolemy Apion, who is generally supposed to have at once succeeded. The coins, however, show that the latest Cyrenaic coinage of Physcon was continued by Lathyrus. Cleopatra III. now ruled with a stronger authority, but by degrees Alexander gained the upper hand, and ultimately dissensions arose which ended by his causing her death (B.C. 89): this occasioned troubles which lost him his throne, and brought about the recall of his brother (B.C. 89). During the interval Lathyrus had ruled in Cyprus, and both brothers had engaged on opposite sides in the wars of the Seleucid princes. As king of Egypt, Lathyrus had to subdue a native revolt, the first we know to have happened in Upper Egypt in the time of the Ptolemies. Thebes seems to have been its centre, and here the insurgents stood a siege of nearly three years, when the city was taken and reduced to the ruined state from which it has never since risen. Lathyrus died in B.C. 81. He appears to have been weak and cruel, with some qualities as a politician and general. He left one legitimate child, a daughter, Berenice III., who succeeded him. Her step-son, Alexander II., son of Alexander I., came from Rome as Sulla's candidate, and married her. The nuptials were almost immediately followed by the murder of the queen by her husband's order, and his deserved death in a popular tumult which was thus excited (B.C. 80). In default of legitimate issue, two base sons of Lathyrus now shared the Egyptian dominions, the elder, Ptolemy Neus Dionysus, surnamed Auletes, the Flute-player, taking Egypt, and his younger brother Ptolemy acquiring Cyprus. Auletes inherited the vices without the ability of Physcon, and having spent great sums in obtaining the recognition of the senate, who probably would not readily part with the claim based on the legacy which either Alexander I. or II. had made of his kingdom to the Romans, he wearied the patience of his subjects by heavy taxation, and was expelled by the Alexandrians B.C. 58. His wife Cleopatra V. and daughter Berenice IV. now reigned together, but, on the death of the elder, the younger became sole queen. Berenice was twice married, first to Seleucus, a pretended Seleucid, whom she put to death, and then to Archelaus. With the support of Gabinius, proconsul of Syria, Auletes at length recovered Egypt, B.C. 55. He punished his daughter with death, and in B.C. 51 his troubled reign came to an end. At this time his family consisted of two sons and two daughters,—the famous Cleopatra and Arsinoë, all of whom in turn exercised regal power, three in Egypt.

Ptolemy, the elder son of Auletes, and Cleopatra VI., his elder daughter, succeeded in accordance with their father's will, which the Roman senate ratified. In B.C. 48 her brother expelled Cleopatra, who fled into Syria. Advancing to conquer Egypt by force of arms, she was met by her brother's forces near Pelusium. Here it was that Pompey, after the ruin of his cause, was assassinated by order of Ptolemy's ministers as he sought the king's protection. Cæsar, following Pompey, reached Alexandria. Here Cleopatra, giving up her ideas of war, made her way to Cæsar and secured his interest. After a struggle with the Egyptian ministers, who almost succeeded in overpowering Cæsar's small forces, and who ultimately had the support of young Ptolemy, who escaped from the Romans, the Egyptians were defeated and the king drowned (B.C. 47). Cleopatra now became queen, associated with a phantom king, the younger Ptolemy. In B.C. 45 she went to Rome with her brother and young Ptolemy Cæsar, her son by the dictator, wishing to be acknowledged Cæsar's wife, and that the boy should be made his heir. Next year Cæsar was murdered, but by his will his nephew Octavius became his heir, Cleopatra's son, his only surviving child, being necessarily set aside. The queen determined to secure for her son Egypt at least, and made away with her unfortunate brother. She next appears when, after the battle of Philippi, the triumvir Antony made his progress through Asia Minor. It was necessary that the queen of Egypt should conciliate the ruler of the Eastern world. Cleopatra resolved to govern him. As Cæsar seven years before, Antony now was instantly captivated by the Egyptian queen. She was past thirty, but if her beauty had waned her wit had grown. Her portrait on her coins is that of a woman of intellect and charm, not of beauty. A broad head with wavy hair, an aquiline nose, large deep-set eyes, and a full eloquent mouth, is supported by a long slender throat. To these personal qualities she added a mind singularly cultivated, ready discourse in several languages, and, what that so often lacks, as ready wit. She took Antony to Alexandria and governed the East for him. While her power waxed his waned. Asia Minor was overrun by Q. Labienus at the head of a Parthian army, and Palestine and Phœnicia by another led by Pacorus, the Parthian king's son. In Italy Antony's adherents were routed. He now resolved to attack Italy itself, and a great war was only averted by the armies, which forced the generals to conclude a peace (B.C. 40). Octavia, his rival's sister, was given in marriage to Antony, and for three years Cleopatra lost her power. In B.C. 36 Antony deserted Octavia and returned to Alexandria and the Egyptian queen. With the exception of an unsuccessful Parthian campaign and an inglorious Armenian one, Antony effected nothing. He was amused by the luxurious life of Alexandria; and, while Cleopatra maintained her Egyptian rights and ruled with Ptolemy Cæsar, she shared Antony's government of the East, appearing as queen with him as triumvir upon the coins of Antioch. In B.C. 32 Octavian declared war against Cleopatra, and Antony took his revenge by divorcing Octavia. Then followed the conflict in the Adriatic for the world's empire, in which Antony's old military skill failed him, and Cleopatra, leaving the battle, perhaps through a woman's fear, drew him away also (B.C. 31). Arrived at Alexandria, Cleopatra showed more energy than Antony, and, when Octavian reached

Egypt, more policy. Antony, on the false news of the queen's death, stabbed himself; and Cleopatra, finding Octavian resolved to make her walk in his triumph, perished by her own hands in some unknown way. Thus Egypt became a Roman province, B.C. 30. The young Ptolemy Cæsar, in spite of his double claim, perished by the command of Octavian, but the beautiful Cleopatra, Antony's daughter by the queen, was generously taken by his divorced wife Octavia, brought up with her own children, and married to a king, Juba II. of Mauretania. With their son Ptolemy, whom Caligula put to death A.D. 40, this great line came to an end. Its genius ended with Cleopatra. The dislike of the Romans for her has tended to give the moderns too low an estimate of her abilities. When we see what Egypt was under Auletes and under her we are astonished to perceive how much she accomplished by her management of Cæsar and of Antony. After all the other independent states had been absorbed by Rome, Egypt was raised from a mere protected province to be once more a kingdom, and at last Alexandria became again a seat of empire. But the task Cleopatra set herself was beyond accomplishment; the more she turned Antony into an imperial ruler the less could he control the Roman armies by which he governed. Thus the fabric she had raised was rotten at the base, and with her fall it disappeared.

The history of Egypt under the Romans being that of a province, and the most interesting events matters of ecclesiastical history, may here be told very briefly. Worn out by the cruelty and avarice of a succession of bad rulers, the country must have welcomed the Romans almost as it had welcomed Alexander, and so soon as it was known that the native religion would be protected, all discontent must have vanished. The temples were still the care of the rulers. Art had indeed fallen very low, yet it continued to produce buildings with a certain rich grandeur, that did not begin to give place to Græco-Roman structures till the time of Hadrian and the Antonines.

Ælius Gallus, prefect of Egypt under Augustus, was ambitious to enlarge the province by foreign conquest. He failed in an expedition into Arabia Felix, but repelled an Ethiopian invasion, and in return penetrated as far as Napata, the capital of Queen Candace, which he captured. In later reigns the chief events were troubles connected with the Jewish population. In the time of Vespasian, the temple Onias had founded was closed, and a great Jewish revolt in the reign of Trajan, which was not easily suppressed, cost the Jews the privileges which, in common with the Greek population, they had enjoyed above the native inhabitants. Hadrian twice visited Egypt (A.D. 130, 134). He renewed the old privileges and granted new ones. The foundation of Antinoë shows how low the nation had then fallen. Under Antoninus Pius, a Sothiac Cycle began (A.D. 139). In the next reign, Avidius Cassius, prefect of Egypt, having suppressed a serious revolt, usurped the purple, and was acknowledged by the armies of Syria and Egypt. On the approach of Marcus Aurelius, the adherents of Cassius slew him, and the clemency of the emperor restored peace. After the downfall of the house of the Antonines, Pescennius Niger, who commanded the forces in Egypt, was proclaimed emperor on the death of Pertinax (A.D. 193). Severus overthrew his rival (A.D. 194), and, the revolt having been a military one, did not punish the province, but gave great privileges to the Alexandrians. In his reign the Christians of Egypt suffered the first of their many persecutions. When Christianity was planted in the country we do not know, but it must very early have gained adherents among the learned Jews of Alexandria, whose school of thought was in some respects ready to welcome it. From them it rapidly passed to the Greeks. Ultimately, the new religion spread to the Egyptians; their own creed was worn out, and they found in Christianity a doctrine of the future life, for which their old belief had made them not unready; while the social teaching of Christianity came with special fitness to a subject race. The history of the Coptic Version has yet to be written. It presents some features of great antiquity, and, unlike all others, has the truly popular character of being written in the three dialects of the language. Side by side there grew up an Alexandrian Church, philosophic, disputative, ambitious, the very centre of Christian learning, and an Egyptian Church, ascetic, contemplative, mystical. The two at length influenced one another; still we can generally trace the philosophic teachers to a Greek origin, the mystics to an Egyptian.

Caracalla, in revenge for an affront, massacred the population of Alexandria. Under Decius the Christians again suffered from persecution. When the Empire broke up in the weak reign of Gallienus, Æmilianus was made emperor by the troops at Alexandria; but, after a short and vigorous reign, was conquered by the forces of Gallienus. Zenobia, queen of Palmyra, after an unsuccessful invasion, on a second attempt conquered Egypt, which she added to her empire, but lost it when Aurelian made war upon her (A.D. 272). The province was, however, unsettled, and the conquest of Palmyra was followed in the same year by the suppression of a revolt in Egypt (A.D. 273). Probus, who had governed Egypt for Aurelian and Tacitus, was subsequently chosen by the troops to succeed Tacitus, and is the first governor of this province who obtained the whole of the Empire. The country, however, was still disturbed, and under the reign of Diocletian, in A.D. 292, a formidable revolt had broken out, led by Achilleus, who as emperor took the name Domitius Domitianus. Diocletian, finding his troops unable to determine the struggle, came to Egypt and reduced the strongholds of the country. After he had left, Domitianus again raised his standard and captured Alexandria, but Diocletian returning to Egypt took the city and put his rival to death (A.D. 297). This revolt has very distinctly the character of a native rising, for it was not localised in Alexandria, but spread over the country.

The reign of Diocletian is the turning-point in the history of the Egyptian Church. The edict of A.D. 303 against the Christians, and those which succeeded it, were rigorously carried out in Egypt, where Paganism was still strong, and face to face with a strong and united church. Galerius, who succeeded Diocletian in the government of the East, implacably pursued his policy, and this great persecution did not end until the persecutor, perishing, it is said, of the dire malady of Herod and Philip II. of Spain, sent out an edict of toleration (A.D. 311). The Copts date from the accession of Diocletian (A.D. 284), which they call the Era of Diocletian or of the Martyrs.

By the Edict of Milan (A.D. 313), Constantine, with the agreement of his colleague Licinius, acknowledged Christianity as having at least equal rights with other religions, and when he gained sole power he wrote to all his subjects advising them, like him, to become Christians (A.D. 324). The Egyptian Church, hitherto free from schism, was now divided by a fierce controversy, in which we see two Greek parties, rather than a Greek and an Egyptian, in conflict. The Council of Nicæa was called together (A.D. 325) to determine between the orthodox and the party of the Alexandrian presbyter Arius. At that council the native Egyptian bishops were chiefly remarkable for their manly protest against enforcing celibacy on the clergy. The most conspicuous controversialist on the orthodox side was the young Alexandrian deacon, Athanasius, who returned home to be made archbishop of Alexandria (A.D. 326). For the long period during which he presided over the Church of Egypt, his history is that of the struggle of the two parties. Four times expelled by the Arians, and once by the emperor Julian, he employed each banishment for work in the cause to which he was devoted, and on each restoration he used his success with a moderation in marked contrast to the persecuting policy of his enemies. His name and person were at last known to the whole empire, which unconsciously recognized in him an ecclesiastical ruler of Christendom, rather than the chief prelate of a province. He was more a man of action than of thought, more an administrator than a student, but his intrepid patience, his moderation, and his indomitable energy, all directed to the welfare of the church and to no personal ends, gave him an influence never afterwards obtained without the support of a vast ecclesiastical machinery. His is the latest character which was formed upon the model of St Paul's, and the most remarkable of his age. He died A.D. 373, at the moment when an Arian persecution began. The reign of Theodosius I. witnessed the overthrow of Arianism, which was followed by the suppression of Paganism, against which a final edict was promulgated A.D. 390. In Egypt, the year before, the temple of Serapis at Alexandria had been destroyed, and to the same period we must assign the beginning of a partial destruction of those Egyptian temples which had escaped the Persian conquerors. Generally the Coptic Christians were content to build their churches within the ancient temples, plastering over or effacing the sculptures which were nearest to the ground and in the way of the worshippers. They do not seem to have been very zealous in the work of destruction. The native religion was already dead and they had no fear of it. The prosperity of the church was the sign of its decay, and before long we find persecution and injustice disgracing the seat of Athanasius. Cyril the patriarch of Alexandria expelled the Jews from the capital with the aid of the mob, and by the murder of the beautiful philosopher Hypatia marked the lowest depth to which ignorant fanaticism could descend. A schism now produced lengthened civil war, and alienated Egypt from the empire. The Monophysites, after a struggle of two centuries and a half, became utterly hostile to the Greek rule. It was in these circumstances that a country which, remote from the great conflicts that destroyed the Western Empire and threatened the existence of the Eastern, had enjoyed uninterrupted freedom from an invader since its conquest by Zenobia, and had known no rebellion since that of Achilleus, fell without a nflict when attacked by Chosroës (A.D. 616). The success of eraclius restored Egypt to the Empire and for a time it again ceived a Greek governor. The Monophysites, who had taken lvantage of the Persian occupation, were persecuted and their atriarch expelled. The Arab conquest was welcomed by the ative Christians, but with it they ceased to be the Egyptian ation. Their language is still used in their churches, but it is no nger spoken, and its literature, which is wholly ecclesiastical, as been long unproductive.

The decline of Egypt was due to the purely military government the Romans, and their subsequent alliance with the Greek party Alexandria which never represented the country. Under weak nperors, the rest of Egypt was exposed to the inroads of savages, nd left to fall into a condition of barbarism. Ecclesiastical disutes tended to alienate both the native population and the Alexndrians. Thus at last the country was merely held by armed rce, and the authority of the governor was little recognized eyond Alexandria, except where garrisons were stationed. There as no military spirit in a population unused to arms, nor any isinclination to be relieved from an arbitrary and persecuting rule. hus the Muslim conquest was easy.

[In the year 639 of our Era, or the eighteenth of the light,[1] Egypt was invaded by the Muslims, under the elebrated 'Amr Ibn-El-Ás (or El-Ásee). Entering the ountry from Syria, at the head of only 4000 men, he esieged Pelusium, and took it after thirty days. This own was considered the key of Egypt on the Syrian ontier, and its capture was, therefore, an important dvantage, which opened the country southwards to the rab general. He marched thence to 'Eyn-Shems, the ncient Heliopolis, where he found the Greeks collected in rce, and commanded by John Mukowkis, or rather John e Mukowkis, or Gureyg the Mukowkis,[2] the governor of emphis, a native Egyptian. They offered a vigorous efence, but were put to the rout, and 'Amr advanced to e banks of the Nile and laid siege to Egyptian Babylon, fortress of great strength, and garrisoned by a Roman gion. Here he received two reinforcements of 4000 uslims each, and after a protracted siege of seven months e took the place by assault. In an enemy's country, and r from all supplies, the small army of the Arabs was still a critical position and unable to push on against the apital, Alexandria, when the enmity of rival Christians nd the perfidy of Mukowkis decided the balance in their vour. The persecutions which the Copts had suffered ad greatly embittered them against the Greeks, and, as ibbon observes, had "converted a sect into a nation, and lienated Egypt from their religion and government." ukowkis, who governed Memphis, was in heart a Monohysite, and had also withheld the tribute due at Constantiople; and both he and his Coptic brethren, after the first sistance, hailed the new invaders as their deliverers from he Greek yoke. On the fall of Babylon they entered into a treaty with the Arabs, engaging to pay to them a poll-tax of two deenárs on every adult male, and agreeing to furnish them with supplies and assistance while completing the subjugation of the country. Having concluded this treaty, and founded the city of El-Fustát on the site of his first encampment on the banks of the Nile, with the mosque known by his name, 'Amr marched against Alexandria; and after overcoming many obstacles, and disputing the whole way with the Greeks, who conducted their retreat, in the face of a victorious army, with great ability, in twenty-two days he appeared before it. Fresh warriors continued to arrive from Syria to strengthen the besieging force; but the defence was as obstinate as the attacks of the Muslims were brilliant, and was protracted for fourteen months. At length, on the 10th December 641, the metropolis of Egypt, the first city of the East, capitulated; but it is said that this conquest was only achieved with the sacrifice of 25,000 Muslims. Abu-l-Farag relates that 'Amr, wishing, at the earnest request of John the Grammarian, to spare the famous Library, wrote to the caliph (khaleefeh) Omar, asking his instructions respecting it, and that he answered: "As to the books you have mentioned, if they contain what is agreeable with the book of God, in the book of God is sufficient without them; and if they contain what is contrary to the book of God, there is no need of them; so give orders for their destruction." The historian adds, that they were burnt in the public baths of the city, and in the space of six months were consumed.[3] The conquest of the rest of Egypt was soon effected, and the various strongholds successively fell into the hands of the invaders.

'Amr governed the country with much wisdom for four years, but was dismissed by 'Othmán, who appointed in his place 'Abd-Allah Ibn-Saad Ibn-Abee-Sarh. The latter reduced Alexandria, which had been retaken by the emperor Constans II., and pushed his conquests beyond Africa Proper. He died at Ascalon, in the year 36, having governed eleven years. His successor's rule was short, and the next viceroy, Mohammad, son of the caliph Aboo-Bekr, on assuming the reins of government acted with such tyranny towards the followers of 'Othmán, that Mu'áwiyeh was compelled to dispatch 'Amr to Egypt with a force from Syria, and a great battle was fought in A.H. 38 between the two armies of Muslims, in which 'Amr was again victorious. As a reward for this service, he was a second time appointed governor of Egypt, and he died there at the age of ninety years, in A.H. 43.

From this time to A.D. 868, or for rather more than two centuries, Egypt was governed by a succession of viceroys, appointed by the caliphs of Damascus and Baghdád. Their period was distinguished by intestine troubles and a constant change of rulers, resulting from the caprice of the caliphs or the vicissitudes of their fortunes. Here we may mention, that shortly after the overthrow of the Amawee ("Ommiade") Dynasty of Damascus, and the accession of the house of 'Abbás, which ruled at Baghdád, the city of El-'Askar, immediately to the north-east of El-Fustát, was founded, and the seat of government removed thither. The site is without the walls of modern Cairo, and is marked by extensive mounds of rubbish.

In A.D. 868 (A.H. 254) Ahmad, the son of Tooloon, a Turkish slave who held a high office at Baghdád, was appointed governor of the province of Misr by the caliph El-Moatezz, and two years after of that of Alexandria also, by his successor El-Muhtedee. His temporal allegiance to the caliph soon became merely nominal, and he was virtually sovereign of Egypt; but at the same time he endeavoured to avoid a complete rupture by continuing the prayer for the Prince of the Faithful in the mosques, and the mention of his name on the coins which he struck. Later in his reign, however, he forbade the mention of the next caliph's brother and colleague El-Muwaffik in the prayers and state-documents of Egypt, and El-Moatemid, who was a weak prince, was prevailed on to denounce him publicly as a traitor from the pulpits throughout his dominions. Yet that he secretly favoured him is proved by his vain attempt to escape to Egypt from the tyranny of his warlike brother. Ahmad founded the dynasty of the Benee-Tooloon, which lasted for a period of 37 years. He built the royal city of El-Katáé', between El-'Askar and Mount Mukattam, enriched it with splendid buildings, and constituted it the seat of his government. Its site is now covered with ruins, only his great mosque remaining a proud example of his wealth and magnificence, still the largest mosque of Cairo, and, as presenting the earliest specimens of the pointed arch, noteworthy in the history of architecture. The reign of this vigorous and wise prince was remarkable for prosperity at home and conquests abroad. He took Barkah, and in Syria in 264 captured Damascus, Hims (Emessa), Hamáh, and Aleppo; after which he proceeded to Antioch, and the governor refusing to surrender, he took that city by storm. He then advanced towards Tarsus, but his supplies failing he was compelled to retire. About five years later, Lu-lu, his deputy and governor of Aleppo and other towns in Syria and in Mesopotamia, revolted and entered into a league with El-Muwaffik. It was apparently after an expedition against this rebel that Ahmad died, in the year 270 (A.D. 884). During the latter years of his reign, he had abandoned that simplicity of life which had distinguished his youth, and had given himself up to boundless luxury. At his death, there was found in his treasury ten millions of deenárs, and his establishment was discovered to consist of 7000 mounted memlooks, 300 picked horses for his own use, a body-guard of 24,000 slaves, besides 6000 asses and mules, 10,000 camels, and 100 wherries. By what oppression the revenue necessary to maintain such a household was raised some idea may be formed, when it is stated that at the time of his death 18,000 persons were confined in Ibn-Tooloon's prisons.

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[1] The years of the Muslim era, the Hijrah, or Flight of Mohammad om Mecca, are generally used in this portion of the history, as they e more convenient to Oriental scholars. The principal dates are, owever, given according to both methods of computation.

The authorities upon which this sketch of the history of Egypt nder Muslim rule is based are these:—Eutychius, *Annales*; the *ámil* of Ibn-el-Atheer (ed. Tornberg); Abu-l-Fidá, *Annales Musleci* (ed. Reiske); El-Makreezee's *Khitat*; El-Isháḳee (MS.); Ab-ul-ahásin; Ibn-Khallikán's *Biogr. Dict.* (tr. De Slane); Es-Suyootee's *itáb Husn el-Mohádarah* (MS.) and *Ta-reekh El-Khulafá*; El-akreezee's *Kitab-es-Sulook* (tr. Quatremère); Bahá-ed-Deen's *Vita aladini* (ed. Schultens); El-Gabartee's Annals (MS.); Wüstenfeld's *ie Statthalter von Aegypten zur Zeit der Chalifen* (1876); Weil's *eschichte der Chalifen*; Quatremère's *Vie de Moezz-li-din-Allah*, and *émoires géogr. et. hist. sur l'Égypte*; Michaud's *Hist. des Croisades*; inville's *Vie de Saint Louis*; Marcel; Mengin's *Hist. de l'Égypte*; r R. Wilson's *History of the British Expedition*; Lane's *Modern gyptians*; Mrs Poole's *Englishwoman in Egypt*; M'Coan's *Egypt it is*; &c.,

[2] Mukowkis, meaning a kind of ring-dove, seems (according to the ámoos) to have been the symbol of the governor of Egypt under the reeks, just as the hawk was the symbol of the Pharaohs. Gureyg ay also be written Jureyj, but the former, representing the Egyptian onunciation of the letter *jeem*, is preferred in this article in this and nilar instances.

[3] This tradition is, we believe, only mentioned fully by Abu-l-Farag, but he was a Christian, and Muslim writers would consider it an occurrence of no importance. Abd-el-Lateef merely says, "Here was the library which 'Amr Ibn-El-'Ás burned by permission of Omar;" and El-Makreezee, speaking of Pompey's Pillar, says, "It is said that this pillar is one of those which stood in the portico of Aristotle, who there taught philosophy, and that his academy contained a library which 'Amr Ibn-El-'Ás burned by direction of Omar." See *Englishwoman in Egypt*, vol. i. 40, *seqq.*

Khumáraweyh, on the death of his father, was appointed his successor by the army, he being then twenty years old, and he inherited a kingdom extending from the Euphrates to Nubia. He fought a battle with the forces of the caliph, commanded by a son of El-Muwaffik (afterwards the caliph El-Moatadid), between Damascus and Ramleh; in which his army gained the victory, although he himself, never having seen a battle before, fled the scene of action in a panic, drawing a large part of his troops after him. But he soon reversed the independent policy of his father, and making peace with the caliph in 273 he not only put the latter's name with that of his brother El-Muwaffik in the public prayers, but entirely omitted his own; though it must be allowed he did not pursue the same servile course in his coinage. On the accession of El-Moatadid in 279, Khumáraweyh continued his conciliatory policy and offered his daughter Katr-en-Nedà (Dewdrops) in marriage to the caliph's son. In 282 he made an incursion into the Greek territory, and died at Damascus. It is said that he was fearful of assassination; to avoid which he had trained a lion to guard him while he slept on his bed of quicksilver. His fears were justified; for he was put to death by his women, or according to some by his eunuchs.

His eldest son, Geyah Abu-l-'Asákir, not yet fourteen years old, succeeded him. This prince was killed in less than eight months: his youth, which rendered him unfit to govern, occasioned his fall; for he had discarded from his society those who were in favour with his father, and associated with none but worthless men. He was succeeded in 283 by his brother Hároon, the principal events of whose rule were a great tempest and earthquake in Egypt in 286, and a treaty which he concluded with the caliph, by which the provinces of Awásim and Kinnesreen were ceded to him and the annual tribute from Egypt was fixed at 450,000 deenárs. He reigned upwards of eight years, but gave himself up to pleasure, and, as some say, was put to death in 292 by his uncles Sheybán and Ádee, sons of the founder of the dynasty, the former of whom succeeded to the government. In the meantime, at the instigation of the generals of Hároon, Mohammad Ibn-Suleymán, a scribe of Lu-lu, advanced against Egypt with a numerous and heavily equipped army. Sheybán went forth to meet him with all the forces he could muster, but numbers of his troops deserted to the invader, and he was soon compelled to surrender. Mohammad Ibn-Suleymán burned El-Katáé', and sacked El-Fustát, reducing the women to slavery, committing many atrocities, and exiling the family of Ahmad Ibn-Tooloon, with all their adherents (A.H. 292, A.D. 905).

Having thus completed his conquest, and restored the province of Egypt to the house of 'Abbás, Ibn-Suleymán yielded the government to 'Eesà En-Nósharee, appointed by El-Muktefee. He died in 297, and was followed by Tekeen El-Gezeree, under whose rule Egypt was invaded by the forces of 'Obeyd-Allah El-Mahdee, first prince of the dynasty of the Fátimees, which had succeeded the Benee-l-Aghlab in the dominion of Northern Africa. His general Hubásheh, having taken Barkah, advanced (in 302), with an army of 100,000 men, to Alexandria, which he found deserted, and thence marched to the Feiyoom, where Tekeen, reinforced with troops from El-Irák, gave battle, and defeated the enemy in a sanguinary conflict. In the following year, he was succeeded by Abu-l-Hasan Zekee Er-Roomee, in whose time El-Mahdee again attempted the conquest of Egypt with an army under the command of his son, Abu-l-Kásim; Alexandria fell into his hands in 307; its inhabitants fled, and Zekee entrenched himself in El-Geezeh, on the western bank of the Nile, and shortly afterwards died. In this emergency Tekeen was reinstated in his office; and a fleet of twenty-five sail was sent from Tarsus by the caliph, which meeting with the flotilla of the enemy off Rasheed almost annihilated it. Tekeen, meanwhile, had defeated the Africans, but without decisive effect. At length, being twice reinforced from Baghdád, he drove Abu-l-Kásim back to Barkah. After rendering this important service Tekeen was again recalled. Three other governors were then successively appointed; but the troops revolting, and much sedition and rapine ensuing, Tekeen was once more despatched to Egypt, where he remained until his death in the year 321 (A.D. 933).

He was followed by Aboo-bekr Mohammad El-Ikhsheed Ibn-Toghag, afterwards the founder of the dynasty of the Ikhsheedees, who was almost immediately superseded by another governor; and for one year more Egypt continued to be a province of the caliphs of Baghdád. In the year 323, El-Ikhsheed again succeeded to the government. About this time little remained to the caliph of his once broad empire beyond the province of Baghdád, and even there his power was but nominal. Khurasán, Fars, Kerman, Rei, Ispahán, Mosul, and the provinces of Mesopotamia, were either in a state of revolt, or nearly or wholly lost to him. Spain was governed by the Dynasty of Umeiyeh, and Africa by that of El-Mahdee; and we have seen the distracted state of Egypt since the fall of the Benee-Tooloon. El-Ikhsheed availed himself of these circumstances to make himself the independent sovereign of Egypt and Syria, continuing, however, to acknowledge the spiritual supremacy of the caliph. Shortly after, he defeated the forces of El-Mahdee, who had again made an inroad into the country: and in 327 he was decorated by Er-Rádee with the title of El-Ikhsheed, a name borne by the rulers of the province of Fergháneh in Transoxania, from whom he was descended. In the following year Ibn-Ráik subdued a great part of Syria, and having taken Damascus advanced to the frontier of Egypt, where after a very severe engagement he was utterly routed and pursued by the troops of El-Ikhsheed as far as Damascus. There, however, the fortune of war turned against El-Ikhsheed, and for a time he was deprived of the province of Syria, though he subsequently regained possession of it. During his reign, the caliphs of Baghdád were daily losing power, and in the year 333, El-Muktefee wrote to him lamenting his miserable state; whereupon El-Ikhsheed immediately repaired to him at Rakkah with valuable presents and offered him assistance and an asylum in Egypt, of which the caliph was too timid to avail himself. About this time, also, he conducted a war with various success against Seyf-ed-Dowleh the Hamdánee, who had attacked Syria. He died at Damascus in 334 (A.D. 946), in the 66th year of his age, and was buried, as were his sons, in the mosque of Omar at Jerusalem.

Of El-Ikhsheed's two sons and successors, Abu-l-Kásim Oonoojoor (who died in 349), and Abu-l-Hasan 'Alee, little is known, the vizir Káfoor, a black eunuch, being the actual ruler. In the reign of the former, in the year 343, a great fire occurred in El-Fustát, which destroyed 1700 houses and much merchandise. Káfoor succeeded to the throne in 355, and was acknowledged throughout Egypt, Syria, and the Higáz. He ruled with great ability, and was a patron of literature; his name is celebrated by the poet El-Mutanebbee, who was his boon-companion, and whom, as well as other learned men, he rewarded with magnificent presents. On his death in 357, internal dissensions respecting the succession of Abu-l-Fuwáris, a son of 'Alee, presented a favourable opportunity to the Fátimee caliph to renew the often-repeated invasion of Egypt.

Hitherto, with few exceptions, the most notable of which are the reigns of Ibn-Tooloon, Khumáraweyh, El-Ikhsheed, and Káfoor, the Muslim rulers of Egypt had not much benefited the country, or rescued it from the anarchy and troubles in which it had become involved under the Lower Empire. But the incidents of the time are so little known that they have been deemed worthy of more mention in this article than perhaps their importance would otherwise warrant. From the period at which we have now arrived, however, the annals of Egypt contain much important matter, and are so closely interwoven with the events of the Crusades as to render them deeply interesting to the student of European history. The rise of the schismatic caliphs of Africa is a remarkable episode in the early days of El-Islám, and most of the princes of that dynasty were not unworthy of their successors, the renowned Salah-ed-din and his family, and the Memlook sultans.

In the year 358 (A.D. 969) El o'izz Li-deen-Illah, the fourth Fátimee caliph, equipped a large and well-armed force, with a formidable body of cavalry, the whole under the command of Abu-l-Hoseyn Góhar el-Káïd, a native of Greece, and a slave of his father El-Mansoor. This general n his arrival near Alexandria received a deputation from the abitants of El-Fustát, charged to negotiate a treaty. Their ov es were favourably entertained, and the conquest of the cou ed probable without bloodshed.

But, while the conditions were being ratified, the Ikhsheedees prevailed on the people to revoke their offer, and the ambassadors on their return were themselves compelled to seek safety in flight. Góhar lost no time in pushing forward. Before El-Geezeh a partial combat took place; several days were passed in skirmishes, and at length he forced the passage of the Nile a few miles south of that town, at the head of his troops. Here the Ikhsheedees offered a brave resistance; the greater part were left dead on the field, and the remainder, taking what valuables they could carry off, fled from El-Fustát. The former mediators were now brought to intercede for the inhabitants and the women of the fallen dynasty, and to the honour of the African general it is related that they were pardoned and the city was peaceably occupied. The submission of the rest of Egypt was secured by this victory; and all the Higáz, including the holy cities, and the Yemen, speedily acknowledged the authority of the Fátimee El-Mo'izz. In the year 359 Syria was also added to his dominions, but shortly after was overrun by the Karmatees (Carmathians), the troops of El-Mo'izz met with several reverses, Damascus was taken, and those lawless freebooters, joined by the Ikhsheedees, advanced to 'Eyn-Shems. In the meanwhile, Góhar had fortified El-Káhireh,[1] or Cairo (the new capital which he had founded immediately north of El-Fustát), and taken every precaution to repel the invaders; a bloody battle was fought on Friday, the 1st of Rabeea el-Owwal, in the year 361, before the city walls, without any decisive result. On the following Sunday, however, Góhar obtained a great victory over the enemy, who experienced a reverse more complete than any before suffered, and the camp and baggage fell into the hands of the conqueror.

At the earnest solicitations of his lieutenant, who had ruled Egypt both ably and justly, with almost absolute authority, El-Mo'izz at length determined to remove his court to his new kingdom. In Ramadán 362, he entered El-Káhireh, bringing with him the bodies of his three predecessors and vast treasure. El-Mo'izz reigned about two years in Egypt, dying in the year 365. He is described as a warlike and ambitious prince, but, notwithstanding, he was especially distinguished for justice and was fond of learning. He showed great favour to the Christians, especially to Severus, bishop of El-Ashmooneyn, and the patriarch Ephrem; and under his orders, and with his assistance, the church of the Mu'allakah, in Old Misr, was rebuilt. He executed many useful works, (among others rendering navigable the Tanitic branch of the Nile, which is still called the canal of El-Mo'izz), and occupied himself in embellishing El-Káhireh. Góhar, when he founded that city built the great mosque named El-Azhar, the university of Egypt, which to this day is crowded with students from all parts of the Muslim world. The principal event of his reign in Egypt was the second irruption of Hasan the Karmatee. The enemy, as on the former occasion, reached 'Eyn-Shems; but now he gained more advantage over the African troops. Although he was twice defeated in different parts of Egypt, and constantly harassed in his advance, the capital was closely besieged by him, and its defenders were driven across the fosse. Thus straitened, El-Mo'izz had recourse to stratagem, and succeeded in bribing Hasan Ibn-El-Garráh (who, with a body of the tribe of Tei, fought with the Karmatees) to desert them in the heat of the next battle. The result of this plan was successful, and again Hasan was defeated and compelled to flee. This event, which occurred in the year 363, relieved Egypt of another invader, an ally of Hasan, by name Abd-Allah Ibn-'Obeyd-Allah (formerly governor of Syria under Káfoor), and obtained for the arms of El-Mo'izz various successes in Syria.

El-'Azeez Aboo-Mansoor Nizár, on coming to the throne of his father, immediately despatched an expedition against the Turkish chief El-Eftekeen, who had taken Damascus a short time previously. Góhar again commanded the army, and pressed the siege of that city so vigorously that the enemy called to their aid the Karmatees. Before this united army he retired by little and little to Ascalon, where he prepared to stand a siege; but being reduced to great straits, he purchased his liberty with a large sum of money. On his return from this disastrous campaign, El-'Azeez took the command in person, and meeting the enemy at Ramleh, was victorious after a bloody battle; while El-Eftekeen, being betrayed into his hands, was with Arab magnanimity received with honour and confidence, and ended his days in Egypt in affluence. El-'Azeez followed his father's example of liberality. It is even said that he appointed a Jew his vizir in Syria, and a Christian to the same post in Egypt. These acts, however, nearly cost him his life, and a popular tumult obliged him to disgrace both these officers. After a reign of twenty-one years of great internal prosperity he died (A.H. 386) in a bath at Bilbeys, while preparing an expedition against the Greeks who were ravaging his possessions in Syria.

El-'Azeez was distinguished for moderation and mildness, but his son and successor rendered himself notorious for very opposite qualities. El-Hákim bi-amri-lláh Aboo-'Alee Mansoor began his reign, according to Muslim historians, with much wisdom, but afterwards acquired a character for impiety, cruelty, and unreasoning extravagance, by which he has been rendered odious to posterity. He is described as possessing at once "courage and boldness and cowardice and timorousness, a love for learning and vindictiveness towards the learned, an inclination to righteousness and a disposition to slay the righteous;" and this character is fully borne out by his many extravagances. Of his cruelty numerous anecdotes are told us, especially in the discharge of his functions as Mohtesib, or "regulator of the markets and of the weights and measures," an office which he assumed, and in which he became the terror of the inhabitants. But his cruelty was surpassed by his impiety. He arrogated to himself divinity, and commanded his subjects to rise at the mention of his name in the congregational prayers, an edict which was obeyed even in the holy cities, Mecca and Medinah. He is most famous in connection with the Druses, a sect which he founded and which still holds him in veneration and believes in his future return to the earth. He had made himself obnoxious to all classes of his subjects, when, in the year 397, he nearly lost his throne by foreign invasion. Hishám, surnamed Aboo-Rekweh, a descendant of the house of Umeiyeh in Spain, took the province of Barkah with a considerable force and subdued Upper Egypt. The caliph, aware of his danger, immediately collected his troops from every quarter of the kingdom, and marched against the invader, whom, after severe fighting, he defeated and put to flight. Hishám himself was taken prisoner, paraded in Cairo with every aggravation of cruelty, and put to death. El-Hákim having thus by vigorous measures averted this danger, Egypt continued to groan under his tyranny until the year 411, when he fell by domestic treachery. His sister Seyyidet-el-Mulook had, in common with the rest of his subjects, incurred his displeasure; and being fearful for her life, she secretly and by night concerted measures with the emeer Seyf-ed-Dowleh, chief of the guard, who very readily agreed to her plans. Ten slaves, bribed by 500 deenárs each, having received their instructions, went forth on the appointed day to the desert tract southward of Cairo, where El-Hákim, unattended, was in the habit of riding, and waylaid him near the village of Hulwán, where they put him to death.

He was succeeded by his son, Edh-Dháhir (commonly pronounced Ez-Záhir) bi-lláh Abu-l-Hasan 'Alee, who ruled with justice and moderation for nearly sixteen years. In 414 Aleppo was taken by Sálih Ibn-Mardás; and although he was defeated and slain by an Egyptian force sent against him, a son, Shibl-ed-Dowleh, yet retained possession of that city. At this time also Hasan, of the tribe of Tei, before mentioned, had made himself master of Ramleh; and indeed from this caliph's reign we may date the decline of the Fátimee power, especially in Syria.

In the year 427, El-Mustansir bi-lláh Aboo-Temeem Ma'add came to the throne at the age of seven years. His reign occupied a long period, rendered remarkable by the unparalleled troubles which befell Egypt. It commenced prosperously with the defeat and death of Shibl-ed-Dowleh. Aleppo was taken, and the submission of the rest of Syria followed; and the general who had conducted the expedition against that province assumed its government. On his death, Mo'izz-ed-Dowleh, a brother of Shibl-ed-Dowleh, retook Aleppo in 433; but the various fortunes of this prince and his nephew Mahmood, from this time and during the calamities of Egypt, are too complicated and subordinate to claim a place here. In the western provinces, the rebel El-Mo'izz (the third successor of Yoosuf Ibn-Zeyree, who was appointed governor on the conquest of Egypt), was punished by an irruption of wild Arab tribes in the pay of El-Mustansir.

In the year 450 (A.D. 1058), the Fátimee caliph was publicly prayed for in Baghdád,—a remarkable event, of which the immediate cause was briefly as follows. El-Besáseeree, a powerful Turkish chief exercising unbounded authority in that city, had fallen into disgrace, and received supplies of men and money from the caliph of Egypt; and while the Seljookee sultan Tughril-Beg espoused the cause of the 'Abbásee caliph, his brother Ibraheem Eynál revolted, joined El-Besáseeree, and defeated Tughril-Beg. El-Besáseeree entered Baghdád, in which the combat continued to rage; and the unfortunate city was devastated by massacre and pillage. El-Mustansir was solemnly declared Prince of the Faithful, and the insignia of the legitimate caliph was sent to El-Káhireh The success of El-Besáseeree, however, was but transient; Tughril-Beg had, in the meantime, defeated and killed his brother Ibraheem; he then entered Baghdád in Dhu-l-Kaadah 451, and despatched a force against El-Besáseeree, who fell in a battle near El-Koofeh.

A persecution of the Christians of Alexandria occurred about this time; and in 454 commenced a desolating struggle between the Blacks and the Turks, both of whom had become numerous in Egypt. The former were succoured by the mother of El-Mustansir, herself a negress, while the command of the latter was taken by Násir-ed-Dowleh Ibn-Hamdán, a general of El-Mustansir, more than once governor of Damascus, and at this period governor of Lower Egypt. To this man's unscrupulous ambition was due much of the trouble which ensued. After many battles the Turks succeeded in destroying the power of their adversaries, and their leader assumed almost absolute authority, while they not only extorted from the caliph immense sums of money and treasure, but even rifled the tombs of his predecessors for the valuables which they contained. At the same time the bulk of the valuable library of the Fátimees was dispersed by these brigands. But the very power of Násir-ed-Dowleh threatened his overthrow. His sense of security in his position rendered him regardless of the support of the Turks; and when at length his schemes for the deposition of El-Mustansir brought matters to a crisis, a large portion of the army declared against him. Defeated and driven from the metropolis, he succeeded in possessing himself of Lower Egypt, and a terrible civil war raged between the contending parties. But an even heavier calamity afflicted Egypt. For seven successive years the inundation of the Nile failed, and with it almost the entire subsistence of the country, while the rebels intercepted supplies of grain from the north. El-Makreezee informs us that El-'Askar and El-Katáë were depopulated, and that half the inhabitants of El-Fustát perished, while in El-Káhireh itself the people were reduced to the direst straits. Bread was sold for 14 dirhems the 1 lb loaf; and all provision being exhausted, the worst horrors of famine followed. The wretched people resorted to cannibalism, and organized bands kidnapped the unwary passenger in the desolate streets by means of ropes furnished with hooks and let down from the latticed windows. In the year 462 the famine reached its height. It was followed by a pestilence; and in the midst of these horrors, Násir-ed-Dowleh advanced on El-Káhireh at the head of an enormous army; he was induced to withdraw by the promise of large concessions, only to repeat the attack, and finally to make himself master of the city, after having inflicted a signal defeat on the caliph, who became only the nominal ruler of Egypt, a condition which lasted until the assassination of this powerful rebel in the year 465.

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[1] The modern Cairo was originally called El-Mansooreeyeh; El-Mo'izz, however, changed its name to that of El-Káhireh, by reason of an omen at its foundation. For details respecting this and the other capitals of Egypt under the Muslims, see the sketch in the *Englishwoman in Egypt*, vol. i. 124, *seqq.* in which the author has availed herself of the valuable MS. notes of Mr Lane.

While these events were occurring in Egypt, Syria was in a continual state of anarchy and war. A distinguished general, the emeer El-Guyoosh Bedr-ed-Deen El-Gemálee, held the government of Damascus during these times; and now El-Mustansir wrote, recalling him to assume the office of vizir of Egypt. On the condition of being allowed to bring with him a veteran force, he, happily for the country, obeyed the summons, and to his talents was owing the restoration of order and even prosperity which followed. By a massacre of emeers at a grand banquet shortly after his arrival, and by numerous executions, he subdued all opposition in the capital; and in a series of brilliant victories he annihilated the savage hordes who infested the country throughout its whole extent, having either been called to the aid of the contending parties, or voluntarily taken advantage of the universal confusion to commit their lawless ravages.

In concluding this necessarily extended notice of the reign of El-Mustansir, the invasion of Aksees with an army of Turkumáns, Kurds, and Arabs, in the year 469, must be mentioned. Spreading devastation around them, they encamped near El-Káhireh; and in the first engagement defeated the forces of El-Gemálee; but fortune favouring him in a second battle, the enemy was totally routed with immense carnage.

El-Mustansir reigned 60 years, and died in the year 487. He was a weak prince, solely given up to pleasure. El-Gemálee had governed with almost absolute authority and great ability for a period of 20 years, dying only a few days before the caliph. While admiring El-Gemálee's talents, we cannot but condemn his severity. He built the mosque which gives its name to the mountain immediately S.E. of the citadel of El-Káhireh (Gebel-El-Guyooshee), and the second wall of the city, with its three principal gates, Báb-Zuweyleh, Báb-en-Nasr, and Báb-el-Futooh. These gates, which are very fine specimens of architecture, are said to be the work of three Greek brothers.

El-Mustaalee bi-lláh Abu-l-Kásim Ahmad succeeded his father; but a son of El-Gemálee, El-Afdal, had the principal management of the affairs of the kingdom. This caliph's reign is memorable for the First Crusade. El-Afdal had taken Jerusalem from the Turks in the year 491 (A.D. 1098); and a few months later it yielded to the Crusaders, after a siege of 40 days. El-Afdal arrived shortly after its fall with a reinforcement of 20,000 men, but he was defeated in the battle of Ascalon. Later, an Egyptian army, commanded by Saad-ed-Dowleh, was worsted by Baldwin, count of Edessa, and the general was killed in the action. From this period, with the exception of some efforts made in the next reign, to the time of Saláh-ed-deen ("Saladin"), Egypt was too much occupied with intestine troubles to equip expeditions against the various parties who now struggled for the possession of Syria. El-Mustaalee died in the year 495. He is stated to have been a Sunnee, a strange anomaly in a dynasty of Shiya'ees.

His son El-A'mir bi-ahkámi-lláh Aboo-'Alee Mansoor came to the throne at the age of five years, and until his arrival at manhood the government was conducted by El-Afdal. The first act of the caliph, however, on taking it into his own hands, was to put his minister to death, and appoint in his stead a man whose wickedness obliged him to imprison him and afterwards condemn him to death. The rule of El-A'mir was chiefly remarkable for his impiety and tyranny, and for the successes of the Crusaders, who, having reduced many of the principal coast-towns in Syria, meditated the conquest of Egypt, and crossed the frontier, but were deterred from the prosecution of their enterprise by the illness of Baldwin, whose death took place at El-Areesh, on his way back to Jerusalem. El-A'mir was put to death in 524, at the town of El-Geezeh, it is said by partisans of El-Afdal, whose son then usurped the entire government, setting up, as caliph, El-Háfidh li-deeni-lláh Abd-El-Megeed, a grandson of El-Mustansir (El-Ámir having left no male issue), but without the usual ceremonies of installation. This vizir, Aboo-'Alee Ahmad, even forbade the mention of El-Háfidh in the public prayers, and inserted his own name in his stead. He perished in a popular tumult, roused by his extortions and arbitrary rule, and El-Háfidh was duly declared caliph and received the oaths of allegiance. After the death of Ahmad, he successively appointed three other vizirs; but these proving equally refractory, he at length dispensed with that office altogether. He reigned nearly 20 years. The licentiousness of his son and successor, Edh-Dháfir bi-aadáï-lláh Aboo-Mansoor Isma'eel, occasioned his death in four years and seven months at the hand of his vizir El-'Abbás.

El-Fáiz bi-Láh Abu-l-Kásim 'Eesa Ibn-'Alee was, on his accession in 549, only five years of age, and the history of his times presents merely the contentions of rival vizirs, of whom the chief were El-Melik Es-Sálih Tatáë Ibn-Ruzzeyk, and his competitor El-'Abbás, before named. The latter, finding his power failing, gathered together the wealth he had amassed and fled to Syria, where he fell into the hands of the Crusaders, who stripped him of all that he had and detained him a prisoner. Eventually he was given up to Tatáë and crucified over the gates of the palace.

El-Fáiz died in the year 555, and El-'Ádid li-deeni-lláh Aboo-Mohammad Abd-Allah, a grandson of El-Háfidh, and the last of the Fátimee caliphs, was raised to what was then but the shadow of a throne, the entire power being in the hands of Tatáë, who by his oppression and cruelty well-nigh rendered El-'Ádid, by nature benevolent and wise, as tyrannical as himself. He was assassinated after a year by the secret orders of the caliph, and the latter to conceal his agency in this act installed his son El-'Ádil in his place. At this time the well-known Sháwir was governor of the Sa'eed (or Upper Egypt), a post next in importance to that of prime minister. During the last three reigns the vizirs had been rapidly increasing in power; and the annals of the period are entirely occupied with the rise and fall of potent grandees, all eager for a post which conferred on its possessor the supreme authority. At length, in the reign of this unfortunate prince, they consummated the ruin of the dynasty and overwhelmed themselves in its fall. In 558 El-'Ádil dispossessed Sháwir of his government, and the latter had immediate recourse to arms, marched against his enemy, and succeeded in putting him to death. He then constituted himself vizir, but in his turn was compelled to flee from a more powerful rival, Ed-Dirghám. Noor-ed-Deen (Noureddin), the sultan of Damascus, received the fugitive with favour; and in the course of the next year (559) despatched an army to Egypt, under the command of Asad-ed-Deen Sheerkooh, to reinstate him. In the meantime Ed-Dirghám had been busy putting to death the great men of the empire; and having thus weakened his power, he offered but a feeble resistance, was overthrown in a battle near the tomb of the Seyyideh Nefeeseh, on the S. of El-Káhireh, and Sháwir was restored. No sooner, however, was this effected, than he forgot the engagements into which he had entered with Noureddin, and threw off his allegiance to him. Sheerkooh retired to the Sharkeeyeh, and occupied the town of Bilbeys, and thence threatened Sháwir. In this position of affairs the latter had recourse to the Crusaders, who willingly responded to his call, and Amaury, king of Jerusalem, arrived with a considerable force. With these allies, Sháwir besieged his former protector in Bilbeys, until, hearing of Noureddin's successes over the Franks in Syria, they negotiated a peace, and permitted Sheerkooh to withdraw from Egypt. About two years later, Noureddin, determined on punishing the treachery of Sháwir, again sent Sheerkooh into Egypt with a great army, and accompanied by his nephew, the famous Saladin. Sháwir again sought to strengthen himself by an alliance with Amaury, from whom he received the first intelligence of the meditated invasion. Apprised of this knowledge of his movements, Sheerkooh changed his course from Bilbeys, entered the valley of the Nile at some distance above Cairo, and crossing the river marched northwards to El-Geezeh. Here he endeavoured to raise the people against Sháwir and his Frank confederates; and had in some measure succeeded when the superior forces of the enemy compelled him to retreat southwards as far as El-Bábeyn, near Ashmooneyn, where he risked an engagement, and gained a complete victory. This success opened to the invaders the greater part of Egypt, and Alexandria itself fell into their hands. Saladin was placed in that city with a numerous garrison, and his uncle departed to subdue the rest of Egypt. The Crusaders, however, at once closely invested Alexandria, and so pressed the siege for three months, as to oblige Sheerkooh to come to its relief. An honourable compromise was effected, by which the Syrians agreed to resign their conquests and evacuate Egypt. But fresh troubles were in store for this unfortunate country. Amaury, irritated at the result of a campaign in which he had only lost, determined on an expedition against his recent ally; and, entering Egypt, took Bilbeys, putting its inhabitants to the sword, and laid siege to El-Káhireh, his course being marked by the most dreadful barbarities. On his approach, the ancient city of El-Fustát was set on fire by order of the vizir, to prevent it falling into the enemy's hands, and it continued burning somewhat more than fifty days. El-'Ádid now earnestly sought the aid of Noureddin; and that monarch, actuated by religious zeal against the Franks, who had already felt his power in Syria, and by the desire of conquest, once more despatched Sheerkooh. In the meantime negotiations had been opened with Amaury to raise the siege of El-Káhireh, on payment of an enormous sum of money; while, however, the conditions were yet unfulfilled, the approach of the Syrian army induced him to retreat in all haste. Sheerkooh and Saladin entered the capital in great state, were received with honour by the caliph and with obsequiousness by the perfidious Sháwir, who was contriving a plot which was fortunately discovered and for which he paid with his head. Sheerkooh was then appointed vizer by El-'Ádid, but dying very shortly, he was succeeded in that dignity by Saladin 564 (A.D. 1169).

For the short period which elapsed before Saladin's assumption of the title of sultan a few words will suffice. One of his first acts was to put to death the chief of the eunuchs, and a revolt of the blacks resulted; a combat took place in El-Káhireh in the street called Beyn-el-Kasreyn; and the malcontents being worsted, the disturbances were quelled. Bahá-ed-Deen Karákoosh, a white eunuch, who afterwards played a prominent part in the reign of Saladin, was appointed to the vacant post. This gave the vizir great influence in the palace, of which he judiciously availed himself. In 565 we hear of Amaury with Greek allies unsuccessfully besieging Damietta; and in the following year, Saladin conducted an expedition against the Franks to Ascalon and Ramleh. In 567, by order of Noureddin, he suppressed the name of El-'Ádid in the congregational prayers, and substituted that of the 'Abbásee caliph, a masterly stroke of policy to secure the adhesion of the orthodox Muslims. The last of the Fátimees was lying dangerously ill, and his relations concealed from him his degradation. He died without the knowledge of it, and with him perished an illustrious but unfortunate dynasty.

Saladin was thus relieved of the most serious obstacle on his way to the throne; yet he dared not throw off his allegiance to the sultan of Damascus, but prudently waited for a favourable opportunity. Noureddin's suspicion was already aroused, and he died (in 569) while secretly preparing to proceed in person to Egypt. Saladin almost immediately proclaimed himself sultan of Egypt, and inaugurated his reign with a series of brilliant successes. With the conquest of El-Mo'izz, Egypt again took an important place among the nations; and by the wars of Saladin it became the nucleus of a great empire. But military glory was not the sole aim of this prince and his successors. The patronage they continued to extend to letters and the arts had the most beneficial effect upon the civilization of the country.

Saladin, whose full appellation was El-Melik En-Násir Saláh-ed-deen Yoosuf Ibn-Eiyoob, acquired his greatest renown by his campaigns against the Crusaders in Syria. As these belong, however, more properly to the history of those wars than to that of Egypt, they will be more briefly noticed in this place than would otherwise be necessary. The youth of El-Melik Es-Sálih Isma'eel, the son and successor of Noureddin, and the consequent confusion which prevailed in his dominions, gave Saladin a fair pretext to occupy Damascus, as the guardian of the young prince, and enabled him to wrest from him his kingdom. He thus considerably enlarged his territory, made himself master of a great portion of Syria, and continued to consolidate his power in those parts until the year 572 (A.D. 1178), when Philip, count of Flanders, laid siege to Antioch, and Saladin entered Palestine. Having encamped before Ascalon, the Egyptian troops ravaged the neighbouring country, and set fire to Joppa, until at length Baldwin the Leper, king of Jerusalem, issued from Ascalon and gave them battle. The result was disastrous to Saladin: his army was totally routed, and he himself fled alone on a dromedary. After this, however, he gained some partial advantages over the Christians, till a terrible famine induced him two years later to conclude a truce with the king of Jerusalem and to retire to Egypt.

In the year 576 he again entered Syria and made war on Kilij-Arslán, the Seljookee sultan of Anatolia, and on Leon, king of Armenia, the Cilicio-Armenian kingdom, both of whom he forced to make terms of peace. Not long after his return, Saladin departed from Egypt (A.H. 578) to prosecute a war with the Crusaders in which neither side desired peace. Their hostility was aggravated by the following circumstances. A vessel bearing 1500 pilgrims had been wrecked near Damietta, and its passengers captured; and to the remonstrances of the king of Jerusalem the sultan replied by complaining of the constant inroads made by Renaud de Châtillon. At this time the latter turbulent chief undertook an expedition against Eyleh, and for this purpose constructed boats at Karak and conveyed them on camels to the sea; but this flotilla was repulsed, and the siege raised by a fleet sent thither by El-'Ádil ("Saphedin"), the brother of Saladin, and then his viceroy; and a second attempt was still more unfortunate, the Christian captives on that occasion were sacrificed in the valley of Mina. Having threatened Karak, Saladin encamped at Tiberias, and ravaged the territory of the Franks; he then besieged Beyroot, but in vain; and thence turned his arms against Mesopotamia and subdued the country, but the city of Mosul successfully resisted him. In the meanwhile, the Crusaders contented themselves with miserable forays across the enemy's borders, and made no serious preparations for the return of their redoubtable antagonist. The latter, having been almost everywhere successful in Mesopotamia, took Tell-Khálid and 'Eyn-Táb in Syria and obtained possession of Aleppo; he again besieged Karak, ravaged the territory of Samaria, and later received the fealty of the lord of Mosul, but not the keys of the city.

In the year 582 (1186 of our era) war again broke out between Saladin and the Crusaders. The sultan had respected a truce into which he had entered with Baldwin the Leper, and Renaud, before named, was the first to break it. The capture by the latter of a rich caravan enraged Saladin, who despatched orders to all his lieutenants and vassals, summoning them to assist in the "Holy War." He marched (A.D. 1187) from Damascus to Karak, and there laid close siege to Renaud; at the same time a large body of cavalry under the command of his son, El-Afdal, advanced on Nazareth; and here a body of 130 Knights Hospitallers and Templars, seconded by a few hundred foot soldiers, and encouraged by the heroic Jacques de Maillé, marshal of the Temple, by their devotion immortalized their memory. Only the Grand Master of the Temple and two of his knights escaped from the unequal struggle. Soon after, Saladin approached in person at the head of an army of 80,000 men; and the Christians with their whole force encountered him on the shore of the Lake of Tiberias. The result of the battle which ensued was the heaviest blow which had yet fallen on the Crusaders. Weakened by thirst, shaken by the flight of a part of their troops on the second day of combat, and overwhelmed by numbers, the knights fought with desperate courage, but at length were forced to the hills of Hitteem. A multitude fell in this bloody fight, and among the prisoners were Guy de Lusignan (the king of Jerusalem and successor of Baldwin), with his brother and Renaud de Châtillon. The number of prisoners is almost incredible; and the massacre of many of them is an indelible stain on the glory of the generally merciful Saladin. Tiberias, Ptolemaïs (Acre), Nábulus, Jericho, Ramleh, Cæsarea, Arsoor, Joppa, Beyroot, and many other places successively fell into the hands of the conqueror. Tyre resisted his attacks; but Ascalon surrendered on favourable terms, and the fall of Jerusalem crowned these victories. The great clemency of Saladin on this occasion is chronicled by Christian historians, though it is but slightly mentioned by the Muslims, who took offence at the mercy shown to the enemies of their faith.

After these events Tyre was again besieged, and when about to capitulate was relieved by the arrival of Conrad, son of the marquis of Montferrat. The valiant defence of the town wearied Saladin, who turned his arms against Tripoli; but here he met with no better success. Bohemond, prince of Antioch, and at that time possessor of Tripoli also, was, however, glad to obtain a truce of eight months; and some strongholds (among others Karak) were taken. But now the fortune of war turned against the sultan. The ever-memorable siege of Acre, maintained with equal constancy by both Christians and Muslims, lasted upwards of two years, and attracted the attention of the whole western world. At length the immense reinforcements received by the besiegers, and the presence of Richard Cœur de Lion of England and of Philip II. of France, enabled them to overcome all resistance, and the standards of the Cross floated on the ramparts of the city (A.D. 1191). A horrible act of barbarity was here perpetrated: 2700 Muslim captives were massacred in cold blood, in consequence of Saladin's having failed to fulfil the terms of the capitulation; and the palliative plea of the heat of an assault cannot be urged in extenuation of this enormity. Richard has been accused of being its author; but Michaud believes with reason that it was decided on in a council of the chiefs of the Crusade. On another occasion, however, that king was certainly guilty of similar cruelty.

After a period of repose and debauchery, the army of the Crusaders, commanded by Richard, directed its march towards Jerusalem. Saladin harassed his advance on every point, rendered the cities and strongholds defenceless, and ravaged the country. Richard, nevertheless, was ever victorious; his personal bravery struck terror into the Muslims, and he gained a signal victory over the sultan in the battle of Arsoor. But dissensions among the chiefs of his army and the uncertain temper of the commander himself debarred the Crusaders from the attainment of their great object, the deliverance of the Holy City; and when all the coast from Joppa to Tyre was in the hands of the Christians, and the army of Saladin was threatened with disorganization, a treaty was concluded, and Richard set sail on his return to England. The glory acquired by Saladin, and the famous campaigns of Cœur de Lion, have rendered the Third Crusade the most memorable in history, and shed a lustre on the arms of both Muslims and Christians greater than they ever attained in these wars, either before or afterwards.

Saladin died about a year after the conclusion of this peace (A.H. 589 or 1193 of our Era) at Damascus, at the age of fifty-seven years. Ambition and religious zeal appear to have been his ruling passions; he was courageous, magnanimous, and merciful, possessed of remarkable military talents and great control over himself. His generosity to the vanquished and his faithful observance of his pledged word are lauded by the historians of the Crusaders; the former brought on him much obloquy among his own fierce soldiers, and is a trait in his character which is worthy of note in the annals of a time when this virtue was extremely rare. While engaged in the conduct of his continual wars, he was not unmindful of the welfare of Egypt, and during his reign many public works were executed. Of these we may mention especially the citadel of Cairo, with the magnificent buildings which, until very recently, it contained; the third wall of the city; and the repair of the great canal called the Bahr Yoosuf, a very important and useful work. From the year 578 until the period of his death he had not entered Egypt; but his brother El-Melik El-'Ádil Seyf-ed-deen (Saphedin) and other princes of his family successively governed that country, and the eunuch Karákoosh, who also defended Acre, held a large share of authority.

On the death of Saladin, his extensive dominions were divided chiefly among his sons, and Egypt fell to the lot of one of them, El-Melik El-'Azeez Imád-ed-Deen 'Othmán. The grandees supported his claim to the throne, and he proved himself worthy of their choice. In conjunction with El-'Ádil, we find him warring against the leaders of the Fourth Crusade. He reigned nearly six years, and was succeeded (in 595) by his son El-Mansoor Mohammad, whose uncle El-Afdal was compelled to relinquish the government of Damascus and assume the regency of Egypt. Disagreement among the sons of Saladin had occurred soon after that monarch's death, and now hastened the rise of El-'Ádil, who, by his military talents and other remarkable qualities, had excited the fears of even his brother. With the view of checking his growing ascendancy, El-Afdal formed an alliance against him with Edh-Dháhir, another son of Saladin and lord of Aleppo, and besieged him in Damascus; but coming to strife, they raised the siege in 597. This attempt proved fatal to the power of El-Afdal. He was pursued to Egypt, in his turn besieged in El-Káhireh, and forced to flee, and El-'Ádil was proclaimed sultan. Having dethroned El-Mansoor, he speedily recovered Damascus from the hands of the confederate brothers, and Syria with Egypt acknowledged his supremacy. El-'Ádil (as Saphedin) is especially known by his opposition to the Fourth and Sixth Crusades, the former of which took place before his accession to the throne. He repulsed the Christians near Nábulus, captured Joppa, and encountered the enemy between Tyre and Sidon. He was there defeated with heavy loss, and Sidon, Laodicea, Gibleh, and Beyrout were taken. But the Crusaders wasted their strength before the fortress of Thoron. El-'Ádil raised the siege of that place, and although afterwards he met with a reverse near Joppa, his adversaries bought a dear victory; and, having come to terms of peace, they returned to Europe. In the year 600 (A.D. 1204) he departed to Syria with the object of securing Jerusalem against threatened attacks, and concluded a truce which he offered to renew when about to expire; and to prove his good faith, he strengthened that offer by promising to cede ten castles to the Christians. These overtures were refused, and the Muslim army drove the newly arrived king of Jerusalem, Jean de Brienne, back to Europe. Those who remained then professed their willingness to accede to conditions of peace, and we do not again hear of El-'Ádil in Palestine until 614 (A.D. 1217), when he was once more called thither to oppose the Crusaders; but a serious invasion of Egypt by these troublesome adventurers hastily recalled its king, and he died of grief, it is said, on hearing of the advantage gained by them.

El-Kámil immediately (615) came to the throne, and took the most energetic measures for the protection of his kingdom. In the meantime, the Franks had besieged Damietta both by sea and land; and, notwithstanding every effort for the relief of the place, its garrison was forced to capitulate. El-Kámil summoned to his aid the princes of his family, and with every available man watched the enemy's movements. Flushed with success, Jean de Brienne commenced his march on the capital; and with the characteristic carelessness of the Crusaders he took no measures to secure supplies. His advance was stopped at the junction of the canal of Ashmoon with the Nile, where he found El-Kámil in a very strong position. Encamped on the opposite shore, the invaders depended for supplies on Damietta and its immediate district; but the inundation of the Nile gradually obstructed land-carriage, and El-Kamil, skilfully availing himself of this natural ally, caused boats to be carried overland to the enemy's rear, and, thus cut off by land and water, they were compelled to attempt a retreat. At Beyramoon, however, all further progress was found to be impossible, the inundation had covered the level country, and the sultan's boats blockaded the Nile. The Franks surrendered, and evacuated Damietta, but not before Egypt had suffered severely from the ravages they committed. The town of El-Mansoorah was founded on the site of El-Kámil's camp, and commemorates his energy and sagacity. The Seventh Crusade was invited by the same sultan who had thus suffered by an invasion of the Franks. In A.D. 1228, El-Kámil invoked the aid of Frederick II. against his brother El-Moadhdham, lord of

id, in consequence of this alliance, Jerusalem, with
id the places between it and Joppa and Acre, Nazareth
tory of Thoron and Sidon, with its dependencies, was
lerick on the 20th of Feb. 1229. Between these two
sted the most friendly relations, presenting a curious
he midst of the intrigues and hatred of their subjects
er, and endangering their popularity and even their
various expeditions against his brother and his suc-
ámil gained possession of Damascus, and died there in
5 (A.D. 1238). He was distinguished by military
rare moderation, and was also a learned man, a patron
nd a good king.

l-Melik El-'Ádil the Younger, was declared sultan of
yria, with the consent of the nobles, and he speedily
se ministers whose counsels he feared, and appointed
is own. Oppressed by his tyranny, and impoverished
agance, the people called his brother Es-Sálih Negm-
ob to the throne ; and he deposed and imprisoned El-
year 637, and to replenish his exhausted treasury,
who had received presents from the late sultan to
to his successor. In the next year serious disturbances
Syria; 'Imád-ed-Deen, who had taken Damascus in
El-'Ádil, formed an alliance with the Franks, and
conquest of Egypt ; the hostile armies met at Acre,
im soldiers of 'Imád-ed-Deen deserting to the banner of
ob, the Franks were routed. Negotiations for peace were
ed, but these failing, the Franks were again induced
eld by the cession of Jerusalem and other places. The
t, on his part, called to his assistance the Tatars of
o took Jerusalem and overran Syria. In the next
12) they were joined by the army of Es-Sálih, under the
is favourite slave Beybars, or Eibars, who was destined
spicuous part in Egyptian history. At Gaza the allied
Franks, eager to avenge themselves on the Khárez-
horrible atrocities of which they had been guilty in
campaign, and willingly joined by the Muslim princes
Hims, and Karak ; on the first day the battle raged
ed fury from daybreak to sunset, and was continued
w until the prince of Hims, having lost 2000 men,
l fled towards Damascus. The Christians maintained
fight with great constancy, and were only vanquished
ater number had fallen. In these encounters 30,000
ans and Muslims) were either killed or taken prisoners.
esses followed this victory, Jerusalem was taken by
s, and Es-Sálih laid siege to Damascus in person. The
apitulated on favourable conditions, his fierce allies,
he loss of pillage, quarrelled with him, and soon after
ellious subjects. Damascus was reduced to the direst
again fortune favoured Es-Sálih. He hastened from
er he had returned, and totally defeated the enemy.
tages were gained by his commander Fakhr-ed-Deen
nks in 645.

attacked by illness, the sultan was once more called
quell fresh troubles ; but at Damascus news reached
threatened invasion of Egypt by the Crusaders under
d he travelled back in great suffering from his malady.
hich he rightly judged would be the first point of
strengthened and well stored, and its defence was
Fakhr-ed-Deen. On Friday, June 4, A.D. 1249, the
ored before the place, and the next day landed opposite
the Egyptian general, who offered but slight opposition,
ourse of the next night betrayed his trust and retreated
His army was precipitately followed by the entire
f Damietta, and this important town with its stores
hands of the invaders without a blow. Fakhr-ed-Deen
is life for this act of cowardice, and fifty-four of his
icers were put to death. In the meantime the sultan's
ally increased, but nevertheless he caused himself to
to the town of El-Mansoorah, which he fortified, and
ired on Nov. 21, at the age of forty-four, and after a
years. He it was who introduced the Bahree Mem-
of Turkish slaves, who composed his body-guard, and
usurped the supreme power. Their name *Bahree* (or
r ") originated in their being trained and quartered on
Er-Ródah, where the sultan had built a palace.

ch were advancing southwards, and, notwithstanding
ons of Sheger-ed-Durr (the widow of Es-Sálih, who
regency), were apprised of the death of the sultan.
d actions took place on the march, and on Dec. 19,
ppeared before El-Mansoorah, the scene of the disaster
rienne. Skirmishing continued until Shrove Tuesday,
tor having shown the enemy a ford over the canal of
ey surprised the camp and town. Very severe fighting
hr-ed-Deen fell early in the struggle, and the place was
when the Bahree Memlooks led by Beybars furiously
assailants, and completely turned the fortune of the
morrow witnessed another battle, also disastrous to the Crusaders, and a succession of misfortunes followed. Tooran-Sháh, on hearing of the death of his father, travelled in all haste from Mesopotamia to Egypt, and having reached the camp assumed the command. He had recourse to the stratagem which had proved so successful under the direction of El-Kámil, and cut off the supplies of the enemy. This, coupled with disease, soon reduced St Louis to great straits, and he sent to propose a truce, but not coming to terms he resolved on retreating to Damietta. A memorable conflict took place by land and water, and St Louis with his troops surrendered themselves prisoners of war.

Toorán-Sháh now gave himself up to debauchery, offended his nobles by bestowing his favours only on certain creatures whom he had brought with him from Mesopotamia, and alarmed the queen by forcing her to render him an account of his father's wealth. Sheger-ed-Durr appealed to the Memlooks, a conspiracy was formed, and the sultan was attacked in his palace. He fled to a pleasure-tower built on the banks of the Nile, which was set on fire in the presence of his army, the wretched king, from the summit, in vain promising to abdicate. He perished miserably, and his corpse lay unburied for many days on the bank. On his accession he had strangled a brother, and his fate deserves no pity.

Sheger-ed-Durr (vulgarly called Shegeret-ed-Durr), herself a slave, and the first of the Dynasty of the Bahree, or Turkish Memlooks, succeeded to the throne ; and 'Izz-ed Deen Eybek was appointed commander of the forces. After many delays, St Louis agreed to pay 400,000 livres as a ransom for himself and his army, 200,000 to be paid in Egypt, and the remainder on the fulfilment of certain stipulations at Acre : Damietta was surrendered and Egypt evacuated. Thus ended the last invasion of Egypt by the Crusaders. Sheger-ed-Durr, in order to strengthen herself on the throne, shortly after married the emeer Eybek, and caused him to be proclaimed sultan, with the title of El-Melik El-Mo'izz, in the year 648. The followers of the late Es-Sálih, however, obliged Eybek to associate with himself in the sovereignty a young prince of the family of Eiyoob, El-Melik El-Ashraf Mudhaffar-ed-Deen Moosa. En-Násir, a son of El-'Azeez, invaded Egypt, and after many combats was driven back to Syria, but the country continued in a very unsettled state. The chief of the adherents of the fallen dynasty was arrested by Eybek ; and Beybars and other leading men having repaired to the citadel to demand satisfaction, his bloody head was thrown to them from the ramparts, and in terror they fled to Syria. El-Ashraf was then cast into prison, and there he died. But Eybek soon roused the jealousy of his beautiful and ambitious wife ; and he was assassinated by her orders (655, A.D. 1257). In her turn she was beaten to death, not many days after, by the wooden clogs of the female slaves of another wife of Eybek, and her corpse was exposed for three days in the moat of the citadel.

El-Melik El-Mansoor Noor-ed-Deen 'Alee, son of Eybek, was now raised to the throne, and Beybars being apprised of the death of his rival attempted to regain his power in Egypt ; but Kutz, the viceroy of Eybek and also of his son, attacked and routed him ; and he soon after (657) desposed El-Mansoor, and declared himself sultan. El-Melik El-Mudhaffar Kutz began his reign by putting to death El-Mansoor and Sharaf-ed-Deen, the able minister of the last Eiyoobee kings and of the first of this dynasty. A reign thus cruelly commenced ended tragically. Kutz was diverted from these severe measures by the advance of Hoolágoo, grandson of Genghis-Khán, who, with a formidable army, overran El-'Irák and Syria. By great efforts Kutz raised a considerable force and marched to meet him. The intelligence of the death of the Moghul emperor had, however, in the meantime recalled Hoolágoo, who left Ketbooghà to encounter the Egyptian sultan. The battle declared in favour of the latter, and Syria was restored to his rule. Returning in triumph to Egypt, he was assassinated on the frontier by Beybars in the year 658, and this Memlook (who had but recently fought under his banner against the Tatars) was forthwith chosen by the emeers to be his successor.

The brilliant reign of El-Melik Edh-Dháhir Beybars El-Bundukdáree is so perplexed and full of incident as to render a concise account of it very difficult. It began with the reduction of a revolt in Syria. The rebels were supported by a Tatar army under Hoolágoo, but Beybars was everywhere victorious, and Damascus surrendered at discretion. Having subdued all opposition in this quarter, he endeavoured to improve the condition of Egypt, abolished the exorbitant imposts under which the people groaned, and welcomed to the court Ahmad, son of the caliph Edh-Dháhir, who was declared Prince of the Faithful with the title of El-Mustansir bi-lláh, and furnished with a small force, by which he hoped to establish himself in Baghdád. He was, however, repulsed by the Tatars and put to death. The succeeding line of caliphs, possessed of spiritual, but no temporal authority, remained at the court of the Memlook sultans until the Turkish conquest. From this time, Beybars continued to extend and confirm his rule. His first expedition was to Syria against the Christians, and the Church of the Nativity at Nazareth was destroyed. Thence he went to the fortified town of Karak, which had more than once resisted the attacks of Saladin, but opened its gates to the Memlook conqueror, and its territory was added to his dominions. A great scarcity afflicted Cairo in 662, and Beybars threw open the Government stores, and strove in every way to alleviate the sufferings of his subjects.

In 663 he again entered Syria, and took Cæsarea and Ursoof; and in the next year he commenced a series of campaigns against the Christians, notwithstanding the earnest remonstrances of the kings of France, of Aragon, and of Armenia. To raise the necessary funds for the expenses of the war, he took occasion from the occurrence of many incendiary fires in Cairo, during his absence, to mulct their co-religionists of the sum of 500,000 deenárs, ostensibly to repair the damage caused by these fires. He threatened Acre, and took Safad; and relieved from the apprehensions caused by the advance of the Tatars by the death of Hoolágoo and the retreat of his army, Beybars despatched a force which effected the conquest of Armenia, and penetrated to the borders of Anatolia, a transient success which was speedily annulled by the advent of Abáká Khán, the son of Hoolágoo. In the next war, Beybars again attacked the Christians, burning their churches and enslaving the people. He took Antioch, with horrible carnage, advanced to Hims and Hamáh, and thence returned to Cairo. After a campaign against the Tatars, he ravaged the country around Acre (the constant object of his attacks), and the "Assassins," so long the terror of dynasties, submitted to his power. About this time the Tatars renewed their inroads and besieged Beyrah; and in the year 671 Beybars took the field against them with two armies, one commanded by himself in person, the other by Kalá-oon El-Elfee. In the battle of Beyrah the sultan was completely victorious, and the Tatars fled to the mountains of Kurdistán. In consequence of this victory, Armenia again fell into his hands, and was given up to pillage. Abáká Khán afterwards was again repulsed at Beyrah. Nubia also about this time acknowledged the authority of Beybars. He died at Damascus in the year 676, after another expedition against Anatolia, attended with various success, in which the Tatars were leagued against him. Great military talents, coupled with the most indefatigable activity, Beybars certainly possessed, but he used his conquests unmercifully; on many occasions he ravaged whole provinces, and sacked many towns, putting great numbers of the inhabitants to the sword. The melancholy annals of the Crusades bear ample testimony to this fact; and while the example of other monarchs, and of the Franks themselves, may be urged as some palliation, nevertheless his barbarity remains an indelible blot on his character. In Egypt he endeavoured to reform abuses and suppress vice; and numerous public works were executed by his orders. Damietta was razed and rebuilt farther inland; and the mouth of the Nile was protected by a boom against sudden invasion. He repaired the fortifications of Alexandria and the Pharos, the mosque El-Azhar in Cairo, and the walls of the citadel, and built the great mosque known by his name to the north of the city.

The son and successor of Beybars, El-Melik Es-Sa'eed Barakeh Khán, was exiled after a short reign of two years, and a younger brother El-'Ádil Selámish, raised to the throne, Kalá-oon El-Elfee acting as regent. This Memlook had married a daughter of Beybars, and was consequently nearly allied to the sultan. He nevertheless conspired against him, and was soon proclaimed king by the title of El-Melik El-Mansoor. Distinguished in former wars, he achieved many successes during his reign of ten years. On his accession he despatched an army to reduce disturbances in Syria, and took Damascus. Peace was thus established in that province; and in the year 680 he in person defeated a very superior force of Tatars and raised the siege of Rahabeh. Later in his reign (in the year 688) he besieged Tripoli, which for nearly two centuries had been in the possession of the Christians and was very rich and flourishing. The town was sacked and its unfortunate inhabitants put to the sword. His memory is still preserved in Cairo by his hospital and mad-house adjoining his fine mosque in the principal street of the city. This charitable institution he is said to have founded as an expiation for great severity towards the citizens in enforcing an obnoxious edict. His son, El-Ashraf Khaleel, rendered himself famous by the siege and capture (in the year 690) of Acre, the last stronghold of the Crusaders in Syria. Many thousands of its inhabitants were massacred; and 10,000 who presented themselves before the sultan and demanded quarter were slaughtered in cold blood. He also took Erzeroom in 691, and two years after was assassinated in Egypt (A.D. 1294).

El-Melik En-Násir Mohammad, another son of Kalá-oon, succeeded him at the age of nine years. The regent Ketbooghà, however, followed the example of Kalá-oon, and usurped the sovereignty, with the title El-Melik El-'Ádil. Pestilence and famine were followed by war with the Tatars, who again ravaged Syria. Ketbooghà despatched an army against them, but the valour of his troops was unable to withstand overpowering numbers, and Lágeen, Kalá-oon's governor in Syria, was driven into Egypt with an immense crowd of fugitives. Ketbooghà was deposed on the allegation that he had not commanded in person, and El-Melik El-Mansoor Lágeen was elevated in his stead. In little more than two years this king was deposed in a conspiracy. His character was amiable, and he deserved a better return for the equity and kindness he showed to his subjects.

A short period of confusion then ensued, during which an emeer was proclaimed king. En-Násir Mohammad, however, was at length recalled from his exile at Karak, and restored in the year 698. Having firmly established himself in Egypt, he led an army against the Tatars, but met with a severe reverse in the plains of Hims; a second expedition proved more fortunate, and En-Násir, then only nineteen years of age, gained a bloody and decisive victory over the enemy near Damascus, in the year 702. The battle lasted three days; during the first two the result was not decisive, although En-Násir held the field; on the third day the Tatars were utterly routed and pursued for many hours. The sultan on his entry into Cairo after this achievement was preceded by 1600 prisoners, each one carrying the head of a comrade slain in the combat, and 1000 other heads were borne on lances in the procession. En-Násir reigned until the year 707, when he went to Karak and voluntarily abdicated. He had long struggled against the control of two powerful emeers, Beybars and Sallár; and in despair of throwing off their ascendency, he then openly yielded the reins of government to those who had long really held them. Since this prince's accession the Christians and Jews of Egypt suffered the most severe persecution (excepting that of El-Hákim) which had yet befallen them. In the year 700, they were ordered to wear blue and yellow turbans respectively, and forbidden to ride on horses or mules, or to receive any Government employment. The people took advantage of these measures to destroy many churches and synagogues. The churches continued shut for about a year; but some of those which had been destroyed were afterwards rebuilt at the request of Lascaris and other princes.[1] Another event of this period was a great earthquake which half ruined Cairo, giving it the appearance of a city demolished by a siege; Alexandria and other towns of Egypt, as well as Syria, also suffered from it considerably.

On the abdication of En-Násir, El-Melik El-Mudhaffar Rukn-ed-Deen Beybars II. was saluted sultan; but ere long En-Násir recovered his courage, and having collected an army marched to Damascus, where he was acknowledged, and thence to Egypt, entering Cairo without opposition. El-Mudhaffar had fled at his approach, and, never a favourite of the people, he was attacked on his exit from the metropolis, by a crowd of the citizens, who loaded him with abuse, and pelted him with stones. En-Násir now for the third time ascended the throne of Egypt, and took the entire authority into his own hands. The remainder of his life was a period of profound peace, during which he occupied himself in improving his dominions, and in embellishing Cairo. But another persecution of the Christians occurred in 721, and all the principal churches in Egypt were destroyed by certain fanatical Muslims. The sultan threatened a general massacre of the inhabitants of Cairo and El-Fustát; the Christians, however, took [illegible] themselves by setting fire to very many mosques and houses in the metropolis; much tumult ensued, and many Christians and Muslims were executed. The threats of the mob induced En-Násir to permit the people to murder and plunder any Christian whom they might meet in the streets; and the oppressive rules before enacted were rigorously enforced, and made even more degrading.

The sons of En-Násir followed him in succession, but the reigns of most of them were short and troublous. El-Mansoor Seyf-ed-Deen Aboo-Bekr, El-Ashraf 'Alá-ed-Deen Koojook, En-Násir Shiháb-ed-Deen Ahmad, Es-Sálih 'Imád-ed-Deen Ismá'eel, El-Kámil Zeyn-ed-Deen Sháabán, and El-Mudhaffar Zeyn-ed-Deen Hágee were only raised to the throne to be either exiled or put to death. After these, the sultan Hasan deserves notice. He was deposed by his brother, Es-Sálih Saláh-ed-Deen, whose minister was Sheykhoon, a man well known to students of Egyptian subjects; but he soon regained his authority, reigned seven years, and at length fell by the swords of his memlooks in the splendid mosque which he built in the open space beneath the citadel of Cairo. Four more Memlook kings bring the history to the accession of a new dynasty. These were El-Mansoor Násir-ed-Deen Hágee (son of El-Mudhaffar), deposed in six months; El-Ashraf Shaabán (son of Hasan), an unfortunate prince, whose reign passed away amid the intrigues of the *fainéant* caliphs and the struggles of the new too powerful emeers, by whom he was ultimately strangled; his son, El-Mansoor 'Alá-ed-Deen, the victim of similar troubles, in whose time the celebrated Barkook rose to the regency; and Es-Sálih Hágee, a brother of the last [illegible] Barkook, who was proclaimed sultan, he unsucce[illegible] to recover his throne in the year 784; in 790 ([illegible] restored, but he was soon once more dethroned, th[illegible] of his life.

The sultan Edh-[illegible] Aboo-Sa'eed Barkook [illegible] now undisputed master of Egypt. He was the first prince of the Dynasty of Burgee or Circassian Memlooks. As the preceding dynasty was founded by the Turkish Memlooks of Es-Sálih Eiyoob, so this dynasty was composed of the Circassian slaves whom those kings from time to time bought with the view of strengthening their power. They were originally placed in garrison-towns, and hence their name *Burgee*, signifying "of a tower or castle." It is worthy of remark that, while many of the sultans of both these dynasties held an insecure tenure of power, many of the former met with a violent death, but few of the latter. The reign of Barkook is memorable for his war with Teemoor, or Teemoor-leng, commonly called by us Tamerlane, who had extended his conquests towards his dominions, but found him not unprepared, for he had foreseen the threatened danger. In the year 795, Kará-Yoosuf, lord of El-Medeeyeh, and Ahmad Ibn-Uweys, sultan of Baghdád, fled to his court for succour. The inhabitants of Edessa had been put to the sword, and Aleppo was menaced with a similar catastrophe, when Barkook at the head of his army came to its relief. Ahmad was reinstated in Baghdád, as a vassal of Barkook; and soon after the 'Othmánlee Báyezeed, commonly called by us Bajazet, concluded a treaty with the sultan of Egypt. His designs against India diverted Teemoor from his projects in Syria, but Barkook continued vigilant and by every means sought to insure the safety of his kingdom. He died suddenly in 801, much beloved by his subjects and regarded by less powerful chiefs as their strongest bulwark against the Tatar monarch. He was called "Sheykh" for his wisdom and learning, and combined with these qualities those of a skilful general and a good king. He was active, wary, and provident, and possessed the military talents of Beybars without his severity. He seems to have been fond of riches and display, and he certainly left his treasury in a very flourishing condition, besides much wealth in stores, slaves, horses, and the like.

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[1] See *Modern Egyptians*, ap[illegible] *Hist. des Sultans Mamlouks*, tra. Quatremère, tom. II. [illegible] on the persecutions of the Chri[illegible] 270–300.

His son, El-Melik En-Násir Abu-s-Sa'ádát Farag, fell a prey to intestine troubles and the inroads of the invader. He had overcome a revolt of the governor of Syria, when Teemoor again threatened that province. Kará-Yoosuf and Ahmad sought refuge with the son of their former protector, and Farag's refusing to betray his guests gave occasion to the enemy to continue the war; a battle was fought, Farag was defeated, Aleppo and Hims fell into the hands of the victor, and the Egyptian forces returned and were concentrated in Egypt. Intimidated, however, by the fall of his ally Bajazet, Farag sent an embassy to Teemoor with presents and offers of amity, and at length concluded a peace at the sacrifice of territory. Teemoor died in the year 807 (A.D. 1405), and Farag was preparing an expedition to recover his Syrian possessions, when he was surprised in his palace by an insurrection, headed by his brother, 'Abd-el-'Azeez, and compelled to take to flight. The people believing that he had perished proclaimed El-Mansoor 'Abd-el-'Azeez his successor. In the space of less than three months, however, he was deposed in favour of Farag, who thenceforth reigned at Damascus, until the caliph El-Musta'een bi-lláh, at the instigation of the emeer Sheykh El-Mahmoodee, who had raised an army, boldly declared himself sultan, by an appeal to religion gained numbers to his side, instituted criminal proceedings against Farag on the plea of the exactions which he had been forced to levy for the conduct of the war against Teemoor, and accomplished his death. Farag was beheaded in the month of Safar in the year 815, and his corpse was left unburied. Abu-l-Mahásin gives him the character of an extravagant, cruel, and voluptuous king.

El-Musta'een bi-lláh, with the title of El-Melik El-'Ádil Abu-l-Fadl, began his reign well; but he had appointed El-Mahmoodee his vizir as a reward for his services, and this powerful and vigorous chief soon obliged him to abdicate and eventually exiled him to Alexandria, where he passed the remainder of his days.

El-Melik El-Mu-eiyad Abu-n-Nasr Sheykh El-Mahmoodee (originally a memlook of Barkook's) waged three successful wars in Syria, in the first of which he was guilty of a breach of faith in putting to death the governor of Damascus and part of the garrison of that city, after they had surrendered on promise of safety. He reigned peacefully in Egypt, and his name is recorded as that of a king who studied the happiness of his subjects and favoured the learned, who counted him among their number. But he was avaricious; although one might judge the contrary from his beautiful mosque and the minarets over the Báb-Zuweyleh in Cairo, held to be among the chief ornaments of the city.

Three kings followed in rapid succession:—El-Mudhaffar Ahmad, a son of El-Mu-eiyad, under two years of age at his accession, Edh-Dháhir Tatar, and his infant son, Es-Sálih Mohammad, who was deposed by Barsábay Ed-Dukmákee. This Memlook assumed the title of El-Melik El-Ashraf, and worthily continued the prosperous reign of El-Mu-eiyad. In power and virtue he ranks second only to Barkook among all the kings of this dynasty. He is known in European history by his expedition in 827 (A.D. 1424) against John III., king of Cyprus, who became his vassal, and by the part he took, about seven years later, in the dissensions of the house of Savoy and the government of Cyprus. He ruled for seventeen years with great clemency, and died in 841. El-'Azeez Yoosuf, his son, was deposed by El-Mansoor Aboo-Sa'eed Jakmak El-'Alá-ee, a good prince, and a patron of the learned. After a peaceful reign he abdicated at the age of about eighty years in favour of his son, El-Mansoor Abu-s-Sa'ádát 'Othmán, who was overthrown by the intrigues of the caliph El-Káim bi-amri-lláh, and was succeeded by an aged Memlook, El-Ashraf-Abu-n-Nasr Eynál, followed by his son, El-Mu-eiyad Shiháb-ed-Deen Abu-l-Fet-h Ahmad. Edh-Dháhir Seyf-ed-Deen-Khóshkadam, a Greek by birth, superseded him, reigning himself for seven years, with equity and benignity, presenting a contrast to the cruelty and oppression of his appointed successor, Ed-Dháhir Aboo-Sa'eed Bilbáy El-Alá-ee, which caused the latter's fall and the elevation of the sultan Aboo-Sa'eed Temerbeg Edh-Dháhiree, who, in his turn, was deposed to make room for El-Ashraf Káit Bey, a prince who deserves especial notice for his struggles with the Turks, whereby the conquest of Egypt by the Porte was deferred for a few years. After a period of quiet which followed his accession, he was alarmed by the victory gained by Mehemet II. over his ally the king of Persia, and posted a considerable force on the frontier of Syria. The successes of the conqueror of Constantinople made him desire to abdicate; but the emeers prayed him to defend his rights, and he consequently prepared for the war. The death of Mehemet, and the dissensions between Bajazet II. and Jem (or Zizim) temporarily relieved him of these apprehensions. The fall of Jem, however, and his arrival at the Egyptian court, implicated the Memlook sultan in the quarrel; and on the final overthrow of this prince Káit Bey made sure of a war with the more fortunate Bajazet, and himself began aggressive measures, intercepted the Turkish caravan of pilgrims, and an ambassador from India who was on his way to Constantinople with presents, and took Tarsus and Adaneh. A remonstrance from Bajazet was answered by a successful attack on his Asiatic commander, 'Alá-ed-Dowleh. In the meantime Tarsus and Adaneh were recovered from him; but the emeer El-Ezbekee, to whom was entrusted the conduct of all future wars, being despatched against these towns, retook them, defeated an army sent to chastise him, and annexed Karamania. Another force was speedily equipped, and took the field in 893; conditions of peace were refused, and considerable success attended the Turkish arms. El-Ezbekee was, therefore, again ordered to Syria; a Turkish squadron conveying troops was dispersed, and at Tarsus he gave battle. The result was at first unfavourable to the Memlooks, whose commander, however, rallied them under cover of the night, and succeeded in surprising and totally defeating the Turks. Long negotiations followed this victory; and at length Káit Bey, who was always most anxious for peace, ceded the disputed towns of Tarsus and Adaneh, and secured repose during the rest of his days. He died in 901, having designated El-Melik En-Násir Abu-s-Sa'ádát Mohammad as his successor. This weak and barbarous king was put to death after four years, during which he was deposed, and Kánsooh, surnamed Khamsameeyeh, and Edh-Dháhir Abu-n-Nasr Kánsooh were successively installed. The first reigned but eleven days, and the latter abdicated after five months of great difficulty and danger. On the death of En-Násir, El-Ashraf Kánsooh Jánbalát was elevated to the throne, but six months sufficed to accomplish his fall, and he was fortunate in preserving his life. The next sultan, El-Melik El-'Ádil Toomán Bey, was acknowledged both in Egypt and Syria. He, however, was overthrown and killed in a few months.

The Memlooks now compelled Kánsooh El-Ghooree to assume the dangerous dignity, with the title of El-Melik El-Ashraf. This prince very unwillingly yielded. His previous life shows him to have been both virtuous and learned; and he proved himself to be an able ruler. After an unsuccessful expedition against the Portuguese in the East, he reigned in peace until the year 915, when Kurkood, the father of Selim I., the Turkish sultan, obtained his protection and assistance. Events similar to those which accompanied the end of Jem followed; and Selim availed himself of a pretext to declare war against Egypt. The first reverse which the Egyptians suffered occurred to an army commanded by 'Alá-ed-Dowleh, formerly defeated by Káit Bey, but now in the pay of El-Ghooree. The winter was passed by the latter in preparing energetically for the inevitable struggle, and in the spring he advanced in person. Selim, on his part, pretended to march towards Persia; but at the same time he sent to demand of El-Ghooree wherefore he opposed his passage and commanded in person on the frontier. El-Ghooree replied that his was merely an army of observation, and that he was desirous of mediating between Selim and Isma'eel Sháh. Selim, however, rapidly advanced, refused to listen to an attempt at negotiation, and was met by El-Ghooree on the plain of Marj-Dábik, near Aleppo. A long and sanguinary battle ensued, and victory declared for neither side, until Kheyr Bey, commanding the right wing, and El-Ghazálee the left, of the Egyptian army, basely deserted to the enemy with their troops. The centre then gave way and fled in utter confusion, notwithstanding the efforts of the sultan to rally them. He was trampled to death by his routed cavalry, while (according to some) in the act of prayer.

[illegible] 1517. [illegible] Tooman Bey [illegible] and Tooman Bey [illegible] between El-Ghooree and the [illegible] of Zu-l-Hegg[illegible] January [illegible]. The [illegible] Pasha [illegible] the Turks, and the [illegible] of the Memlooks [illegible]. Immense numbers of them were slain by their enemies [illegible] Cairo. [illegible] murdered [illegible]. The Turks [illegible] for [illegible]; and [illegible] given to Tooman Bey [illegible] the west of Cairo. A [illegible] Tooman [illegible] but he [illegible] a great many Turks. He fortified himself in the city, and a [illegible] ensued, the Memlooks defending every foot with the energy of despair; the [illegible] the unfortunate Tooman effected his escape towards Alexandria. But on the way he was taken by Arabs, given up to [illegible] and brought in chains to Selim, who at first received him with honour, but afterwards falsely accused him of conspiring against him, and with the cruelty and perfidy characteristic of his race, hung him over the Bab-Zuweyleh, the place of execution for common malefactors. Thus miserably perished the last independent ruler of Egypt, who possessed the best qualities of his line, and whose noble defence of his kingdom would have secured to him the commendation of any but a Turk.

In reviewing the period during which Egypt was governed by independent Muslim princes, it is necessary to consider the spirit of the times and the people over whom they ruled. They succeeded to the government of countries worn out by incessant warfare, overrun by savage hordes, and debased by the rule of the Lower Empire. Egypt had long struggled against the slavery to which it was condemned, and the history of the last three dynasties of Pharaohs evinces the patriotism which yet animated her people. But the successive tyranny of the Persians, the Greeks, and the Romans appears to have annihilated their nationality; and when the Arabs invaded the country, these causes, combined with religious strife, induced the people to afford to the conquerors every assistance in their power. But the changeful rule of the lieutenants and the troubles of the caliphs debarred Egypt (except at times under the Benee-Tooloon and the Ikhsheedeeyeh) from profiting by the enlightenment of the race who held the dominion over it, until the conquest by the Fátimees. The caliphs of that dynasty contributed in a great degree to restore to Egypt some portion of its ancient prosperity, and with the house of Eiyoob it attained its greatest military glory under the Muslims; but the edifices erected during the rule of the two dynasties of Memlook kings, the libraries collected in Cairo at that period, and the learned men who then flourished would point to it as the age in which literature and the arts were cultivated with the most success, a sure evidence of the internal prosperity of any country. This is the more surprising when we consider the state of Syria, which had long before their accession fallen a prey to intestine wars and the ravages of the Tatars, the Crusaders, and other invaders, and also bear in mind the constitution of their government, in which the more powerful chiefs were constantly aiming at the supreme authority; and the practice of purchasing memlooks, and rearing them in the households of the great to enable their masters to maintain their ascendency augmented the number of these aspirants to the throne. These slaves were, unlike the Bahrees (who were the Turkish Memlooks of Es-Sálih Eiyoob), chiefly Circassians, who afterwards composed the Second (or Burgee) Dynasty. Many of the Memlook sultans rivalled in military achievements the great Saladin, and even penetrated further than he in their foreign expeditions. In Cairo are still seen the finest specimens of Arab architecture, almost all dating during the period comprised under the domination of the two Memlook dynasties; the libraries of the mosques and the private collections of that city, though grievously injured since the Turkish conquest, are or very recently were the best and most considerable of those of Egypt or Syria;[1] and, as before remarked, the university El-Azhar is still, owing to the fostering care of these sultans, the principal seat of learning of the Eastern world. In this sketch of the history of Egypt we have given no account of the state of commerce, taxation, &c., under the Muslims. Those only who have read the Arab histories of this and other Eastern countries can appreciate the general fallacy of the conclusions based on their authority.

It would be tedious and unprofitable to follow the details of Turkish misrule and tyranny which are from this time presented to the student of Egyptian history. Although Selim had apparently destroyed the power of the Memlooks, he thought it wise to conciliate them, and to appoint twenty-four beys over the military provinces of that number into which he divided Egypt, subject to the supreme control of a pasha, whose council was formed of seven Turkish chiefs (ójáklees), while one of the beys held the post of Sheykh el-Beled, or Governor of the Metropolis, an officer who became an object of hatred to the other chiefs. This system was begun by Selim, and completed by his successor. For nearly two centuries the successive pashas were mostly obeyed; but the ambition of becoming Sheykh el-Beled was the fruitful cause of intrigue and murder. The Memlooks who then held power in Egypt were called the Ghuzz, that being the name of the tribe to which they are said to have at first generally belonged; and they continually bought slaves, of Circassian or Georgian race, to supply the place of children, for they did not intermarry with natives of Egypt, and women of more northern climates are generally either barren or bear sickly offspring in that country. Thus they lacked the surest source of power; few possessed any family ties; but at the same time the slaves in general were remarkably faithful to their patrons. After two centuries, the beys gradually increased in power, until the authority of the pasha was almost nominal, and the government became a military oligarchy. This brings us to the rise of the celebrated Ali Bey. He was created Sheykh el-Beled in A.H. 1177; but, having revenged himself on an old enemy who had assassinated Ali's master, to whom he owed his elevation to the rank of bey, he shortly after fled to Syria, and took refuge with the governor of Jerusalem, and thence went to Acre, where the Sheykh Dháhir became his friend; and that same year he returned to Cairo in his former capacity of Sheykh el-Beled. In 1179 his enemies again compelled him to flee, and he betook himself this time to El-Yemen, once more to return to Egypt; after which he gained increased power. His favourite memlook, Mohammad Aboo-Dhahab, proved ungrateful, and, while enjoying the highest power, entered into a conspiracy against his life; but after receiving the presents of the hostile beys, he denounced them to his master, who would not listen to warnings of his meditated treachery.

In the year 1182 (A.D. 1768) the Porte demanded the assistance of Ali Bey in the Russian war, an order which he was about to obey, when he was apprised of the departure of a messenger with a firmán demanding his head, he having been falsely accused at Constantinople of intending to aid the Russians and throw off his allegiance. He caused the bearer of this order to be waylaid and put to death, and having possessed himself of the firmán, he con-

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[1] It should, however, be mentioned that many of the most precious of their contents are plunder brought from the libraries of mosques in Syria, as is proved by seals which they bear.

the beys, showed them the document, and aided by
of his own household persuaded the council to expel
isha, and declare Egypt independent. The Sheykh
r took part in this rebellion, and the pasha of
scus was beaten by him between Mount Lebanon and
ıs. A period of good but vigorous government and
quillity followed these events in Egypt, notwithstand-
e very heavy imposts levied for the replenishment of
asury; and Ali's generals gained for him extended
abroad. Mohammad Aboo-Dhahab was despatched
ıbia, and entered Mecca, where the Shereef was
ıd; and another bey traversed the eastern shores of
ed Sea. After the expedition to Arabia, Mohammad
arched into Syria to assist the Sheykh Dháhir against
orte, and the co-operation of the Russians was
ded. A successful campaign terminated before the
of Damascus, the siege of which was abandoned when
brought to a close, and Mohammad Bey returned
arge forces to Egypt. This man, loaded with benefits
patron, now openly rebelled; and being joined by
enemies, at the head of whom was Ismail, chief of
ıard, he advanced on Cairo, and Ali escaped to his
ally, Sheykh Dháhir, the prince of Acre. These
took place the year 1186. Mohammad Bey was then
ed Sheykh el-Beled. Ali Bey, in the meanwhile, in
ıction with his ally, gained various advantages in
and, on the information that his return was desired
ypt, he collected a small force, assisted by Sheykh
r and a Russian squadron, and determined on attempt-
recover his power. He, however, fell into an
scade near Es-Sáliheeyeh, and was wounded by one
memlooks named Murád (afterwards Murád Bey),
l to the citadel, and poisoned by Mohammad Bey.
terminated the career of the famous Ali Bey, a man
energy, talents, and ambition bear a strong resem-
to those of the later Mehemet Ali.

hammad Bey continued Sheykh el-Beled, tendered his
ınce to the Porte, and was invested with the pashalik.
ıen entered Syria, and severely chastised Sheykh
r, taking Gaza, Joppa, and Acre itself. Joppa was
by assault, and suffered a massacre of its inhabitants,
cre was pillaged. At the latter place the pasha
nly died. His mosque in Cairo is the latest fine
ıen of Arab architecture, and is not unworthy of its
days.

chief competitors for power were now Ismail,
m, and Murád, the first of whom was speedily
ed, the contest continuing between the two latter beys.
ım at length succeeded in causing himself to be pro-
d Sheykh el-Beled, and Murád contented himself with
fice of Emeer el-Hágg, or chief of the pilgrims; but
rrangement was not destined to be of long continuance;
ent quarrel resulted in a recourse to arms, and that
in a peace of three years' duration, during which the
eys held an equal sway. In the year 1200 the Porte
tched Hassan Capitan (properly Kapoodán) Pasha (or
Admiral), with a Turkish force, to reduce the turbu-
Memlooks to obedience, and to claim the annual
e. Murád Bey was defeated at Er-Rahmáneeyeh, and
urks advanced to Cairo, desolating the country, and
according to their almost invariable practice on such
ons. The metropolis opened its gates to Hasan Pasha,
letermined on pursuing the beys to Upper Egypt,
er he despatched a large portion of his army, and a
inary conflict took place. But a war with Russia re-
this commander to Constantinople. Ismail was
created Sheykh el-Beled, and he held that post until
rrible plague of the year 1205, in which he perished,
ence it is commonly called the "Plague of Ismail."
leath caused the return of Ibrahim and Murád; and eight years after, intelligence of the arrival at Alexandria of a French army of 36,000 men, commanded by General Bonaparte, united these chiefs in a common cause.

On the 18th May 1798, this expedition, consisting of 13 sail of the line, 6 frigates, and 12 vessels of a smaller size, sailed from Toulon, and made the coast of Egypt on the 1st July. The troops were landed near Alexandria, and the city fell by assault on the 5th of that month. The French conquest and occupation of Egypt belong to European history; a recapitulation of the principal events of the period will therefore suffice in this place. The Memlooks affected to despise their antagonist, and hastened to chastise him: at Shibirrees they attacked the French and were repulsed; but, nothing discouraged, they collected all their forces, exceeding 60,000 men, under the command of Murád, and entrenched themselves at Embábeh, opposite Cairo. Here was fought the battle which has been dignified with the name of that of the Pyramids. European tactics completely bewildered the Memlooks: their famous cavalry was received on the bayonets of the French squares; a galling fire of grape and musketry mowed down their ranks; and of this great army only about 2500 horse escaped with Murád Bey, while 15,000 men of all arms fell on the field of battle. Having made himself master of Cairo, Bonaparte despatched General Desaix to effect the conquest of Upper Egypt, and the success of the Eastern expedition seemed secured. But, ten days after the victory of Embábeh, the battle of the Nile annihilated the French fleet in Aboo-Keer (Aboukir) Bay, and most materially influenced the future conduct of the war. On this point, Napoleon himself says, "La perte de la bataille d'Aboukir eut une grande influence sur les affaires d'Egypte et même sur celles du monde; la flotte Française sauvée, l'expédition de Syrie n'éprouvait point d'obstacles, l'artillerie de siége se transportait sûrement et facilement au-delà du désert, et Saint-Jean-d'Acre n'arrêtait point l'armée Française. La flotte Francaise détruite, le divan s'enhardit à déclarer la guerre à la France. L'armée perdit un grand appui, sa position en Égypte changea totalement, et Napoléon dut renoncer à l'espoir d'asseoir à jamais la puissance Française dans l'Occident par les résultats de l'expédition d'Egypte."[1] The disastrous expedition into Syria, undertaken for the purpose of frustrating the efforts of Sir Sydney Smith before Alexandria, and of Jezzár Pasha, who was advancing from Acre, still further obscured Napoleon's prospects in the East, and the victory soon after obtained by him over the Ottoman army at Aboo-Keer, the second defeat of Murád Bey, and various successes over the Turks, enabled the French general Kléber (Napoleon having left for Europe after the first of these events) to set on foot negotiations for an honourable evacuation of the country. But when the convention was already signed, and the French were about to quit Cairo, Lord Keith signified to Kléber that Great Britain would not consent to the terms of the treaty; and although this refusal was afterwards rescinded, Kléber considered that the withdrawal came too late: he totally defeated 70,000 men under the grand vizir at Heliopolis, and returned to Cairo to quell an insurrection of the inhabitants. This distinguished officer was about this time assassinated in the garden of his palace by a fanatic, who was impaled in the great square (then a lake) called the Ezbekeeyeh, in Cairo, and miserably lingered for the space of three days before death put an end to his sufferings. Under Kléber's administration, Egypt began to resume its former prosperity; by his conciliatory and good government much prejudice against the French was overcome; by ceding a part of Upper Egypt to Murád, he gained the good will of that chief, who gave him no cause to regret this politic step; while under his auspices the "savans" of the Institute of Egypt collected the valuable mass of information embodied in the "great French work," the *Description de l'Égypte*.

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[1] Napoleon, *Mémoires*, t. ii.

On the death of Kléber, General Menou succeeded to the command, and although he afterwards conducted the defence of the country with much valour, yet to his injudicious administration, and his want of military talent, we must mainly ascribe the determination of the British Government to attempt the expulsion of the French from Egypt, and the rapid success of the campaign that ensued. On the 2d of March 1801 an army under Sir Ralph Abercromby arrived in Aboo-Keer Bay, and made good a landing in the face of a well-disposed French force, which offered every possible resistance. The memorable battle of Alexandria, in which Abercromby fell, decided the fate of the war. A bold march, executed with talent, effected the capitulation of Cairo; Alexandria surrendered on the 1st of September, and the French sailed from the shores of Egypt in the course of that month.[1] General Hutchinson had taken the command of the English expedition, afterwards reinforced by a detachment from India under General Baird; and the army of the grand vizir, and that of the capitan-pasha, with the troops of Ibrahim Bey (Murád having died of the plague), had co-operated in the measures which led to the evacuation of the country by Menou.

The history now requires that we should mention the early career of a man who subsequently ruled the destinies of Egypt for a period of nearly forty years. Mehemet Ali Pasha was born in A.H. 1182 (A.D. 1768–9) at Cavalla, a small sea-port town of Albania. On the death of his father, in early life, he was brought up in the house of the governor of the town, who, as a reward for military prowess, gave him his daughter in marriage. By her he had, it is said, his three eldest sons, Ibrahim,[2] Toosoon, and Ismail. Having attained the rank of búluk-báshee (or head of a body of infantry), he became a dealer in tobacco, until, in his thirty-third year, he was despatched to Egypt with his patron's son, Ali Ághá, and 300 men, the contingent furnished by his native place to the Turkish expedition against the French; and soon after his arrival in that country he succeeded, on the return of Ali Ághá, to the command, with the nominal rank of beenbáshee (or chief of a thousand men).

Soon after the evacuation of Egypt by the French, that unfortunate country became the scene of more severe troubles, in consequence of the unwarrantable attempts of the Turks to destroy the power of the Ghuzz. In defiance of promises to the English Government, orders were transmitted from Constantinople to Hoseyn Pasha, the Turkish high admiral, to ensnare and put to death the principal beys. Invited to an entertainment, they were, according to the Egyptian contemporary historian El-Gabartee, attacked on board the flag-ship; Sir Robert Wilson and M. Mengin, however, state that they were fired on, in open boats, in the bay of Aboo-Keer. They offered an heroic resistance, but were overpowered, and some made prisoners, some killed, while some, including the afterwards celebrated 'Osmán Bey El-Bardeesee, escaped in a boat, and sought refuge with the English, who at that time occupied Alexandria. General Hutchinson, informed of this treachery, immediately assumed threatening measures against the Turks, and in consequence, the killed, wounded, and prisoners were given up to him. Such was the commencement of the disastrous struggle between the Memlooks and the Turks.

Mohammad Khusruf was the first pasha after the expulsion of the French. The form of government, however, was not the same as that before the French invasion, for the Ghuzz were not reinstated. The pasha, and through him the sultan, endeavoured on several occasions either to ensnare them or to beguile them into submission; but these efforts failing, Mohammad Khusruf took the field, and a Turkish detachment 14,000 strong, despatched against them to Demenhoor, whither they had descended from Upper Egypt, was defeated by a small force under El-Elfee; or, as Mengin says, by 800 men left by El-Elfee under the command of El-Bardeesee. Their ammunition and guns fell into the hands of the Memlooks.

In March 1803 the British evacuated Alexandria, and Mohammad Bey El-Elfee accompanied them to England to consult respecting the means to be adopted for restoring the former power of the Ghuzz. About six weeks after, the Arnaoot (or Albanian) soldiers in the service of Khusruf tumultuously demanded their pay, and surrounded the house of the defterdár, who in vain appealed to the pasha to satisfy their claims. The latter opened fire from the artillery of his palace on the insurgent soldiery in the house of the defterdár, across the Ezbekeeyeh. The citizens of Cairo, accustomed to such occurrences, immediately closed their shops, and the doors of the several quarters, and every man who possessed any weapon armed himself. The tumult continued all the day, and the next morning a body of troops sent out by the pasha failed to quell it. Táhir, the commander of the Albanians, then repaired to the citadel, gained admittance through an embrasure, and, having obtained possession of it, began to cannonade the pasha over the roofs of the intervening houses, and then descended with guns to the Ezbekeeyeh, and laid close siege to the palace. On the following day, Mohammad Khusruf made good his escape, with his women and servants and his regular troops, and fled to Damietta by the river. This revolt marks the commencement of the rise of Mehemet Ali to power in Egypt, and of the breach between the Arnaoots and Turks which ultimately led to the expulsion of the latter.

Táhir Pasha assumed the government, but in twenty-three days he met with his death from exactly the same cause as that of the overthrow of his predecessor. He refused the pay of certain of the Turkish troops, and was immediately assassinated. A desperate conflict ensued between the Albanians and Turks; and the palace was set on fire and plundered. The masters of Egypt were now split into these two factions, animated with the fiercest animosity against each other. Mehemet Ali became the head of the former, but his party was the weaker, and he therefore entered into an alliance with Ibrahim Bey, and 'Osmán Bey El-Bardeesee. A certain Ahmad Pasha, who was about to proceed to a province in Arabia, of which he had been appointed governor, was raised to the important post of pasha of Egypt, through the influence of the Turks and the favour of the sheykhs; but Mehemet Ali, who with his Albanians held the citadel, refused to assent to their choice; the Memlooks moved over from El-Geezeh, and Ahmad Pasha betook himself to the mosque of Ez-Záhir, which the French had converted into a fortress. He was compelled to surrender by the Albanians; the two chiefs of the Turks who killed Táhir Pasha were taken with him and put to death, and he himself was detained a prisoner. In consequence of the alliance between Mehemet Ali and El-Bardeesee, the Albanians gave the citadel over to the Memlooks; and soon after, these allies marched against Khusruf Pasha, who having been joined by a con-derable body of Turks, and being in possession of amietta, was enabled to offer an obstinate resistance. fter much loss on both sides, he was taken prisoner and rought to Cairo; but he was treated with respect. he victorious soldiery sacked the town of Damietta, and ere guilty of the barbarities usual with them on such ccasions.

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[1] Very many of the French had either married Muslim women, or bought concubine slaves of the same faith, whom, on their departure, they left behind them; and these unfortunates were forthwith tied up in sacks and drowned.

[2] Ibrahim is, however, believed by many, or most, to have been the wife's son by a former husband.

A few days later, Ali Pasha El-Tarábulusee landed at lexandria with an imperial firmán constituting him pasha f Egypt, and threatened the Beys, who now were virtual asters of Upper Egypt, as well as of the capital and early the whole of Lower Egypt. Mehemet Ali and El-ardeesee therefore descended to Rosetta, which had fallen to the hands of a brother of Ali Pasha, and having ecovered the town and captured its commander, El-ardeesee purposed to proceed against Alexandria; but he troops required arrears of pay which it was not in his ower to give, and the pasha had cut the dyke between he Lakes of Aboo-Keer and Mareotis, thus rendering the pproach to Alexandria more difficult. El-Bardeesee and ehemet Ali therefore returned to Cairo. The troubles f Egypt were now increased by an insufficient inundation, nd great scarcity prevailed, aggravated by the exorbitant axation to which the beys were compelled to resort in rder to raise money to pay the troops; while murder and apine prevailed to a frightful extent in the capital, the otous soldiery being under little or no control. In the eantime, Ali Pasha, who had been behaving in an outageous manner towards the Franks in Alexandria, received khatt-i-shereef from the sultan, which he sent by his ecretary to Cairo. It announced that the beys should ive peaceably in Egypt, with an annual pension each of ifteen purses and other privileges, but that the government should be in the hands of the pasha. To this the eys assented, but with considerable misgivings; for they had ntercepted letters from Ali to the Albanians, endeavourng to alienate them from their side to his own. Deceptive nswers were returned to these, and Ali was induced by hem to advance towards Cairo at the head of 2500 men. he forces of the beys, with the Albanians, encamped near im at Shalakán, and he fell back on a place called ufeyteh. They next seized his boats conveying soldiers, ervants, and his ammunition and baggage; and, following im, they demanded wherefore he brought with him so umerous a body of men, in opposition to usage and to their previous warning. Finding they would not allow his troops to advance, forbidden himself to retreat with them to Alexandria, and being surrounded by the enemy, he would have hazarded a battle, but his men refused to fight. He therefore repaired to the camp of the beys, and his army was compelled to retire to Syria. In the hands of the beys, Ali Pasha again attempted treachery. A horseman was seen to leave his tent one night at full gallop; he was the bearer of a letter to 'Osmán Bey Hasan, the governor of Kinè. This offered a fair pretext to the Memlooks to rid themselves of a man whose antecedents and present conduct proved him to be a perfidious tyrant. He was sent under a guard of forty-five men towards the Syrian frontier; and about a week after, news was received that in a skirmish with some of his own soldiers he had fallen mortally wounded.

The death of Ali Pasha produced only temporary tranquillity; in a few days the return of Mohammad Bey El-Elfee (called the Great or Elder) from England was the signal for fresh disturbances, which, by splitting the Ghuzz into two parties, accelerated their final overthrow. An ancient jealousy existed between El-Elfee and the other most powerful bey, El-Bardeesee. The latter was now supreme among the Ghuzz, and this fact considerably heightened their old enmity. While the guns of the citadel, those at Masr El-'Ateekah, and even those of the palace of El-Bardeesee, were thrice fired in honour of El-Elfee, preparations were immediately commenced to oppose him. His partisans were collected opposite Cairo, and El-Elfee the Younger held El-Geezeh; but treachery was among them; Hoseyn Bey El-Elfee was assassinated by emissaries of El-Bardeesee, and Mehemet Ali, with his Albanians, gained possession of El-Geezeh, which was, as usual, given over to the troops to pillage. In the meanwhile El-Elfee the Great embarked at Rosetta, and not apprehending opposition, was on his way to Cairo, when a little south of the town of Manoof he encountered a party of Albanians, and with difficulty made his escape. He gained the eastern branch of the Nile, but the river had become dangerous, and he fled to the desert. There he had several hair-breadth escapes, and at last secreted himself among a tribe of Arabs at Rás-el-Wádee. A change in the fortune of El-Bardeesee, however, favoured his plans for the future. That chief, in order to satisfy the demands of the Albanians for their pay, gave orders to levy heavy contributions from the citizens of Cairo; and this new oppression roused them to rebellion. The Albanians, alarmed for their safety, assured the populace that they would not allow the order to be executed; and Mehemet Ali himself caused a proclamation to be made to that effect. Thus the Albanians became the favourites of the people, and took advantage of their opportunity. Three days later they beset the house of the aged Ibrahim Bey, and that of El-Bardeesee, both of whom effected their escape with difficulty. The Memlooks in the citadel directed a fire of shot and shell on the houses of the Albanians which were situated in the Ezbekeeyeh; but on hearing of the flight of their chiefs, they evacuated the place; and Mehemet Ali, on gaining possession of it, once more proclaimed Mahomet Khusruf pasha of Egypt. For one day and a half he enjoyed the title; the friends of the late Táhir Pasha then accomplished his second degradation,[1] and Cairo was again the scene of terrible enormities, the Albanians revelling in the houses of the Memlook chiefs, whose hareems met with no mercy at their hands. These events were the signal for the reappearance of El-Elfee.

The Albanians now invited Ahmad Pasha Khursheed to assume the reins of government, and he without delay proceeded from Alexandria to Cairo. The forces of the partisans of El-Bardeesee were ravaging the country a few miles south of the capital and intercepting the supplies of corn by the river; a little later they passed to the north of Cairo and successively took Bilbeys and Kalyoob, plundering the villages, destroying the crops, and slaughtering the herds of the inhabitants. Cairo was itself in a state of tumult, suffering severely from a scarcity of grain, and the heavy exactions of the pasha to meet the demands of his turbulent troops, at that time augmented by a Turkish detachment. The shops were closed, and the unfortunate people assembled in great crowds, crying Yá Lateef! Yá Lateef! "O Gracious [God]!" El-Elfee and 'Osmán Bey Hasan had professed allegiance to the pasha; but they soon after declared against him, and they were now approaching from the south; and having repulsed Mehemet Ali, they took the two fortresses of Turà. These Mehemet Ali speedily retook by night with 4000 infantry and cavalry; but the enterprise was only partially successful. On the following day the other Memlooks north of the metropolis actually penetrated into the suburbs; but a few days later were defeated in a battle fought at Shubrà, with heavy loss on both sides. This reverse in a measure united the two great Memlook parties, though their chiefs remained at enmity. El-Bardeesee passed to the south of Cairo, and the Ghuzz gradually retreated towards Upper Egypt. Thither the pasha despatched three successive expeditions (one of which was commanded by Mehemet Ali), and many battles were fought, but without decisive result.

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[1] Khusruf Pasha afterwards filled with credit several of the highest offices at Constantinople. He died on the 1st of February 1855. He was a bigot of the old school, strongly opposed to the influence of Western civilization, and consequently to the assistance of France and England in the Crimean war.

At this period another calamity befell Egypt; about 3000 Delees arrived in Cairo from Syria. These troops had been sent for by Khursheed in order to strengthen himself against the Albanians; and the events of this portion of the history afford sad proof of their ferocity and brutal enormities, in which they far exceeded the ordinary Turkish soldiers and even the Albanians. Their arrival immediately recalled Mehemet Ali and his party from the war, and instead of aiding Khursheed was the proximate cause of his overthrow.

Cairo was ripe for revolt; the pasha was hated for his tyranny and extortion, and execrated for the deeds of his troops, especially those of the Delees: the sheykhs enjoined the people to close their shops, and the soldiers clamoured for pay. At this juncture a firmán arrived from Constantinople conferring on Mehemet Ali the pashalic of Jiddeh; but the occurrences of a few days raised him to that of Egypt.

On the 12th of Safar 1220 (May 1805) the sheykhs, with an immense concourse of the inhabitants, assembled in the house of the kadee; and the 'Ulemà, amid the prayers and cries of the people, wrote a full statement of the heavy wrongs which they had endured under the administration of the pasha. The 'Ulemà, in answer, were desired to go to the citadel; but they were apprised of treachery; and on the following day, having held another council at the house of the kadee, they proceeded to Mehemet Ali, and informed him that the people would no longer submit to Khursheed. "Then whom will ye have?" said he. "We will have *thee*," they replied, "to govern us according to the laws; for we see in thy countenance that thou art possessed of justice and goodness." Mehemet Ali seemed to hesitate, and then complied, and was at once invested. On this, a bloody struggle commenced between the two pashas. Cairo had before experienced such conflicts in the streets and over the housetops, but none so severe as this. Khursheed, being informed by a messenger of the insurrection, immediately laid in stores of provisions and ammunition, and prepared to stand a siege in the citadel. Two chiefs of the Albanians joined his party, but many of his soldiers deserted. Mehemet Ali's great strength lay in the devotion of the citizens of Cairo, who looked on him as their future deliverer from their afflictions; and great numbers armed themselves, advising constantly with Mehemet Ali, having the seyyid 'Omar and the sheykhs at their head, and guarding the town at night. On the 19th of the same month, Mehemet Ali besieged Khursheed. Retrenchments were raised, and the lofty minaret of the mosque of the sultan Hasan was used as a battery whence to fire on the citadel; while guns were also posted on the mountain in its rear. After the siege had continued many days, Khursheed gave orders to cannonade and bombard the town; and for six days his commands were executed with little interruption, the citadel itself also lying between two fires. Mehemet Ali's position at this time was very critical: his troops became mutinous for their pay; the siláhdár, who had commanded one of the expeditions against the Ghuzz, advanced to the relief of Khursheed; and the latter ordered the Delees to march to his assistance. The firing ceased on the Friday, but recommenced on the eve of Saturday and lasted until the next Friday. On the day following, news came of the arrival at Alexandria of a messenger from Constantinople. The ensuing night in Cairo presented a curious spectacle; many of the inhabitants gave way to rejoicing, in the hope that this envoy would put an end to their miseries, and fired off their weapons as they paraded the streets with bands of music. The siláhdár, imagining the noise to be a fray, marched in haste towards the citadel, while its garrison sallied forth, and commenced throwing up retrenchments in the quarter of 'Arab-el-Yesár, but were repulsed by the armed inhabitants and the soldiers stationed there; and during all this time, the cannonade and bombardment from the citadel, and on it from the batteries on the mountain, continued unabated.

The envoy brought a firmán confirming Mehemet Ali, and ordering Khursheed to repair to Alexandria, there to await further orders; but this he refused to do, on the ground that he had been appointed by a khatt-i-shereef. The firing ceased on the following day, but the troubles of the people were rather increased than assuaged; murders and robberies were daily committed by the soldiery, the shops were all shut and some of the streets barricaded. While these scenes were being enacted, El-Elfee was besieging Demenhoor, and the other beys were returning towards Cairo, Khursheed having called them to his assistance.

Soon after this, a squadron under the command of the Turkish high admiral arrived in Aboo-Keer Bay, with despatches confirmatory of the firmán brought by the former envoy, and authorizing Mehemet Ali to continue to discharge the functions of governor for the present. Khursheed at first refused to yield; but at length, on condition that his troops should be paid, he evacuated the citadel and embarked for Rosetta.

Mehemet Ali now possessed the title of Governor of Egypt, but beyond the walls of Cairo his authority was everywhere disputed by the beys, who were joined by the army of the siláhdár of Khursheed; and many Albanians deserted from his ranks. To replenish his empty coffers he was also compelled to levy exactions, principally from the Copts. An attempt was made to ensnare certain of the beys, who were encamped north of the metropolis. On the 17th of August 1805, the dam of the canal of Cairo was to be cut, and some chiefs of Mehemet Ali's party wrote, informing them that he would go forth early on that morning with most of his troops to witness the ceremony, inviting them to enter and seize the city, and, to deceive them, stipulating for a certain sum of money as a reward. The dam, however, was cut early in the preceding night, without any ceremony. On the following morning, these beys, with their memlooks, a very numerous body, broke open the gate of the suburb El-Hoseyneeyeh, and gained admittance into the city from the north, through the gate called Báb el-Futooh. They marched along the principal street for some distance, with kettle-drums behind each company, and were received with apparent joy by the citizens. At the mosque called the Ashrafeeyeh they separated, one party proceeding to the Azhar and the houses of certain sheykhs, and the other continuing along the main street, and through the gate called Báb Zuweyleh, where they turned up towards the citadel. Here they were fired on by some soldiers from the houses; and with this signal a terrible massacre commenced. Falling back towards their companions, they found the bye-streets closed; and in that part of the main thoroughfare called Beyn-el-Kasreyn, they were suddenly placed between two fires. Thus shut up in a narrow street, some sought refuge in the collegiate mosque El-Barkookeeyeh, while the remainder fought their way through their enemies, and escaped over the city-wall with the loss of their horses. Two memlooks had in the meantime succeeded, by great exertions, in giving the alarm to their comrades in the quarter of the Azhar, who escaped by the eastern gate called Báb el-

Ghureiyib. A horrible fate awaited those who had shut themselves up in the Barkookeeyeh. Having begged for quarter and surrendered, they were immediately stripped nearly naked, and about fifty were slaughtered on the spot; and about the same number were dragged away, with every brutal aggravation of their pitiful condition, to Mehemet Ali. Among them were four beys, one of whom, driven to madness by Mehemet Ali's mockery, asked for a drink of water; his hands were untied that he might take the bottle, but he snatched a dagger from one of the soldiers and rushed at the pasha, and fell covered with wounds. The wretched captives were then chained and left in the court of the pasha's house; and on the following morning the heads of their comrades who had perished the day before were skinned and stuffed with straw before their eyes. One bey and two others paid their ransom and were released; the rest, without exception, were tortured and put to death in the course of the ensuing night. Eighty-three heads (many of them those of Frenchmen and Albanians) were stuffed and sent to Constantinople, with a boast that the Memlook chiefs were utterly destroyed. Thus ended Mehemet Ali's first massacre of his too confiding enemies.

The beys, after this, appear to have despaired of regaining their ascendency; most of them retreated to Upper Egypt, and an attempt at compromise failed. El-Elfee offered his submission on the condition of the cession of the Feiyoom and other provinces; but this was refused, and that chief gained two successive victories over the pasha's troops, many of whom deserted to him.

At length, in consequence of the remonstrances of the English, and a promise made by El-Elfee of 1500 purses, the Porte consented to reinstate the twenty-four beys, and to place El-Elfee at their head; but this measure met with the opposition of Mehemet Ali and the determined resistance of the majority of the Memlooks, who, rather than have El-Elfee at their head, preferred their present condition; for the enmity of El-Bardeesee had not subsided, and he commanded the voice of most of the other beys. In pursuance of the above plan, a squadron under Sálih Pasha, shortly before appointed high admiral, arrived at Alexandria on the 1st of July 1806, with 3000 regular troops, and a successor to Mehemet Ali, who was to receive the pashalik of Salonica. This wily chief professed his willingness to obey the commands of the Porte, but stated that his troops, to whom he owed a vast sum of money, opposed his departure. He induced the 'Ulemà to sign a letter, praying the sultan to revoke the command for reinstating the beys, persuaded the chiefs of the Albanian troops to swear allegiance to him, and sent 2000 purses contributed by them to Constantinople. El-Elfee was at that time besieging Demenhoor, and he gained a signal victory over the pasha's troops; but the dissensions of the beys destroyed their last chance of a return to power. El-Elfee and his partisans were unable to pay the sum promised to the Porte; Sálih Pasha received plenipotentiary powers from Constantinople, in consequence of the letter from the 'Ulemà; and, on the condition of Mehemet Ali's paying 4000 purses to the Porte, it was decided that he should continue in his post, and the reinstatement of the beys was abandoned. Fortune continued to favour the pasha. In the following month, El-Bardeesee died, aged forty-eight years; and soon after, a scarcity of provisions excited the troops of El-Elfee to revolt. That bey very reluctantly raised the siege of Demenhoor, being in daily expectation of the arrival of an English army; and at the village of Shubra-ment he was attacked by a sudden illness, and died on the 30th of January 1807, at the age of fifty-five. Thus was the pasha relieved of his two most formidable enemies; and shortly after he defeated Sháheen Bey, with the loss to the latter of his artillery and baggage and 300 men killed or taken prisoners.

On the 17th of March 1807, a British fleet appeared off Alexandria, having on board nearly 5000 troops, under the command of General Fraser; and the place, being disaffected towards Mehemet Ali, opened its gates to them. Here they first heard of the death of El-Elfee, upon whose co-operation they had founded their chief hopes of success; and they immediately despatched messengers to his successor and to the other beys inviting them to Alexandria. The British resident, Major Missot, having represented the importance of taking Rosetta and Er-Rahmáneeyeh, to secure supplies for Alexandria, General Fraser, with the concurrence of the admiral, Sir John Duckworth, detached the 31st regiment and the Chasseurs Britanniques, under Major-General Wauchope and Brigadier-General Meade, on this service; and these troops entered Rosetta without encountering any opposition; but as soon as they had dispersed among the narrow streets, the garrison opened a deadly fire on them from the latticed windows and the roofs of the houses. They effected a retreat on Aboo-Keer and Alexandria, after a very heavy loss of 185 killed and 262 wounded, General Wauchope and three officers being among the former, and General Meade and seventeen officers among the latter. The heads of the slain were fixed on stakes on each side of the road crossing the Ezbekeeyeh in Cairo.

Mehemet Ali, meanwhile, was conducting an expedition against the beys in Upper Egypt, and he had defeated them near Asyoot, when he heard of the arrival of the British. In great alarm lest the beys should join them, especially as they were far north of his position, he immediately sent messengers to his rivals, promising to comply with all their demands, if they should join in expelling the invaders; and this proposal being agreed to, both armies marched towards Cairo on opposite sides of the river.

To return to the unfortunate British expedition. The possession of Rosetta being deemed indispensable, Brigadier-General Stewart and Colonel Oswald were despatched thither, with 2500 men. For thirteen days a cannonade of the town was continued without effect; and on the 20th of April, news having come in from the advanced guard at El-Hamád of large reinforcements to the besieged, General Stewart was compelled to retreat; and a dragoon was despatched to Major Macleod, commanding at El Hamád, with orders to fall back. The messenger, however, was unable to penetrate to the spot; and the advanced guard, consisting of a detachment of the 71st, two companies of the 78th, one of the 35th, and De Rolles's regiment, with a picquet of dragoons, the whole mustering 733 men, was surrounded, and, after a gallant resistance, the survivors, who had expended all their ammunition, became prisoners of war. General Stewart regained Alexandria with the remainder of his force, having lost, in killed, wounded, and missing, nearly 900 men. Some hundreds of British heads were now exposed on stakes in Cairo, and the prisoners were marched between these mutilated remains of their countrymen.

The beys became divided in their wishes, one party being desirous of co-operating with the British, the other with the pasha. These delays proved ruinous to their cause; and General Fraser, despairing of their assistance, evacuated Alexandria on the 14th of September. From that date to the spring of 1811, the beys from time to time relinquished certain of their demands; the pasha on his part granted them what before had been withheld; the province of the Feiyoom, and part of those of El-Geezeh and Benee-Suweyf, were ceded to Sháheen; and a great portion of the Sa'eed, on the condition of paying the land-tax, to the others. Many of them took up their abode in

Cairo, but tranquillity was not secured; several times they met the pasha's forces in battle, and once gained a signal victory. Early in the year 1811, the preparations for an expedition against the Wahhábees in Arabia being complete, all the Memlook beys then in Cairo were invited to the ceremony of investing Mehemet Ali's favourite son, Toosoon, with a pelisse and the command of the army. As on the former occasion, the unfortunate Memlooks fell into the snare. On the 1st of March, Sháheen Bey and the other chiefs (one only excepted) repaired with their retinues to the citadel, and were courteously received by the pasha. Having taken coffee, they formed in procession, and, preceded and followed by the pasha's troops, slowly descended the steep and narrow road leading to the great gate of the citadel; but as soon as the Memlooks arrived at the gate it was suddenly closed before them. The last of those who made their exit before the gate was shut were Albanians under Sálih Koosh. To these troops their chief now made known the pasha's orders to massacre all the Memlooks within the citadel; therefore, having returned by another way, they gained the summits of the walls and houses that hem in the road in which the Memlooks were incarcerated, and some stationed themselves upon the eminences of the rock through which that road is partly cut. Thus securely placed, they commenced a heavy fire on their defenceless victims; and immediately the troops who closed the procession, and who had the advantage of higher ground, followed their example. Of the betrayed chiefs, many were laid low in a few moments; some, dismounting, and throwing off their outer robes, vainly sought, sword in hand, to return, and escape by some other gate. The few who regained the summit of the citadel experienced the same cruel fate as the rest (for those whom the Albanian soldiers made prisoners met with no mercy from their chiefs or from Mehemet Ali), but it soon became impossible for any to retrace their steps even so far; the road was obstructed by the bleeding bodies of the slain Memlooks, and their richly caparisoned horses, and their grooms. 470 Memlooks entered the citadel; and of these very few, if any, escaped. One of these is said to have been a bey. According to some, he leapt his horse from the ramparts, and alighted uninjured, though the horse was killed by the fall; others say that he was prevented from joining his comrades, and discovered the treachery while waiting without the gate. He fled and made his way to Syria. This massacre was the signal for an indiscriminate slaughter of the Memlooks throughout Egypt, orders to this effect being transmitted to every governor; and in Cairo itself, the houses of the beys were given over to the soldiery, who slaughtered all their adherents, treated their women in the most shameless manner, and sacked their dwellings. During the two following days, the pasha and his son Toosoon rode about the streets, and endeavoured to stop these atrocious proceedings; but order was not restored until 500 houses had been completely pillaged. In extenuation of this dark blot on Mehemet Ali's character, it has been urged that he had received the order for the destruction of the Memlooks from Constantinople, whither the heads of the beys were sent. It may be answered to this plea, that on other occasions he scrupled not to defy the Porte.

A remnant of the Memlooks fled to Nubia, and a tranquillity was restored to Egypt to which it had long been unaccustomed, and which has rarely been interrupted since. In the year following the massacre, the unfortunate exiles were attacked by Ibrahim Pasha, the eldest son of Mehemet Ali, in the fortified town of Ibreem, in Nubia. Here the want of provisions forced them to evacuate the place; a few who surrendered were beheaded, and the rest went further south and built the town of New Dongola (correctly Dunkulah), where the venerable Ibrahim Bey died in 1816, at the age of eighty. As their numbers thinned, they endeavoured to maintain their little power by training some hundreds of blacks; but again, on the approach of Ismail, another son of the pasha of Egypt, sent with an army to subdue Nubia and Sennár, some returned to Egypt and settled in Cairo, while the rest, amounting to about 100 persons, fled in dispersed parties to the countries adjacent to Sennár.

Mehemet Ali, being undisputed master of Egypt, at the reiterated commands of the Porte despatched in 1811 an army of 8000 men, including 2000 horse, under the command of Toosoon Pasha, against the Wahhábees. After a successful advance, this force met with a serious repulse at the pass of Safrà and Judeiyideh, and retreated to Yembo'. In the following year Toosoon, having received reinforcements, again assumed the offensive, and captured Medinah after a prolonged siege. He next took Jiddeh and Mecca, defeating the Wahhábees beyond the latter place and capturing their general. But some mishaps followed, and Mehemet Ali, who had determined to conduct the war in person, left Egypt for that purpose in the summer in 1813. In Arabia he encountered serious obstacles from the nature of the country and the harassing mode of warfare adopted by his adversaries. His arms met with various fortune; but on the whole his forces proved superior to those of the enemy. He led a successful expedition in the Hijáz, and, after concluding a treaty with the Wahhábee chief, 'Abd-Allah, in 1815, he returned to Egypt on hearing of the escape of Napoleon from Elba

He now confiscated the lands belonging to private individuals, merely allowing them a pension for life, and attempted to introduce the European system of military tactics. A formidable mutiny, however, broke out in the metropolis, the pasha's life was endangered, and he sought refuge by night in the citadel, while the soldiery committed many acts of plunder. The revolt was reduced by presents to the chiefs of the insurgents, and Mehemet Ali very honourably ordered that the sufferers by the late disturbances should receive compensation from the treasury. The project of the "Nizám Gedeed," as the European system is called in Egypt, was, in consequence of this commotion, abandoned for a time.

Soon after Toosoon returned to Egypt, but Mehemet Ali, dissatisfied with the treaty which had been concluded with the Wahhábees, and with the non-fulfilment of certain of its clauses, determined to send another army to Arabia, and to include in it the soldiers who had recently proved unruly. This expedition, under Ibrahim Pasha, left in the autumn of 1816. After several unimportant advantages, Ibrahim sat down before the town of Er-Rass; but three months' exertions proving unavailing, he raised the siege, with the loss of nearly half his army. Notwithstanding, he advanced on the capital, Ed-Dir'eeyeh, by slow but sure steps. The last place before reaching that city offered a brave resistance, and Ibrahim, in revenge, caused all its inhabitants to be put to the sword, except a number of women and children, the former of whom were spared not from motives of pity. Ed-Dir'eeyeh fell after a five months' siege, in the course of which an explosion destroyed the whole of the besiegers' powder; and had the Wahhábees been aware of the extent of the disaster, few, we may believe, would have escaped to tell the tale. 'Abd-Allah, their chief, was taken, and with his treasurer and secretary was sent to Constantinople, where, in spite of Ibrahim's promise of safety, and of Mehemet Ali's intercession in their favour, they were paraded and put to death. At the close of the year 1818, Ibrahim returned to Cairo, having conquered all present opposition in Arabia, but without having broken the spirit of the Wahhabees.

The pasha, since his return from Arabia, had turned his attention to the improvement of the manufactures of Egypt, and engaged very largely in commerce. The results of these attempts are stated in other places, but the important work of digging the new canal of Alexandria, called the Mahmoodeeyeh, must here be again mentioned. The old canal had long fallen into decay, and the necessity of a safe channel between Alexandria and the Nile was much felt. Such was the object of the canal then excavated, and it has on the whole well answered its purpose; but the sacrifice of life was enormous, and the labour of the unhappy felláhs was forced. Towards the accomplishment of a favourite project, the formation of the Nizám Gedeed, a force was ordered to the southern frontier of Egypt, and the conquest of Sennár was contemplated in order to get rid of the disaffected troops. and to obtain a sufficient number of captives to form the nucleus of the new army. The forces destined for this service were led by Ismail, then the youngest son of Mehemet Ali; they consisted of between 4000 and 5000 men, Turks and Arabs, and were despatched in the summer of 1820. Nubia at once submitted, the Shágeeyeh Arabs immediately beyond the province of Dongola were worsted, and Sennár was reduced without a battle. Mohammad Bey, the defterdár, with another force of about the same strength, was then sent by Mehemet Ali against Kurdufán with a like result, but not without a hard fought engagement. In 1822 Ismail was, with his retinue, put to death by an Arab chieftain named Nimr; and the defterdár, a man infamous for his cruelty, assumed the command in those provinces, and exacted terrible retribution from the innocent inhabitants.

In the years 1821 and 1822 Mehemet Ali despatched both ships and men (the latter about 7000 or 8000 Albanians and Turks) to the Morea, Cyprus, and Candia, to aid the Porte in reducing the Greek insurrection; and he continued to take part in that struggle, his fleet being engaged at Navarino, until the English insisted on the evacuation of the Morea in 1828 by Ibrahim Pasha. In 1822 an army of disciplined troops was at length organized: 8000 men (chiefly slaves, from Sennár and Kurdufán) were trained by French officers at Aswán. Of the vast numbers seized in the countries above named, many died on the way; those who were not eligible were, with the women, sold in Cairo, and in the remainder were incorporated many felláhs. Colonel Sèves (Suleymán Pasha), a Frenchman who afterwards became a Moslem, superintended their organization; great numbers of the blacks died, but the Egyptians proved very good troops. Many thousands were pressed in consequence, and they now constitute the bulk of the army. In 1823 the new conscripts amounted to 24,000 men, composing six regiments of infantry, each regiment consisting of five battalions of 800 men, and the battalions of eight companies of 100 men.

In 1824 a native rebellion of a religious character broke out in Upper Egypt, headed by one Ahmad, an inhabitant of Es-Sálimeeyeh, a village situate a few miles above Thebes. He proclaimed himself a prophet, and was soon followed by between 20,000 and 30,000 insurgents, mostly peasants, but some deserters from the Nizám, for that force was yet in a half-organized state and in part declared for the impostor. The insurrection was crushed by Mehemet Ali, and about one-fourth of Ahmad's followers perished, but he himself escaped and was never after heard of. Few of these unfortunates possessed any other weapon than the long staff (nebboot) of the Egyptian peasant; still they offered an obstinate resistance, and the combat resembled a massacre. In the same year war was once more made on the Wahhábees, who had collected in considerable numbers. The 2d regiment was sent on this service, and it behaved in a very creditable manner.

But the events of the war with the Porte are perhaps the most important of the life of Mehemet Ali. The campaign of 1831 had ostensibly for its object the castigation of 'Abd-Allah, pasha of Acre; the invading force consisted of six regiments of infantry, four of cavalry, four field-pieces, and a greater number of siege-guns, the whole under the command of Ibrahim Pasha, while the fleet, conveying provisions, ammunition, &c., was to accompany the army by sea. The terrible cholera of 1831, however, stayed the expedition when it was on the eve of departing; 5000 of its number died, and it was not until early in October of the same year that it started. Little opposition was encountered on the way to Acre, whither Ibrahim had gone by sea, and that place was invested on the 29th of November. The artillery of the besieged was well served; an assault in the following February was repulsed, and the cold and rain of a Syrian winter severely tried the Egyptian troops. A second assault in like manner failed, and Ibrahim was called away to repel 'Osmán Pasha, governor of Aleppo. The latter, however, hastily decamped without giving him battle, and Ibrahim, deeming this advantage sufficient, retraced his steps towards Acre. He then pushed the siege with fresh vigour, and stormed the city on the 27th of May; 1400 men fell in the breach, and the garrison was found to be reduced to about 400 men. The fall of Acre was followed by negotiation. Mehemet Ali evinced a disposition for peace, but demanded the government of Syria, and the Porte, in consequence, denounced him as a traitor. On his part, Ibrahim pushed his successes; Damascus was evacuated at his approach, and the battle of Hims, fought on the 8th of July 1832, decided the superiority of the Egyptian army, and the advantage of disciplined troops over an irregular force, although very disproportionate in numbers. The enemy composed the advanced guard of the Turkish army, 30,000 strong, and the Egyptians numbered only 16,000 men.

After this victory, Ibrahim marched to Hamáh, and thence to Aleppo (which had just before closed its gates against the Turkish general-in-chief, Hoseyn Pasha, whose troops became rapidly disorganized), forced the defiles of Beylán, and pursued the fugitive Turks to Adaneh. About the same time an Egyptian squadron had chased the sultan's fleet into Constantinople. Diplomacy was, at this point, again resorted to, but without any result; the sultan depended on his fleet to protect the capital, and determined to risk another engagement with the victorious enemy. The charge of this venture was intrusted to Resheed Pasha, the grand vizir. In the meantime, Ibrahim Pasha had gained the pass of Taurus, and having beaten the Turks at Oulou-Kislák, he hesitated not to give battle to Resheed Pasha at the head of about 60,000 men, his own army being less than half that strength; the battle of Kooniyeh, on the plains of Anatolia, proved utterly disastrous to the Porte; in the confusion of the fight, and the darkness of a thick day, the grand vizir was made prisoner, his army routed, and Constantinople was within six marches of the victor, without an army to oppose his passage. The capital of the Ottoman Empire, in imminent danger by sea and land, was then intrusted to the keeping of its hereditary enemy, as the last resource of the sultan Mahmood, and a Russian fleet and army were sent thither. Negotiations were in consequence opened, and on the 14th of May 1833 a treaty was concluded between Mehemet Ali and the Porte, by which the whole of Syria and the district of Adaneh were ceded to the former, on condition of his paying tribute. With this terminated the war, but not the animosity of the sultan. Ibrahim, by excessive firmness and rigour, speedily restored security and tranquillity to the greater part of Syria; but some years later, the attempt of Mahmood to get the better of his vassal, and the consequent disaster experienced by his arms at Nezeeb, entailed fresh complications, and the interference of Great Britain ended in the restoration of Syria to the Porte in 1841 Mehemet Ali had placed all his reliance on the co-operation of France, and to its desertion of his cause, and his confidence in its assistance, either moral or material, must be ascribed the unfortunate issue of the war. That the Syrians, in general, preferred the rule of Mehemet Ali to the tyranny of pashas appointed from Constantinople may be safely averred; but we cannot close this account of his possession of that province without animadverting on the horrible cruelties perpetrated by Ibrahim Pasha, or warning our readers not to give credence to the unmeasured praise bestowed by many on the Egyptian troops there engaged. Conceding that they were superior soldiers to the Turks, it must be borne in mind that they were veterans, disciplined and led by the French officers and an able general; their opponents were destitute of any European discipline, badly officered, and discouraged by the disasters in Greece. It has, moreover, been stated on good authority, that Ibrahim owed much of his success to the placing of artillery in the rear of his troops, with orders to fire on them should they show symptoms of wavering.

After the peace of 1841 Mehemet Ali gave up all great political projects, and solely occupied himself in improvements, real or imaginary, in Egypt. He continued to prosecute his commercial speculations, and manufacturing, educational, and other schemes. The barrage of the Nile, still uncompleted, was commenced by his direction, and in 1847 he visited Constantinople, where he received the rank of vizir. In the year 1848, however, symptoms of imbecility appeared; and after a short space Ibrahim was declared his successor, but died after a brief reign of two months.

Mehemet Ali survived Ibrahim, and died on the 3d of August 1849. Many and conflicting have been the opinions entertained of this remarkable man, for such at least all acknowledge him to have been. His massacre of the Memlooks has been the great point of attack by his enemies; but that, as well as many of his other acts, must be ascribed to his boundless ambition, not to innate cruelty; for he proved himself to be averse to unnecessary bloodshed. That he really esteemed European civilization may be doubted; but his intelligent mind could not fail to perceive that therein lay his great strength, and of this he availed himself with consummate ability. To his firm government Egypt is indebted for the profound tranquillity which it has long been its good fortune to enjoy. A traveller of any nation or faith may traverse it in its length and breadth, with greater safety than almost any other country out of Western Europe; and the display of fanaticism has been rigorously punished. While, however, Egypt has benefited by the establishment of order, the people have suffered most severe exactions. The confiscation of private lands has been before mentioned; to that arbitrary act must be added the seizure of the lands of the mosques, the imposition of heavy taxation, and a system of merciless impressment. In fact, the condition of the Egyptian fellâh has rarely been as wretched as it is at the present day. Mehemet Ali also misunderstood the real resources of Egypt, which are certainly agricultural; he dealt a severe blow to native produce by endeavouring to encourage manufacturing industry, and by establishing enormous Government monopolies, a measure which crushed the spirit of the agriculturists. His military and governing abilities were actually very great, and his career is almost unequalled in Turkish history. Had it not been for the intervention of Great Britain, his Syrian successes over the Porte would probably have rescued Egypt from the wretched condition of a Turkish

province. But the firmán of 1841 entailed the
his military power, the army was reduced to 18,000
and the navy condemned to rot in the
Alexandria; while Mehemet Ali, failing to gain the
object of his ambition, the establishment of an
dynasty, and being compelled to look on his then
family as his only heirs, thenceforth confined
measures of less importance, and did not
these with his former energy.

The entire constitution of the government of
the work of Mehemet Ali. With a few
destroyed all former usages, and introduced a system
derived from European models. The army and
of his creation, so are the taxation, the regulation of
and export duties, &c., quarantine laws, the
colleges, and the ministry. Some of these
useful, others both vexatious and ill-calculated
country. The colleges of languages and medicine,
printing-press at Boolâk, are among the former, and
ceedingly praiseworthy efforts in a right direction;
the same category must be placed many minor
ments, in which Mehemet Ali showed himself to be
advance of his countrymen; while, weighing his
life and numerous disadvantages of position and
his moral character, enlightened mind, and
ability must place him high among the great men of
times.[1]

Ibrahim was succeeded by his nephew 'Abbás,
Toosoon. This miserable voluptuary, and withal
though ignorant Muslim, utterly neglected the
government and solely consulted his own
During his reign all the great works begun by
were suspended. It was a time of deliberate
and his sudden death in July 1854 was welcomed
true Egyptians as the removal of the country's
successor, Said Pasha, the fourth son of
endeavoured to pursue his great father's policy and
out his aims. He had not, however, the strength
acter or the health needed to meet the serious
the task, and he will chiefly be remembered for the
of some of the more grinding Government
for the concession of the Suez Canal. It was
his nephew, the present khedive, to attain all
than all that Mehemet Ali had designed for his

The reign of Ismail promises to be the
a new era for Egypt. A man of undoubted
sessed of unusual energy in administration, fully
ciative of the importance of Western civilization,
the ambition proper to a grandson of Mehemet
khedive is a ruler such as Egypt has scarcely seen
Arab conquest. His first step was to remove,
possible, the irksome control of the Porte. At
he obtained an imperial firmán in 1866, removing
the old treaty restrictions, granting him the title of

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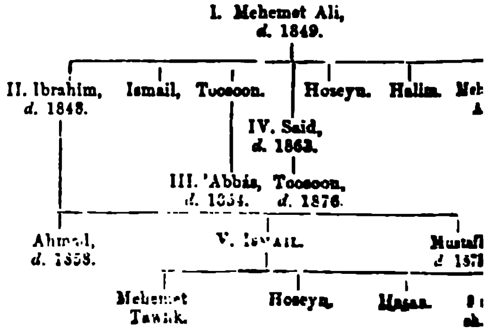
[1] *The Dynasty of Mehemet Ali.*



(pron. khedeev), and settling the succession on the eldest son; and in 1872 another firmán made him virtually an independent sovereign.

Having thus obtained for himself and his dynasty a settled regal rank, Ismail turned his attention homewards, and began a series of reforms such as no previous governor of Egypt ever contemplated. He re-established and improved the administrative system organized by Mehemet Ali, and which had fallen into decay under 'Abbás's indolent rule; he caused a thorough remodelling of the customs system, which was in an anarchic state, to be made by English officials; in 1865 he bought the Egyptian post-office, and placed it under the direction, with full powers, of an official from St Martin's le Grand, who has brought it into admirable working order; he reorganized the military schools of his grandfather, and lent his willing support to the cause of education in every way. Public works have largely engaged the attention of the khedive. Railways, telegraphs, lighthouses, the harbour works at Suez, the breakwater at Alexandria, have been carried out under his personal auspices by some of the best contractors of Europe. If there is a fault to be found in this Europeanizing of Egypt, it is that the practical zeal for modern civilization leaves no room for the honourable respect due to the unique antiquities of the country. It is true that ancient Egypt is protected by the care of Mariette Bey, but the art of the Arabs is suffered to decay, nay, is even purposely demolished, to make room for modern French gewgaws. A recent writer tells us that a new street cuts through about a mile of the "old Arab rookeries," and gravely advances the opinion that the opera house and the public gardens and the other meretricious abominations that have been set up in Cairo are worthy of a second class European city! Still, terrible as is the vandalism now going on in Egypt, there can be little doubt that the present policy of the khedive will add greatly to the prosperity and health of the people. At the same time, future generations will gain at the fearful expense of the present. The funds required for these public works, as well as the actual labour, have been remorselessly extorted from a poverty-stricken population; and there is probably no peasant now existing whose condition is worse than that of the long-suffering Egyptian fellâh.

One of the greatest reforms that Egypt owes to its present ruler is the abolition of the old system of consular jurisdiction, and the substitution of mixed courts, where European and native judges sit together to try all mixed cases without respect to nationality. These courts were established in 1876 on the suggestion of the wisest of Egypt's statesmen, Nubar Pasha, and on the recommendation of an international commission. A code based on the Mohammadan law and the Code Napoléon has been drawn up, which seems thoroughly suited to the needs of the position; and the best results may be looked for from this reform. It were greatly to be desired that the jurisdiction of these courts should be extended so as eventually to supersede the old native system. At present they only take the place of the consular courts.

In recent times the khedive has annexed a large territory to the south of Khartoom, now extending about as far as Gondokoro, and which will doubtless shortly include the lakes of Victoria and Albert Nyanza. The expedition was at first commanded by Sir Samuel Baker, with very unsatisfactory results; and great relief was felt when the continuation of the work of conquest was intrusted to Colonel Gordon, an officer in whose character and ability the fullest confidence is placed. The khedive has professed himself anxious to put down the Nile slave-trade, and that he is really desirous of seeing the traffic ended is shown by the full powers he has given Colonel Gordon for the suppression of it in the heart of the slave-country. What the result will be it is hard to foretell; but the good faith of the khedive and the determination of Colonel Gordon are now beyond a doubt. Quite recently (Aug. 14, 1877) a convention between the British and Egyptian Governments for the suppression of the slave-trade has been signed, imposing stringent penalties on the importation of slaves into Egypt, and extending the power of search in the case of suspected vessels.

Altogether it may be believed that a better time is beginning for Egypt. (R.S.P.—S.L.P.)]

TOPOGRAPHY AND MONUMENTS.[1]

The northern coast of Egypt is low and barren, presenting no features of interest, and affording no indication of the character of the country which it bounds. It is a barrier, generally of sand-hills, but sometimes of rock, for the most part wholly destitute of vegetation, except where grow a few wild and stunted date-palms. Immediately behind are desolate marshy tracts or extensive salt lakes, and beyond, the fertile country. The last is a wide plain, intersected by the two branches of the Nile, and by many canals, of which some were anciently branches of the river, and having a soil of great richness, though in this particular it is excelled by the valley above. The only inequalities of the surface are the mounds of ancient towns, and those, often if not always ancient, on which stand the modern towns and villages. The palm-trees are less numerous, and not so beautiful as in the more southern part of the country, but other trees are more common. The houses and huts of the towns and villages are of burnt brick near the Mediterranean; but as the climate becomes drier, and the occurrence of rain far less frequent, the use of crude brick obtains, until near the point of the Delta it is very general. The mosques even of the towns are rarely remarkable for architectural beauty in the tract to the north of Cairo. The palaces or villas of the Turkish grandees, which are not uncommon, have, however, a light and picturesque appearance, though their style is not good. The deserts which inclose the plain on both sides are rocky tracts of very slight elevation, having their surface overspread with sand and other debris.

Of the towns on the northern coast, the most western, Alexandria, called by the natives El-Iskendereeyeh, is the largest and the most important. It was founded in the year B.C. 332 by Alexander the Great, who gave it the form of a Macedonian mantle (chlamys). The ancient city occupied the space between the sea and Lake Mareotis, being about four miles in its greatest length, and a little less than a mile in its greatest breadth. The island of Pharos was likewise inhabited, and was joined to the continent by the mole called the Heptastadium. The Heptastadium and the island divided the bay into two harbours. These were spacious, and although the western, anciently called Portus Eunosti, but now the Old Port, is difficult to enter, and the eastern, Magnus Portus, or the New Port, is not so deep and is less secure, they are, except Port Said, by far the best anchorages on this coast of Egypt.

Alexandria, which partly occupied the site of the ancient Rhacotis, a place of little importance, naturally speedily increased in consequence, and became the emporium of the trade between Europe, Arabia, and India. After the death of Alexander the city became the capital of the Ptolemies. By the Ptolemies Alexandria was adorned with palaces and of great magnificence, [illegible] which they did not scruple to [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. While its commercial importance increased, it became a [illegible] seat of learning [illegible] the greatest [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]. Under the Romans [illegible]. From the time of [illegible] [illegible] [illegible] A.D. [illegible] [illegible] [illegible] by the Arabs A.D. [illegible] Alexandria rapidly [illegible] [illegible] [illegible] in consequence of [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] of the inhabitants and their [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] of government being transferred to the [illegible] of Egypt at [illegible], near the modern Cairo, which became [illegible] with the capital. During this period it had been distinguished for the learning of its [illegible] and the strong part which they took in the theological differences of the early Church. Under the Muslims Alexandria never regained the position of metropolis of Egypt, and its importance, with some fluctuations, waned until the discovery and consequent adoption of the route to India by the Cape of Good Hope almost withdrew the main cause of its prosperity. Recently, however, the resumption of the overland route has greatly benefited this city, and although it was not made the capital, it became the favourite residence of Mehemet Ali, which in like manner contributed to its welfare.

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[1] The following account of the topography and monuments of Egypt is mainly based on Mr Lane's MS. "Description of Egypt," which the writer of this article used as his guide to the monuments during his residence in that country.

The older part of the town of Alexandria stands upon the Heptastadium, now much wider than it was anciently; but the recent part, where are the houses of the European merchants, occupies the site of a portion of the ancient city, which was nearest to the mole. The most striking edifice is the castle on the island of Pharos, containing a lighthouse, which has succeeded to the more famous Pharos of antiquity. Here also is the pasha's palace, as well as a lesser Pharos. The houses of the town are built of stone, or have their lowest story cased with that material, and the portion above built of brick plastered and whitewashed. The residences of the European merchants and consuls and the richer Turks and natives are spacious and well-built, somewhat in the modern Italian style, but have no claims to architectural beauty. The mosques are not remarkable, but the English church will, if ever completed, be a great ornament to the town. The population of the town is estimated at over 200,000. One of the favourite projects of Mehemet Ali was the fortification of Alexandria, which has been thus rendered so strong that if well garrisoned it could not be invested by a force of less than about 40,000 men.

The ancient remains are very scanty and of little interest, compared to those which are seen on the sites of other Egyptian towns. Two objects are conspicuous, one of the obelisks commonly called "Cleopatra's Needles," and the great column known as "Pompey's Pillar." The former is a fine obelisk of red granite nearly 70 feet in height, bearing hieroglyphic inscriptions with the names of Thothmes III., Ramses II., and a later king. Beside it was a fallen obelisk of the same dimensions, its fellow, now (Oct. 1877) on its way to England. They were brought here from some ancient temple during the Roman rule. Pompey's Pillar is in like manner of red granite, and its shaft is about 70 feet high, the whole column being nearly 100 feet in height. Its pedestal bears a Greek inscription in honour of the emperor Diocletian.

Proceeding to the east of Alexandria, the first place of importance is Er-Rasheed, called by the Europeans Rosetta, a considerable town on the west bank of the Rosetta branch of the Nile, anciently the Bolbitine. Before the cutting or clearing out of the Mahmoodeeyeh Canal to connect Alexandria with this branch of the river, Rosetta was a place of greater importance than now, as in consequence of the decay of the old canal of Alexandria, the overland trade from India mostly passed through it. It is a well-built town, having some gardens, and is in many respects more agreeable than Alexandria. Its population is stated to be [illegible]. A little to the north of the town is the boghaz, a bar of sand stretching across the mouth of the river, and rendering it often impassable; and between it and Rosetta is an old fort called Fort St Julien by the French, who repaired it during their occupation of Egypt, when one of their officers discovered the Rosetta Stone, the famous trilingual tablet which afforded the clue by which hieroglyphics were interpreted.

In ascending the Rosetta branch, the first place of interest is the site of Sais, Sâ, on the eastern bank, marked by lofty mounds and the remains of massive walls of crude brick, which were those of a great inclosure in which the chief temple and doubtless other sacred edifices stood. The goddess Nit or Neith was the divinity of the place, and a great festival was annually held here in her honour, to which pilgrims resorted from other parts of Egypt. Sais was remarkable for the learning of its priests, and was the royal residence of the Saite kings (Dynasties XXIV., XXVI.) A modern village here is called "Sá-el-Hagar," or "Sais of the Stone," a name which perhaps alludes to the famous monolith described by Herodotus.

In the interior of the modern Delta no remains of importance have been discovered, though there are many ancient sites marked by mounds. The chief towns are El-Mahalleh el-Kebeereh, not far from the Damietta branch, about forty miles from the sea; Tantà, nearly in the middle of the Delta; and Manoof, farther south. Of these Tantà is best known as the birth-place of a Muslim saint, the seyyid Ahmad El-Bedawee, in whose honour three festivals are annually kept, the greatest of which attracts more pilgrims than any other in Egypt, and is in this respect second alone to the pilgrimage to Mecca. The festivals of Tantà are rather distinguished by riot than piety, and recall the revelries of Bubastis and Canopus.

Several places of interest are found on the course of the Damietta branch, the old Phatnitic or Pathmetic. First of these is the town whence it takes its name, Dimyát, called by the Europeans Damietta, which stands not far from the mouth of the branch, on its eastern side. In the time of the crusades it was a strong place, and regarded as the key of Egypt. It was taken and retaken by the contending forces, and formed the basis of the operations of St Louis in the unfortunate eighth crusade. Shortly afterwards the sultan Edh-Dháhir Beybars, in A.D. 1251, razed it and rebuilt it on the present site somewhat farther from the sea. It is a flourishing town, and has a population of 29,000 inhabitants. The next place of importance is the town of El-Mansoorah, founded by El-Melik El-Kámil, the nephew of Saladin, during the sixth crusade, to commemorate, as its name imports, his success over the invading army of Jean de Brienne. A little to the south of El-Mansoorah, on the opposite or western bank, at a short distance from the river, are the remains of a very remarkable temple of the goddess Isis, and the mounds of the town of Iseum. Although the temple is entirely thrown down, as though by a natural convulsion, but probably by human violence, its plan may be partly traced and its date ascertained, as the materials have not been removed. It was, unlike most Egyptian temples, built altogether of granite, and was about 600 feet in length and 250 in breadth. The materials must have been transported from Syene, a distance by the river, on which they were doubtless floated, of more than 600 miles. Bearing in mind this circumstance, and the difficulty of both working and sculpturing so hard a material, this temple must be considered to be one of the most costly in the country. The earliest name which has been found here is that of Nekht-har-heb (Dynasty XXX.), but the most common one is that of Ptolemy Philadelphus. A little to the south of this site, on the same bank, is the small town of Semennood, anciently Sebennytus; and a short distance farther, on the same side, is the village of Aboo-Seer, the ancient Busiris, named after Osiris, who, with Isis, was here worshipped. Herodotus mentions among the great festivals that of Isis held at Busiris, but this was more probably kept at Iseum, which was not far. For a long distance there is nothing of interest until we reach Tel-Atreeb, where the site of the town of Athribis is marked by high mounds, with remains of ancient houses and some blocks of stone.

To the eastward of the Damietta branch, in the broad cultivated tract or the desert beyond, are some places worthy of note. The most eastern of these is the site of Pelusium, which was, in the times of the Pharaohs of Dynasty XXVI., the key of Egypt towards Palestine. No important remains have been discovered here. Between this site and the Damietta branch are the mounds of Tanis, or Zoan, Z'AN, ZAR, where are considerable remains of the great temple, the most remarkable of which are several fallen obelisks, some of which are broken. From their inscriptions, and those of other blocks, it has been ascertained that the temple was as ancient as the time of Dynasty XII., and was much beautified by Ramses II. and other kings of that time and the subsequent period. Tanis was on the eastern bank of the Tanitic branch of the Nile, now called the Canal of the El-Mo'izz. On the same side of the same branch, but far to the south, was the city of Bubastis, PE-BAST, the site of which is indicated by very lofty mounds, in which may be traced the remains of its great temple, which was entirely of red granite. Here was held the festival of the goddess Bast, or Bubastis, which attracted great crowds of pilgrims, and is ranked by Herodotus first of the festivals of Egypt. Not far south, and on the borders of the desert, is Bilbeys, which was a place of some importance as a frontier-town in the time of the Eiyoobee princes. Still farther south are the mounds of Onion, the Jewish city founded by the high priest Onias, where was a temple closed by Vespasian not long after the overthrow of Jerusalem. The site is called Tell-el-Yahoodeeyeh, or "The Mound of the Jewess."

At the point of the Delta is the unfinished barrage, which, by crossing both branches of the river, will regulate the inundation above and below this point. The river here becomes broader than in its divided state, and long continues so. A little south of the point of the Delta, on the eastern bank of the river, near the village of El-Matareeyeh, not far north of Cairo, is the site of the ancient Heliopolis, or On, AN, the City of the Sun, marked by a solitary obelisk, and crude brick ridges formed by the ruins of a massive wall. The obelisk bears the name of Usurtesen I., the second king of Dynasty XII., in the simple inscription which runs down each of its sides. It is of red granite, and nearly 70 feet in height. The city was famous rather for the learning of its college than for its size, and the temple of the sun was held in high veneration. Many famous Greek philosophers studied here, and much of their earliest knowledge of natural science was no doubt derived from their Egyptian instructors.

Boolák, the port of Cairo, is a flourishing town, having two remarkable mosques. It was built A.H. 713, in the reign of the sultan Mohammad Ibn Kalá-oon. Here M. Mariette has founded the national "Musée Boulaq," a splendid collection of Egyptian antiquities.

Cairo is the fourth Muslim capital of Egypt; the site of one of those that have preceded it is, for the most part, included within its walls, while the other two were a little to the south. 'Amr, the Muslim conqueror of the country, founded El-Fustát, the oldest of these, close to the fortress of Egyptian Babylon, the seat of government at that time. Its name signifies "the Tent," as it was built where 'Amr had pitched his tent. The new town speedily became a place of importance, and was the residence of the Náibs, or lieutenants, appointed by the orthodox and Ommiade caliphs. It received the name of Masr, properly Misr, which was also applied by the Arabs to Memphis and to Cairo. It declined after the foundation of El-Káhireh, but never became altogether deserted, for a small town, called Masr El-'Ateekah, or "Old Masr," occupies, in the present day, part of what was its area in its time of prosperity. Shortly after the overthrow of the Ommiade Dynasty, and the establishment of the 'Abbásee, the city of El-'Askar was founded (A.H. 133) by Suleymán, the general who subjugated the country, and became the capital and the residence of the successive lieutenants of the 'Abbásee caliphs. El-'Askar was a small town adjacent to El-Fustát, of which it was a kind of suburb. Its site is now entirely desolate. The third capital, El-Katáë', or El-Katáyë', was founded about A.H. 260, by Ahmad Ibn-Tooloon, as his capital. It continued the royal residence of his successors; but not long after the fall of the dynasty, and the subsequent Ikhsheedees, the seat of government was transferred by the Fátimees to a new city, El-Káhireh. El-Katáë', which had been sacked on the overthrow of the Tooloonees, rapidly decayed. A part of the present Cairo occupies its site, and contains its great mosque, that of Ahmad Ibn-Tooloon.

Góhar el-Káïd, the conqueror of Egypt for the Fátimee caliph El-Mo'izz, founded a new capital, A.H. 358, which was named El-Káhireh, that is, "the Victorious," a name corrupted into Cairo. This town occupied about a fourth part, the north-eastern, of the present metropolis. By degrees it became greater than El-Fustát, and took from it the name of Misr, or Masr, which is applied to it by the modern Egyptians. It continually increased, so as to include the site of El-Katáë' to the south, and of the old town of El-Maks to the west. The famous Saladin built the Citadel on the lowest point of the mountain to the east, which immediately overlooked El-Katáë', and he partly walled round the towns and large gardens within the space now called Cairo. Under the prosperous rule of the Memlook sultans this great tract was filled with habitations; a large suburb to the north, the Hoseyneeyeh, was added; and the town of Boolák was founded. After the Turkish conquest (A.D. 1517) the metropolis decayed, but its limits were the same; with the present dynasty it has somewhat recovered.

Cairo is of an irregular oblong form. Its greatest length is about three miles, and its average breadth about a mile and a half, and its dimensions do not fall very much short of these in any part. M. Jacotin (*Description de l'Égypte*, xviii. ii. 111) estimates the superficies of Cairo at 793 hectares, or about 3 square miles. This surface is not, however, entirely occupied by houses, for it contains the Citadel and various extensive gardens and open spaces, as well as lakes. Most of the streets are extremely narrow, and the markets generally crowded, so that the stranger usually acquires a delusive idea of the density of the population. Mr Lane states the population to have been 240,000 before the great plague of 1835, and adds that the deficiency, equal to not less than one-third of the inhabitants, caused by that terrible visitation, would be speedily supplied from the villages. (*Modern Egyptians*, Introduction.) Sir Gardner Wilkinson, in his *Modern Egypt and Thebes* (i. 256), published in 1843, gives the population at about 200,000: and Mrs Poole, writing in 1842, estimates it at about 240,000 (*Englishwoman in Egypt*, i. 136); but Clot-Bey (*Aperçu Général*, i. 204), whose work appeared in 1840, states the much higher amount of about 300,000 souls. The census of 1847–8 states the more moderate number of 253,541 inhabitants, and in this instance it is not likely to have been far wrong. We may fairly suppose that during the time of comparative prosperity that followed the great plague of 1835, the population gradually increased to about 250,000, and that the cholera in 1848, and the conscriptions occasioned by the Crimean War, somewhat diminished its amount, which in the subsequent time of peace rose to the present sum of about 350,000. Of the population of 240,000, in Mr Lane's estimate, about 190,000 were Muslim Egyptians, about 10,000 Copts, 3000 or 4000 Jews, and the rest, strangers from various countries. The adult male population was about one-third of the whole, or 80,000 persons, of whom 30,000 were merchants, petty shopkeepers, and artisans, 20,000 domestic servants, and 15,000 common labourers, porters, &c.; the remainder chiefly consisting of military and civil servants of the Government. (*Modern Egyptians, l. c.*)

Cairo is still the most remarkable and characteristic of Arab cities. The beauty of its religious and domestic architecture, before the recent innovations, is unexcelled elsewhere. The edifices raised by the Moorish kings of Spain and the Muslim rulers of India may have been more splendid in their materials, and more elaborate in their details; the houses of the great men of Damascus may be more costly than were those of the Memlook beys; but for purity of taste and elegance of design both are far excelled by many of the mosques and houses of Cairo. These mosques have suffered much in the beauty of their appearance from the effects of time and neglect; but their colour has been often thus softened, and their outlines rendered the more picturesque. What is most to be admired in their style of architecture is its extraordinary freedom from restraint, shown in the wonderful variety of its forms, and the skill in design which has made the most intricate details to harmonize with grand outlines. Here the student may best learn the history of Arab art. Like its contemporary Gothic, it has three great periods, those of growth, maturity, and decline. Of the first, the mosque of Ahmad Ibn-Tooloon in the southern part of Cairo, and the three great gates of El-Káhireh (the old city), the Bab-en-Nasr, Bab-el-Futooh, and Bab-Zuweyleh, are splendid examples. The leading forms are simple and massive, with in the mosque horse-shoe arches. The decoration is in friezes, and its details of conventionalized foliage. The second period passes from the highest point to which this art attained to a luxuriance promising decay. The mosque of Sultan Hasan, below the Citadel, those of Muciyad and Kalá-oon, with the Barkookeyeh, in the main street of the old city, and the mosque of Barkook in the Cemetery of Káit Bey, are instances of the earlier and best style of this period. The forms, though still massive, are less simple, and they are admirably adapted to the necessities of space. The decoration is in conventionalized foliage of the most free forms, balanced by exquisite geometrical patterns. Of the last style of this period, the Ghooreeyeh, in the main street of the old city, and the mosque of Káit Bey in his cemetery, are beautiful specimens. They show an elongation of forms and an excess of decoration in which the florid qualities predominate. Of the age of decline the finest monument is the mosque of Mohammad Bey Aboo-Dahab, in the old city. The forms are now poor, though not lacking in grandeur, and the details are not as well adjusted as before, with a want of mastery of the most suitable decoration. The usual plan of a congregational mosque is a large, square, open court, surrounded by colonnades, of which the chief, often with more rows of columns, faces Mecca (eastward), and has inside its outer wall a decorated niche to mark the direction of prayer. In the centre is a fountain for ablutions, often surmounted by a dome, and in the eastern colonnade a pulpit and a desk for readers. When a mosque is also the founder's tomb, it has a richly ornamented sepulchral chamber. Of domestic architecture there are a few precious fragments before the age of decline; but most specimens are of the latest period of that age. These are marked by a singular fitness and great elegance in the interiors. The decoration, though inferior to that of the mosques of the best style, is charming for variety and beauty of pattern. See CAIRO, and also ARCHITECTURE, vol. ii. pp. 445–44.

To the east of Cairo is a bold spur of the mountains known as El-Gebel El-Mukattam. Beneath it, and to the north of the Citadel, is the Cemetery of Káit Bey, remarkable for the splendid tombs of the Memlook sultans. The most beautiful of these is that of Káit Bey, from which the cemetery takes its name, but those of the sultan Barkook and of El-Ghooree must not be passed by unmentioned. At a little distance to the north-east is the Gebel-el-Ahmar, or "Red Mountain," and southward of this, petrified wood in large quantities is seen strewn on the surface of the desert. The space between Cairo and the Nile, varying from a mile to a mile and a half in breadth, is occupied by plantations which were made by Ibrahim Pasha during his father's rule. Formerly this side of the city was, as the other three are still partially, bounded by lofty mounds of rubbish; these he caused to be removed, and by doing so conferred a great benefit upon the inhabitants, as well as by planting with trees the intervening space. By irrigating this tract very freely with a steam-engine he considerably lessened the good he had effected, rendering the western part of the city somewhat damp. To the south of Cairo is a great cemetery containing the tomb of the Imám Esh-Sháfe'ee, and also an aqueduct, built by the sultan El-Ghooree, which conducts water from the Nile to the Citadel; and further south, the Roman fortress of Egyptian Babylon, now called Kasr-esh-Shema, at present chiefly occupied by a Coptic convent, as well as the small town of Masr El-'Ateekah, which is all that remains of the famous metropolis El-Fustát. It contains no remarkable edifice: in its immediate neighbourhood, however, is the oldest mosque in Egypt, that of 'Amr, the Muslim conqueror, but it has been so frequently repaired and almost rebuilt that it is impossible to form any idea of its original appearance. Opposite to Masr El-'Ateekah, from which it is separated by a very narrow branch of the Nile, is the island of Er Rôdah, containing the famous Mikyás, or Nilometer.

The chief place on the western bank near Cairo is the small town of El-Geezeh, opposite Masr El-'Ateekah. El-Geezeh is best known as having given its name to the most famous group of Pyramids, the chief monuments of Memphis, which stand on the slightly elevated border of the low Libyan range, not more than a quarter of a mile beyond the limit of the cultivated land.

The city of Memphis, MEN-NOFER, "the good station," stood on the western bank of the Nile about ten miles above Cairo. It was founded by Menes, the first king of Egypt. The kings and people who dwelt there chose the nearest part of the desert as their burial-place, and built tombs on its rocky edge, or excavated them in its sides. The kings raised pyramids around which their subjects were buried in comparatively small sepulchres. The pyramids were grouped together, and often there is a long distance from one group to another. Although many pyramids have been nearly or wholly destroyed, yet, as the largest undoubtedly remain, the general features of the necropolis cannot be much changed. From the Citadel of Cairo we obtain a good view of the several groups. First, opposite to us, but a little to the south, are the three great Pyramids of El-Geezeh, two of which exceed all the others in magnitude; at some distance farther south we see those of Aboo-Seer, likewise three in number, of smaller dimensions, and, not so far beyond them, the great Pyramid of Sakkárah, called from its form that of Steps, with smaller pyramids in its neighbourhood. Farthest of all, after a wider interval, are the two large Pyramids of Dahshoor, which approach in size the two great structures of El-Geezeh. There are more to the south as far as the Feiyoom, the last being that of El-Láhoon, but none above the Pyramids of Dahshoor can be included within the Memphite necropolis. That great tract extended, if we measure from the ruined Pyramid of Aboo-Ruweysh, somewhat to the north of those of El-Geezeh, to the southernmost Pyramid of Dahshoor, throughout a space of nearly twenty miles, in almost every part of which some sepulchres have been discovered, while it cannot be doubted that many more await a fortunate explorer.

The road to the pyramids of El-Geezeh from the town is through cultivated fields diversified by villages in palm-groves. As we approach them, these structures do not give us that idea of size that we had expected from our first distant view; and until we stand at their feet we do not appreciate their vastness. But as we endeavour to scan the height of the Great Pyramid, when about to begin its ascent, we fully realize a result that human labour has not achieved elsewhere. The very dimensions (a height of about half a thousand feet, four sides each measuring the seventh of a mile) are in themselves gigantic; but when we know that this huge space is almost solid, containing a few chambers so small as not to be worthy of consideration in calculating its contents, we discover that no monuments of man's raising elsewhere afford any scale by which to estimate its greatness. The Pyramids, except one or more small ones, were tombs of kings. Each had its name and a priest attached to it, for whose functions there was a chapel at some distance in front of the entrance.

The Great Pyramid, "the Splendid," was the mausoleum of Khufu, or Cheops, of Dynasty IV. The present perpendicular height of the structure is, according to General Vyse, 450 feet 9 inches, and the side of its present base 746 feet. It is about 30 feet lower than it was originally, in consequence of the casing stones and much of the outer masonry having been torn off; and its base is likewise smaller. General Vyse gives the former height at 480 feet 9 inches, and the side of the former base at 764 feet. Like all the other pyramids, it faces the cardinal points. At the completion of the pyramid the faces were smooth and polished, but now they present a series of great steps formed by the courses of stone, and are in some places (particularly in the middle of each face, and at the angles, and about the entrance) much broken. The ascent is easy though fatiguing, and the traveller is amply rewarded by the view which he obtains from the platform, about 32 feet square, at the summit. The prospect of the fertile plain and valley on the one side, and of the undulating barren surface of the Great Desert on the other, as well as of the pyramids and tombs beneath, is alike remarkable from its character and the associations which it calls up. The examination of the interior is no less interesting. All other tombs but the Memphite pyramids, and those which were simply pits, were not closed, the upper chamber being intended for the performance of funeral rites when the family of the deceased visited his sepulchre. These pyramids, however, were most carefully closed. The chambers which contained the bodies of the king, and of those (doubtless of his family) who were sometimes buried in the same structure, are without sculptures, and scarcely ornamented in any way, being usually wholly plain. The passages leading to them are only large enough to admit a sarcophagus, and after the king's burial were closed by the lowering of heavy stone portcullises, and the blocking up of the entrance. The desired object was security, and we must not, therefore, expect beauty or grandeur in chambers constructed for this purpose, although we cannot fail to admire their massive and gloomy aspect.

The entrance of the Great Pyramid is not far from the middle of the northern face, 49 feet in perpendicular height from the base. The fallen stones and rubbish have, however, raised a mound which reaches nearly to the entrance, the masonry about which having been torn down, we gain some idea of the construction of the pyramid. In this manner the passage has lost somewhat of its length. The passage itself is 3 feet 11 inches high, and 3 feet 5½ inches wide, and is lined with fine limestone. It descends at an angle of 26° 41′.[1] At a distance of 63 feet 2 inches from the beginning of the roof of the present entrance, a second passage commences from this, taking an ascending direction. The entrance of this new passage is obstructed by great blocks of granite which entirely fill it, and have been passed by means of an excavation around them. We thus enter the ascending passage, which is of the same breadth and height as the former, and inclines at an angle of 26° 18′. The stones which line its roof and sides are very rough, and it has evidently been left unfinished. After ascending this passage for a distance of 109 feet 7 inches, we reach the Grand Passage, which, from its greater dimensions, presents a comparatively imposing appearance. It ascends at the same angle as the last, while a horizontal passage runs beneath it to a chamber to be subsequently mentioned. Just within the Grand Passage is the mouth of the Well, an irregular pit, partly excavated in the rock, leading to the lower portion of the first passage. Its object was probably to afford an exit to the workmen who had been engaged in closing the ascending passage. The Grand Passage is 6 feet 10 inches in width at its base, 28 feet high, and 156 feet long. The blocks which compose its sides gradually approach, every course above the second projecting a little, and on each side is a stone bench. At the end of this passage a horizontal one begins, of much smaller but unequal dimensions, and 22 feet 1 inch in length, leading to the Grand Chamber, commonly called the King's Chamber, which it enters at the eastern end of its north side. This, which is the principal sepulchral chamber (unless, indeed, there be an undiscovered one of greater importance), is lined with red granite, and measures in length 34 feet 3 inches, in width 17 feet 1 inch, and in height 19 feet 1 inch. It is altogether plain, and contains only a sarcophagus of red granite, which is equally unadorned. Above this chamber are five small ones, which may be called entresols, evidently designed to lighten the pressure of the superincumbent masonry, particularly as the uppermost of them has a pointed roof. Four of these were discovered by the late General Howard Vyse, who found in them quarry-marks, bearing, in two varieties, the name of Khufu, the royal builder of the pyramid. These chambers are reached with difficulty, and chiefly by forced passages. The horizontal passage beneath the Grand Passage must now be described. This is but 3 feet 10 inches high, and

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[1] See Sir John Herschel's "Observations on the Entrance Passages in the Pyramids of Gizeh," in Vyse's *Pyramids of Gizeh*, vol. ii. 107–109. The different angles of the entrance passages of other pyramids, and the circumstance that they were always closed at the completion of the buildings, show that the fact of this one's having pointed, at a supposed date of its erection, to α Draconis, which was then the pole-star, is not to be regarded as more than accidental. Nevertheless, as above mentioned, the pyramids face the cardinal points.

3 feet 5½ inches wide, for the first 92 feet of its length, and then we descend a step and find the passage to be 5 feet 8 inches high for 17 feet 11 inches farther, until it enters the "Queen's Chamber," as it is usually called, at the eastern corner of its north side. This chamber is 18 feet 9 inches long, and 17 feet broad, and its extreme height is 20 feet 3 inches. It has a pointed roof, of great blocks of stone, inclined upwards and meeting in the middle. Within it is the entrance of a forced passage. The remainder of the first passage, beyond where the first ascending passage leads to the most interesting parts of the structure, is still to be noticed. It continues below the forced entrance to the ascending passage for a distance of 239 feet 10 inches, being cut through the rock on which the pyramid is built. For this space its inclination and proportions do not change, but it then becomes horizontal for 27 feet, terminating at the entrance of an excavated chamber 46 feet in length, and 27 feet 1 inch in breadth, but of irregular and inconsiderable height. There is no doubt that this chamber was left unfinished at the closing of the pyramid. Beyond it the passage continues, opposite to where it entered the chamber, and extends horizontally 52 feet 9 inches into the rock in the same direction.

The Second Pyramid, which bore the name of "the Great," and was the tomb of Khafra, or Chephren (Dynasty IV.), stands at a short distance to the south-west of the Great Pyramid, which does not very much exceed it in magnitude, though far superior in its construction. It has a base of 690 feet 9 inches square, and is 447 feet 6 inches in height, being more steep than its larger neighbour. A great part of its casing having been preserved, extending about a fourth of the distance from the summit, the ascent is very difficult, especially as when one has climbed on to the cased portion he can see nothing of the lower part of the building, and thus feels as if upon a pyramid in the air. There are two entrances, both in the north side, from which, and other peculiarities, it is possible that the building was originally much smaller than now, and that, after its first completion, it was enlarged, and a new entrance and sepulchral chamber added.

The Third Pyramid, "the Superior," the tomb of Menkaura, or Mycerinus, is almost in a line with the other two, and of much smaller dimensions, being only 203 feet in height, and 354 feet 6 inches square at the base. It is constructed beautifully, and in a costly manner, and in these respects is unexcelled, if equalled, by any other pyramid. The exterior was anciently cased altogether, or in part, with granite, but this has been generally torn off. General Vyse opened it, and found that it had been previously ransacked. In it he discovered a very beautiful sarcophagus (which was unfortunately lost at sea on its way to England), as well as part of a mummy-case, bearing the name of King Menkaura, and a mummy, not certainly the king's, both of which are now in the British Museum. This confirms the statement of Herodotus that it was the tomb of Mycerinus. Manetho says that it was built by Queen Nitocris (Dynasty VI.). This apparent inconsistency is explained, as Bunsen remarks (*Egypt's Place*, ii. 165, *seq.*, 210, *seq.*), by the construction of the pyramid, which has two principal chambers, and was evidently enlarged after its first completion, so that we may reasonably suppose that it is the sepulchre of both Mencheres and Queen Nitocris.

Near the three large pyramids are six smaller ones; three of these are near the east side of the Great Pyramid, and three on the south side of the Third Pyramid. They were probably the tombs of near relations of the kings who founded the great pyramids. The space around the pyramids is occupied by very numerous tombs, some built of stone, others excavated in the sides of the rock on which the pyramids stand, while others are simply pits with sepulchral chambers leading from them. The most interesting of these occupy a square bounded on the east by the Great Pyramid and on the south by the Second, and are mostly the sepulchres of the subjects of Khufu and other kings of Dynasties IV. and V. These tombs, which are of inconsiderable dimensions in comparison with many at Thebes and elsewhere, are all built of stone, and have inclined walls, so as to resemble truncated pyramids. They usually contain a chapel, or more rarely chapels, the walls of which are decorated with most remarkable painted sculptures, portraying the everyday life of the Egyptians at that remote age, with short inscriptions of an explanatory character. The absence of representations of the gods and subjects clearly connected with religion is noteworthy. Other similar tombs stand to the east and south of the Great Pyramid; and in the former direction are the principal sepulchral grottoes hewn in the side of the elevated rocky tract on which the pyramids stand. Some of these excavations bear similar representations to those of the other tombs already mentioned. To the east of the Second Pyramid is the Great Sphinx, called in Egyptian "hu," emblem of Hor-em-akhu, "Horus in the horizon," one of the most characteristic monuments of this wonderful necropolis, of an earlier date than the Great Pyramid. It is a recumbent androsphinx, or man-headed lion, 188 feet 9½ inches in length, hewn ont of a natural eminence in the solid rock, some defects of which are supplied by a partial stone-casing, the legs being likewise added. Steps lead down to its front, where are a sanctuary and tablets, but these are covered by the sand, which, after the hollow has been cleared, speedily fills it again. Not far to the westward of the Sphinx is the remarkable excavation known as Campbell's Tomb, discovered by General Vyse, chiefly consisting of a large pit surrounded by a trench. The causeways leading to the Great Pyramid and to the Third, the former of which greatly excited the admiration of Herodotus, are well worthy of a careful examination. The only pyramid which stands to the north of this group is that of Aboo-Ruweysh, which is in so ruined a condition as scarcely to deserve a visit. It lies about five miles to the north of the Great Pyramid.

Southward of the Pyramids of El-Geezeh, the first objects of interest are those forming the similar group of Aboo-Seer, of much smaller dimensions, the largest being about the size of the Third Pyramid. They are on the elevated edge of the Libyan chain, about seven miles from the Third Pyramid, and are four in number, three being large, and the fourth very small. The Northern Pyramid of Aboo-Seer appears to have been the tomb of Sahura of Dynasty V., and the Middle Pyramid is the tomb of Ra-user of the same line.

About two miles farther in the same direction are the Pyramids of Sakkárah, the greatest and most remarkable of which is called the Pyramid of Steps. The tract around them appears from the number of the tombs to have been the principal burialplace of Memphis, to which it is near. The Pyramid of Steps has a height of 196 feet 6 inches, and its base formerly measured on the north and south sides 351 feet 2 inches, and on the east and west 393 feet 11 inches. Within it are numerous passages and a gallery, which must, for the most part, have been made subsequently to the completion of the structure. In the centre is a very lofty and narrow chamber, and near it a small one, which was lined with blue tiles. In the latter was an inscription containiug the title of the bulls Apis. Under the old monarchy those sacred animals were here entombed. It is thought that this pyramid was constructed by Uenephes of Dynasty I. If Manetho be correct in assigning the introduction of the worship of Apis to a later king, this pyramid, if of Uenephes, was originally a royal sepulchre. In the tract between the Pyramids of Sakkárah and Aboo-Seer are the remains of the Sarapeum, and the burialplace of the bulls Apis, both discovered by M. Mariette. They are inclosed by a great wall, having been connected, for the Sarapeum was the temple of the defunct Apis. The tombs are in subterranean galleries or in separate excavations which contain many sarcophagi, in which the bulls were entombed. Not the least important result of this discovery is the certainty that Sarapis was a form of Osiris, and that his name was Hesiri-hâpi, or Osiris-Apis (Brugsch, *Reiseberichte aus Aegypten*, 27, *seqq.*), as Sir Gardner Wilkinson had long previously suggested (*Materia Hieroglyphica*, 21, and Vocab. MS. addition). The other pyramids are of comparatively little interest. There are also some curious private tombs, among which may be particularized a large grotto excavated in the face of the rock overlooking the valley, which is remarkable for being vaulted on the principle of the true arch, but without a key-stone. It is of the time of Psammetichus I. of Dynasty XXVI., being, as Sir Gardner Wilkinson remarks, one of the two earliest known examples of the arch in stone, though, as he adds, there are brick arches at Thebes of the time of Amenophis I. of Dynasty XVIII. (*Modern Egypt and Thebes*, i. 368–9).

The site of Memphis is marked by mounds in the cultivated tract to the east of the Pyramids of Sakkárah, and near the village of Meet-Raheeneh. Of the great temple of Ptah, its tutelary divinity, there are no remains above ground, except a few blocks of stone and some broken statues, one of which is a fine colossus of Ramses II., which most probably stood in ancient times before one of the principal entrances of the temple. It is of white chert, and beautifully executed, representing the king in a standing posture. It has fallen to the ground, and has lost part of its legs; nevertheless it has suffered inconsiderable damage elsewhere, so as to be still one of the finest specimens of Egyptian art. The original height was more than 40 feet. This colossus is the property of the British nation, but no steps have been taken to remove it to this country. As Sir Gardner Wilkinson remarks, "when the Turks have burnt it for lime, it will be regretted" (*Modern Egypt and Thebes*, i. 373). The site of Memphis being in the cultivated tract, and near the modern capitals of Egypt, its monuments have alike suffered from the destructive power of nature, and from the barbarism of those who have used them as quarries or defaced them from motives of fanaticism. The Pyramids have not escaped man's violence, but their vastness has generally defied his attacks.

At a distance of about five miles to the south of the Pyramid of Steps is the northernmost of the Pyramids of Dahshoor, an interesting group, of the history of which nothing certain is known. To their north is a vast truncated pyramid, the sepulchre of Unas, last king of Dynasty V., anciently called "the Most Beautiful Place," now Mastabat Faraoon, or "Pharaoh's Seat." Two of the Pyramids of Dahshoor are of stone, and three of crude brick. The former exceed in size all the other pyramids except the First and Second of El-Geezeh, and have remarkable chambers within them. The Northern Stone Pyramid has a base of 700 feet, and a height of 326 feet 6 inches, and has lost somewhat of its size, having originally measured 719 feet 5 inches, and 342 feet 7 inches. Some of the casing remains. It has an entrance in the northern face, leading to three chambers of similar construction to the Grand Passage in the Great Pyramid. The Southern Stone Pyramid is distinguished by the peculiarity of its form and by having two entrances, one in the eastern face and the other in the northern. The lower portion has an angle of 54° 14′ 46″, but the inclination then changes to 42° 59′ 26." It has been supposed that it was suddenly completed, having been originally planned to be much loftier, but the method in which the pyramids were built renders this unlikely; and it seems rather to have been given this form to gratify a whim of the founder, especially as the entrances in different faces afford another peculiarity. Its base is 615 feet 8 inches, and its height 319 feet 6 inches. At its southern side is a small brick pyramid. The Northern and Southern Brick Pyramids of Dahshoor are to the east of those already described. They are now in a very ruined state, being merely mounds of crude brick: one of them is probably the Pyramid of Asychis mentioned by Herodotus.

Among the earlier explorers of the necropolis of Memphis was Belzoni, by whom the Second Pyramid was opened. General Howard Vyse first undertook a complete examination of the series of pyramids, and having secured the assistance of Mr Perring, carried out this project with well-merited success. Professor Lepsius, the head of the Prussian expedition, opened many tombs in the Memphite necropolis, and has published in his magnificent work (*Denkmäler aus Aegypten und Aethiopien*) the most interesting sculptures which they contain. M. Mariette, aided by the French Government, discovered the Sarapeum and the tombs of the bulls Apis, and has since continued his researches under the authority of the khedive.

The voyage up the Nile from Cairo may now be described. Not far south of Masr El-'Ateekah, the mountain and desert approach very near the river on that side, and soon after the wide opening of a valley is seen. Beyond it is a bold promontory of the eastern range, which first gradually recedes and then becomes parallel with the river for some distance, leaving but a narrow strip of cultivated land. Behind the village of Turà, the ancient Troja, are the quarries named after it, and a little farther to the south are those of El-Maasarah. These quarries are great excavated chambers and passages, which are entered by large square apertures in the steep face of the mountain. Hence were taken the finer blocks of limestone employed in the construction of the Pyramids of El-Geezeh. Tablets in both quarries record the quarrying executed under different sovereigns. South of the quarries the character of the eastern bank continues unchanged, and presents no remarkable object until we reach the promontory of the Sheykh Aboo-Noor, which will be subsequently mentioned. The western bank, on the contrary, is broad and fertile, abounding in villages, and above its palm-groves rise in the distance the massive forms of the long series of pyramids. Considerably beyond those of Dahshoor, which may be considered as the most southern in the Memphite necropolis, are the two Pyramids of El-Metáneeyeh, which are too small to be seen from the river, and yet farther the solitary Pyramid of Meydoom, commonly called the False Pyramid. Dr Brugsch thinks it very probable that it was the tomb of Senoferu, last king of Dynasty III. It is a structure of great size, having a base of about 400 feet, and a height of about 310 feet. In consequence of blocks having been pulled off its sides for building purposes, it has the appearance of being built in two degrees, the lower of which is much greater than the upper, while the fallen stones around its base make it seem as if raised upon an eminence to increase its apparent size, and hence its name. The entrance has not been discovered. Its position, rising alone above the rich valley and desert beyond, without any object by which to measure its size, render this pyramid, especially when seen from some distance across a broad part of the river to the north, a very striking object. There is nothing else worthy of a visit on the western bank until we reach the town of Benee-Suweyf, about seventy miles by the course of the river from Cairo.

Benee-Suweyf is a busy town, being the port of the Feiyoom. A road leads hence to that province in a north-westerly direction. After crossing the great canal called the Bahr Yoosuf, we pass through the opening in the Libyan range which leads to the Feiyoom, having on our right the ruined brick Pyramid of Illahoon, so called from an adjacent village.

The Feiyoom, including its lake, is a pear-shaped tract (its narrowest part being to the east), extending into the desert, and measuring in its greatest length about thirty miles, and in its greatest breadth about twenty. The part now cultivated is more than two-thirds of this extent from the east. At the north-western extremity is the great lake of El-Karn, which is long and narrow, and fills the northern portion of the valley. A branch of the Bahr-Yoosuf flows through the opening leading to the Feiyoom. This canal soon spreads into many streams, two of which, after joining into a single course, carry off the superabundant waters of the inundation into the lake of El-Karn, while they contribute with the others to irrigate the cultivable tracts.

The site of the famous Labyrinth first claims our notice after entering the Feiyoom. Its position may be known by a ruined crude brick pyramid, that of Hawárah, which is spoken of by both Herodotus and Strabo, and may be called the Pyramid of the Labyrinth. The remains of the Labyrinth itself, which had been previously known, were first carefully examined by the Prussian expedition headed by Professor Lepsius, in 1843. The structure was so ruined, however, that the results were not as decisive as might have been hoped. Yet the plan was to some extent made out, and the building shown to have contained a great number of very small chambers, as ancient writers had said; and the discovery of royal names of Dynasty XII., particularly of Amenemhat III., to whom Manetho ascribes the founding of the Labyrinth, leaves little doubt that this king was the Mœris who built the Labyrinth, according to the classic writers. The use of this building has not been distinctly ascertained. Manetho indeed makes it to have been the founder's tomb, but it is most probable that he was buried in the pyramid, which, however, the Egyptian historian may have regarded as part of the Labyrinth, as it is evidently connected with that structure.

Not far beyond the site of the Labyrinth is the capital of the province, usually called "El-Medeeneh," or "the City," and "Medeenet-el-Feiyoom," "the City" or "Capital of the Feiyoom," close to the mounds of the ancient Arsinoe, or Crocodilopolis. It is a small but flourishing town. The only monuments of antiquity in its neighbourhood are the remains at Beyáhmoo somewhat to the north, and the great broken tablet at Begeeg, at a smaller distance to the south. The former are two structures supposed by some to be pyramids, and the latter, which is a record of the time of Usurtesen I., is usually called an obelisk, but it must rather be regarded as a very tall and narrow stele or tablet, upwards of 40 feet in height.

In this part of the Feiyoom, to the north of El-Medeeneh, may be traced the remains of that remarkable hydraulic work the Lake Mœris. M. Linant, a French engineer, was the first to determine the position and character of this famous work of antiquity; and the results of his investigations are in accordance with the opinions of some who had previously noticed the subject in published works (Mémoire sur le Lac Mœris, Soc. Eg., 1843). The object of the Lake Mœris was to regulate the irrigation of the Feiyoom, anciently the Crocodilopolite Nome, and afterwards the Arsinoite; and it was valuable on account of its fisheries. It seems rather to have deserved the name of a very large reservoir than that of a lake. Notwithstanding the drying up of the Lake Mœris, the Feiyoom is still an important and fertile province. It produces very large quantities of grapes; and the fields of roses, cultivated for the sake of rose-water, present a remarkable appearance.

The great Lake of El-Karn is perhaps the most interesting object in this part of Egypt. Its name, Birket-el-Karn, signifies "The Lake of the Horn," or "Projection," by which an island is intended, and not its general form, as has been supposed. It is, according to Sir Gardner Wilkinson, about 35 miles long and about 7 broad at its widest part and is not deep, as far as has been ascertained. The water is brackish and unwholesome, though derived from the Nile, which has at all seasons a much higher level. It is bounded on the south by tracts in a state of cultivation, or deserted for want of labourers, though anciently cultivated, and on the north by the Libyan desert, above which rises a bold range of mountains; and it has a strange and picturesque wildness. Its northern shore was anciently cultivated, at least in part, but is now entirely waste. Near the lake are several sites of ancient towns, and the temple called Kasr-Károon distinguishes the most important of these. That temple, however, being devoid of sculpture, and doubtless of the Roman period, could not attract attention except in a region barren of monuments. After this cursory view of the Feiyoom we may return to the Nile and continue our southward course.

Not far south of Benee-Suweyf the eastern chain is washed by the river at the picturesque promontory of the Sheykh Aboo-Noor, whose tomb stands on its summit. From this point as far as the town of Manfaloot the mountains on the east are close to the Nile, leaving a narrow space of cultivable land, or none at all, while the western bank is far broader than before. For forty miles nothing remarkable attracts the eye except the lofty mounds of ancient towns, until one sees the well-proportioned minaret of a mosque in the large village of Semaloot, said to have been erected by the architect of the mosque of Sultan Hasan at Cairo. Not far beyond, the river washes the picturesque cliffs of Gebel-et-Teyr, or the Mountain of Birds, part of the eastern range. Upon its summit stands a Coptic convent, called the Convent of the Virgin, Deyr-el-'Adra. One of the monks of this convent usually climbs down the steep face of the mountain by a dizzy path, and swims to the traveller's boat to solicit alms as a fellow Christian. In this part of Egypt we first begin to notice the entrances of grottoes in the face of the eastern mountains, but none of these for some distance are known to be of any interest. Not far beyond Gebel-et-Teyr is the town of El-Minyeh, on the western bank, a place wearing a cheerful aspect. Opposite El-Minyeh are quarries and sepulchral grottoes, the most remarkable of the latter being at a site called El-Kóm-el-Ahmar, or "the Red Mound." These are of the age of Dynasties IV. and VI., but they have sustained so much damage in modern times that they do not repay a visit, except from one who is a student of hieroglyphics. A governor of El-Minyeh, an ignorant Turk, used these ancient tombs as quarries; and had it not been for the interference of Mr Harris of Alexandria, the more important grottoes of Benee-Hasan would have shared the same fate at his hands.

The first noteworthy objects above El-Minyeh are the sepulchral grottoes of Benee-Hasan, which are inferior to none in Egypt for beauty and interest. They are excavated in the face of the eastern mountains, which are here very low and sloping, and separated from the river by a small extent of debris and desert, and a very narrow strip of cultivable land. The grottoes are almost in a line near the summit of the mountain, and at no great height above the river. The two northernmost are remarkable for having porticoes, each supported by two polygonal columns of an order which is believed to be the prototype of the Doric. Most of the grottoes are adorned with sculptures and paintings, which portray with eminent truthfulness and character the manners of the Egyptians of the remote period at which they were executed, for they are tombs of nomarchs and other governors of Dynasty XII. They generally consist of a chapel of large dimensions, having sometimes a portico before it, and a niche with seated figures of the chief persons buried in the tomb at the extremity, and have pits leading to sepulchral chambers. The principal apartment is sometimes supported by pillars cut out of the rock, and vaulted. Its walls bear representations of the diversions of the occupant during his lifetime, and of his varied occupations, in scenes depicting hunting, fishing, games, feasts, the processes of agriculture, and the like. The figures of beasts and birds, more especially the latter, are characterized by a remarkable fidelity and beauty, and there can be no doubt that Egyptian art had attained a greater excellence at this time than it possessed under Dynasty IV. A little to the south of these grottoes, in a ravine, is the Speos Artemidos, a small rock-temple of Sekhet or Pakht, the Egyptian Diana, and some sepulchres of little interest.

A few miles to the south of the Speos Artemidos are two sites, one on either side of the river, which were marked, in the present century, by most important monuments, which have since been destroyed by the Turks. That on the western side, near the large village of El-Ashmooneyn, the ancient Hermopolis Magna, was part of a magnificent portico, bearing the names of Philip Aridæus, Alexander Ægus, and Ptolemy I., all that stood of the temple of Thoth; and on the opposite side of the river were considerable remains of the edifices of the town of Antinoöpolis founded by Hadrian. While we regret the destruction of such interesting records, we must not charge either the Turks or the native Egyptians with all the mischief of this kind which is perpetrated, and our sorrow is increased by the reflection that to European travellers, principally Englishmen and Americans, must be assigned no small share in the destruction or mutilation of the monuments, which in the case of educated men is nothing less than a crime.

A short distance south of Antinoöpolis is the town of Mellawee, on the western bank, and a little farther, on the other side of the river, the promontory called Gebel-esh-Sheykh Sa'eed, which is honeycombed with grottoes, some of which are shown by their sculptures to be very ancient, but are so ill preserved as to require but a short examination. A little beyond, however, in the district of Tell-El-'Amárineh, or the Mound of El-'Amárineh, a small fertile tract where the eastern mountains recede, noted, like Benee-Hasan, for the turbulent and thievish propensities of its inhabitants, are most curious remains of a very ancient town. It was the capital of Khu-n-aten, the sun-worshipper of Dynasty XVIII., and was no doubt destroyed by Horus, and not subsequently rebuilt. In the mountain behind it are very interesting sepulchral grottoes, in which were buried the courtiers of this king, and from them we obtain much information respecting his religion, a very pure form of sun-worship. The representations are chiefly of the king, his queen, and their children, distributing presents to the soldiers and others, of acts of worship to the sun, and of the temple of the sun as well as gardens and villas.

On the western bank of the Nile, a little to the south of Tell-el-'Amárineh, is the small town of Deroot-esh-Shereef, supposed to be on the site of the Thebaïca Phylace, which guarded the northern boundary of the Thebaïs. About 20 miles to the south is the town of Manfaloot, on the same side of the river, which has a decayed appearance from the manner in which the stream has encroached upon and washed away part of it. Opposite to Manfaloot in the eastern range are extensive crocodile-mummy catacombs. There is nothing of note during the next 25 miles of the river's course, which is very winding, until we reach the village of El-Hamrà, the port of Asyoot. This town, the capital of Upper Egypt, or the Sa'eed, that is, of the whole country above Cairo, lies inland, about two miles from El-Hamrà, in a richly cultivated plain. Asyoot, with its beautiful mosques, two of which, one of the Memlook style, and the other of the Turkish, are not unworthy of comparison with those of the metropolis, and its Constantinopolitan palace, surrounded on three sides by verdant fields, and having behind it a fine rounded spur of the western chain, which here, for the first time, is near the river, presents a picturesque aspect as the traveller approaches it. On entering Asyoot he is not disappointed, for the excellence of the goods and provisions sold in the well-built chief market, and the solid look of the houses, indicate activity and prosperity. And it is not a little remarkable that this was an important town some 4000 years ago, and has thus outlived Thebes and Memphis, Tanis and Pelusium. The ancient Egyptian name was Ssut, or probably Ssiut, but the Greeks called it Lycopolis, on account of the worship of the wolf- or jackal-headed divinity of the place, a form of Anubis. In the mountain behind Asyoot are some ancient grottoes, one of which is of great size, but their sculptures have unfortunately suffered much. The view of the valley and the town beneath is an ample reward for the ascent.

Thirty miles farther by the river, on the eastern bank, is the village of Káw-el-Kebeereh, where was anciently Antæopolis. The interesting remains of the temple of Antæus, which stood here early in the present century, have entirely disappeared through the encroachment of the river, and also, it is believed, from having been used as a quarry by the Turks. A few miles beyond, the lofty part of the eastern range called the Gebel-esh-Sheykh-El-Hareedee from a famous Muslim saint, hems in the river on one side for a short distance. It soon, however, retires again, and the valley on that side becomes broader than usual. Here, a short way from the river, stands the small town of Akhmeem, the ancient Chemmis, or Panopolis. No remains of importance mark this site. About 22 miles farther by the course of the river, on the western bank, is the important town of Girgà, which was, until a comparatively recent period, the capital of the Sa'eed. The rise of Asyoot, however, and the agency of the river which is gradually washing it away, have contributed to its decline, and it wears a dilapidated aspect.

The city of Abydos was a few miles from Girgà, in a south-westerly direction on the border of the desert, here separated from the Nile by a broad cultivated tract. Close to it was Thinis or This, the town of Menes. Two interesting edifices render Abydos worthy of a visit. They are both dedicated to Osiris, the chief divinity of the place. The southernmost of these is a temple of Osiris, in which we find the names of Ramses II. and his father Setee I. The other structure is smaller, and in a worse state of preservation than the other temple, and among its sculptures are the same names, those of Setee I. and Ramses II. Hence was taken the famous list of Pharaohs known as the Tablet of Abydos, which is now one of the most valuable objects in the British Museum, and M. Mariette has since discovered a corresponding tablet in the other temple, happily complete. In the desert near by are many sepulchres remarkable on account of the interesting antiquities which have been discovered by clearing them out. The sanctity of Abydos as a reputed burial-place of Osiris rendered this a favourite necropolis of the ancient Egyptians from very early times, particularly under Dynasty XII.

At a distance of more than 40 miles from Abydos, but in nearly the same latitude, is the village of Dendarah, on the left, here the southern, bank of the Nile. Before reaching it we pass the small town of Farshoot at the mouth of the great canal called the Bahr-Yoosuf, and the large village of Hoo, marking the site of Diospolis Parva. Opposite the latter place are some sepulchral grottoes in the eastern chain, called those of Kasr-es-Seiyád, which is believed to occupy the position of Chenoboscion. They contain names of kings of Dynasty VI., but the representations which occupy their walls are not of unusual interest. At Dendarah is the first well-preserved and unencumbered temple that is seen in a voyage up the Nile, that of Athor, the Egyptian Venus, who presided over the town of Tentyra, or Tentyris, the capital of the Tentyrite nome. It stands on the mounds of the town about a mile and a half from the Nile. From it we gain a good idea of Egyptian religious architecture under the Greek and Roman dominions.

The temple is surrounded by a great wall of crude brick, entered by a stone portal adorned with sculptures representing the emperors Domitian and Trajan, engaged in acts of worship before several divinities. The portico to which it leads is about 135 feet in width, and is one of the richest and most beautiful structures of the kind. It is supported by twenty-four columns, four deep, nearly 50 feet in height, and having a diameter of somewhat more than 7 feet at the thickest part. The capitals have a full face of Athor sculptured on each of their four sides, and above these a kind of shrine. The three columns on each side of the entrance are connected by an intercolumniation. The portico, like the rest of the temple, is of higher merit as regards its architecture than its sculpture, for the latter art had declined under the Greek and Roman rule to a much greater degree than the former. The sculptures are of the same kind as on the portal, representing offerings made by some of the earlier Cæsars; and on the ceiling are various mystical subjects, probably of an astronomical import, and the famous Zodiac from which an extravagant idea of the antiquity of the temple was deduced before hieroglyphics were interpreted. The greater part of the back wall of the portico was the front of the temple before this portion was added. This inner part consists of three considerable chambers, an isolated sanctuary, and numerous small apartments. The first of these is a hall, supported by a double row of columns, three on each side, of a rather heavy form, for they have, beneath the capital formed of the block with the faces of Athor and the shrine, another capital of a cup shape. This hall is entered by a doorway in the middle of the back wall of the portico, and passing through it we reach a second and third chamber of the same breadth but shorter, and then the sanctuary. This chamber is much narrower, and is isolated by a passage running round it. On each side of the chambers and passage are many small apartments, two passages to the exterior, and two staircases; and there are singular inclined passages in the walls, two of which are entered from the sides of the portico. The whole interior is covered with sculptures and inscriptions of a religious character, stating in a systematic manner the use of each chamber in the temple-worship. The royal names have not always been filled in, the rings remaining vacant; but when they have been sculptured, they are generally those of the last Cleopatra, and Ptolemy Cæsar, her son by Julius Cæsar. On the roof of the temple to which the staircases lead, there are a sort of chapel and some small chambers, one of which is very interesting, because its sculptures relate to the myth of Osiris. The exterior of the temple is as completely covered with sculptures as the interior. Among the figures represented here are those of Cleopatra and Ptolemy Cæsar; but they cannot be supposed to convey any resemblance, since they belong not alone to a conventional art, but almost to its lowest period. There are two smaller temples near the great temple of Athor, one of Isis, and the other of the kind called a Typhonium. Both are of the Roman time. See admirable account of the temple in Mariette's *Monuments of Upper Egypt*, 125 *seqq.*

On the opposite side of the Nile, a little above Dendarah, is the town of Kinè, between which and Arabia some traffic is carried on by the route through the desert to El-Kuseyr on the Red Sea. The best of the porous water bottles which are used throughout Egypt are manufactured here; and the great water-jars, called "ballásee," which the women carry, are made at the large village of Bellás, a few miles higher on the western bank. Opposite to Bellás is the village called Kuft or Kift, marking the site of the important town of Coptos, which was the emporium on the Nile of the Arabian and Indian trade under the Ptolemies; and, somewhat to the south, is the inconsiderable town of Koos, the ancient Apollinopolis Parva, which succeeded to the trade of Coptos, under the Muslims, until Kinè supplanted it. On the western bank, a little higher, is the small town of Nakádeh, which the people call Nagádeh, where are Roman Catholic and Coptic convents. A short distance beyond Nakádeh are the northernmost of the remains of Thebes.

The monuments of Thebes do not present from afar the imposing appearance of the Pyramids of Memphis. Placed for the most part at a distance from the Nile, as well as from one another, and having on the western side the picturesque form of a much higher mountain than any near Memphis rising behind them, they do not strike those who see them from the river.. Most of them are not indeed visible from the Nile except when it is at its height. The stately colonnade of the temple of El-Uksur, incorrectly called Luxor, on the very bank, is, however, not unworthy the magnificence of Thebes, and when one approaches the other monuments his utmost expectations are exceeded by the grandeur of El-Karnak, the beauty of the temple of Ramses II., and the mystery of the Tombs of the Kings. Nowhere else are the mythology, the history, the very life and manners of the Egyptians of old times so vividly brought before the eye as in the sculptured and inscribed monuments of the capital of the Empire.

Thebes, or Diospolis Magna, is called in the hieroglyphic inscriptions Ap-t, or, with the article prefixed, T-ap, whence Thebes, and Nu-Amen, the city of Amen, the No-Amen or No of the Bible. The date of its foundation is unknown, but there are remains of the time of Dynasty XI., the first of Diospolite kings. Under the sovereigns of Dynasty XII. it must have become a place of importance, but it probably declined during the troubles of the Shepherd period. With Dynasty XVIII. it attained its highest prosperity, and maintained it during Dynasties XIX. and XX. To this period its greatest monuments belong. Then its decline evidently commenced; but from the manner in which Homer mentions it (*Il.* ix. 381–4), Thebes must have been still a great city in his days. After this it suffered severely from the violence of the Assyrians and Persians, and lastly of Ptolemy Lathyrus; so that in Strabo's time the Thebans inhabited villages as now, and there was no longer a city (*Geogr.*, xvii. 1).

The monuments of Thebes, exclusive of its sepulchral grottoes, occupy a space on both sides of the river, of which the extreme length from north to south is about two miles, and the extreme breadth from east to west about four. The y was on the eastern bank, where is the great temple, or her collection of temples, called after El-Karnak, a modern age near by. The temple of El-Karnak is about half a e from the river, in the cultivable land. More than a e to the south-west is the temple of El-Uksur, on the k of the Nile. On the western bank was the suburb ring the name Memnonia. The desert near the thernmost of the temples on this side, the Setheum, ost reaches the river, but soon recedes, leaving a fertile n generally more than a mile in breadth. Along the e of the desert, besides the Setheum, are the Rameseum El-Kurneh, and, less than a mile farther to the south-t, that of Medeenet-Haboo, and between them, but hin the cultivated land, the remains of the Amenophium h its two gigantic seated colossi. Behind these edifices s the mountain, which here attains a height of about 00 feet. It gradually recedes in a south-westerly direc-n, and is separated from the cultivated tract by a strip desert in which are numerous tombs, partly excavated in o isolated hills, and two small temples. A tortuous ley, which begins not far from the Setheum, leads to se valleys in which are excavated the Tombs of the ngs beneath the highest part of the mountain which vers above them in bold and picturesque forms.

The temple of El-Uksur is nearest of the edifices to river, and but an appendage to the great group of Karnak. It takes its name from the small town of Uksur, or Abu-l-Haggág, which is built in and around t of it, thus injuring its effect, and rendering examina-n difficult. It differs from most Egyptian temples not facing the river, but this is accounted for by its nection with the temple of El-Karnak, from the thern approaches to which a long avenue of sphinxes w wholly ruined) leads to it, ending at its entrance. s is a massive propylon, or portal with wings, 200 feet width, before which is a very fine obelisk of red granite. fellow, which stood on the western side, was removed the French to Paris in 1831, and now adorns the Place la Concorde. Both have beautifully cut hieroglyphic criptions. The height of that which remains is about feet. It is adorned with three vertical lines of roglyphics on each side, bearing the titles of Ramses II. other obelisk differs from this only in being slightly rter. Close to the winged portal are three seated ues of red granite representing Ramses II.; a fourth been destroyed. The wings of the portal are covered h sculptures of remarkable interest, representing occur-ces in the war of Ramses II. with the Kheta or Hittites, his fifth year. On the left wing is depicted the defeat the Egyptians, led by their king, of the confederate ples under the walls of the Hittite stronghold called tesh, or Kadesh, on the Orontes. The king is repre-ted, according to the Egyptian custom, of a gigantic s, standing in his chariot, which he has urged into the dst of the hostile force, whose warriors fall by his well-ected arrows. The Egyptians, on the other hand, sustain loss. On the right wing is represented the Egyptian np. This has been sculptured over another subject, of ich part may be now seen, owing to the falling out of plaster with which it had been filled. All these repre-tations are in sunk relief, and beautifully executed.

The entrance to the temple is contracted by a modern ll, through the small door of which we pass into a great rt choked by the huts of the town, among which stands mosque. The court is surrounded by a double row of umns, the capitals of which have the form of the bud of e papyrus. A ruined portal with wings forms the end this court, and with it begins the older part of the ifice, which has a more southerly direction; and its thernmost part in like manner turns a little more in that direction, that is, from the river, though not so remarkably. Some deviation was probably rendered necessary by the course of the Nile. The second court is much obstructed by rubbish; nothing is seen of it but a magnificent central avenue of fourteen columns, having capitals of the bell-shaped flower of the papyrus. The columns are about 60 feet in height, of fine form, and elegantly sculptured. They were raised by Amenophis III., whose name is the oldest which occurs on them and in the rest of the temple. Behind this is another court, which has a double row of columns on each side, and at its end a portico supported by columns four deep. This court is much ruined. Beyond it are several chambers of the time of Amenophis III., and in the midst of them an isolated sanctuary, the sculptures of which bear the name of Alexander Ægus, in whose reign it was built, in the place, no doubt, of one destroyed by the Persians under Cambyses or Ochus, as Sir Gardner Wilkinson remarks (*Modern Egypt and Thebes*, ii. 245). Most of these apartments are in a dilapidated state.

Although there is an approach to the temple of El-Karnak from that of El-Uksur, the grand entrance was towards the river, and from that direction it should be entered. This extraordinary assemblage of buildings consists of a great temple and several smaller structures, surrounded by a massive crude brick wall. There are other remains similarly inclosed, which were connected with the great temple.

The grand entrance is through a propylon more than 360 feet wide, for this is its measure above the rubbish which is piled up around it. It was never sculptured, nor was its surface smoothed. It presents, therefore, a rude appearance, and is much ruined, a great part of the left or northern wing having been demolished. The court of which the propylon forms the front measures 329 feet in width and 275 in length, having on each side a gallery with a single row of columns; and a double colonnade, of which one column alone stands, formed an avenue from its entrance to that of the hypostyle hall beyond. On the right side a temple of older date interrupts the side gallery, extending 50 feet into the court. Its front is formed by a propylon, about 90 feet wide, on each wing of which Ramses III. is portrayed in the act of slaying prisoners before Amen-ra. The interior of this temple consists of a court, which has on each side a row of Osiridean pillars, and at the end another row of such pillars with columns behind them, a hall or portico supported by eight columns, next to the court, and, beyond, other apartments. Nearly all the sculptures are of the reign of Ramses III., but the names of later sovereigns occur. On the other side of the great court is a small structure which may be called a chapel, or three chapels. The most interesting sculptures in this part of the group of temples are outside the eastern portion of the south wall of the great court, for here is the famous list of countries and towns subdued by Sheshonk I., or Shishak, the head of Dynasty XXII. Among the names is that thought to be the kingdom of Judah, and those of several places in the dominions of Rehoboam and Jeroboam I. At the end of the court is a fine portal, the wings of which are much ruined. This is the entrance to the great hypostyle hall, the most magnificent work of its class in Egypt. Its length is 170 feet, and its width 329; it is supported by 134 columns, the loftiest of which are nearly 70 feet in height, and about 12 in diameter, and the rest more than 40 feet in height, and about 9 in diameter. The great columns, 12 in number, form an avenue through the midst of the court from the entrance, and the others are arranged in rows very near together on each side. There is a transverse avenue made by two rows of the smaller columns being placed farther apart than the rest. This great hall is therefore crowded with columns, and the effect is surprisingly grand. The spectator, being generally unable to see beyond the columns which are immediately around him, perceives the vast dimensions which, if viewed from a distance, might lose their effect. The forest of columns seems interminable in whatever direction he looks, producing a result unsurpassed in any other Egyptian temple. The partial ruin of its stone roof, and of some of the columns, renders the hall the more picturesque, and makes us wonder at the force which must have been expended in attempting to demolish it. This grand hall was built by Setee I., Dynasty XIX., and sculptured partly in his reign and partly in that of his son and successor Ramses II., who has sometimes effaced his father's name to substitute his own. It commemorates, not in its grandeur alone, but also by its sculptures, the magnificence and power of these two great Pharaohs. The sculptures of the interior of the walls represent these kings making offerings to the gods, and the like subjects occupy the columns. Far more interesting are those which adorn the exterior of the walls, and record the achievements of the same kings, those of Setee I. being on the north wall, and those of Ramses II. on the south. The former are of much greater interest than the latter, as far as we can judge, and in this respect inferior to none in Egypt. The scenes on the north wall are arranged in three compartments, of which the upper one has been nearly destroyed. In these scenes the king is represented of a gigantic size, charging in his chariot, and putting to the rout his enemies, capturing their strongholds, and returning home in triumph. The chief nations are the *Kheta* or Hittites; the *Ruten* (*Luten*), at this time a great nation of Syria; the *Shasu*, or Arabs; the *Khalu*, Syria, or Syrians; and *Remenen*, Armenia. Among the captured places is *Ketesh*, in those days the most important stronghold between Egypt and Mesopotamia. There is also a long list of countries, cities, and tribes, conquered or ruled by the king, among which we find *Naharina*, that is Aram-naharaim, or Mesopotamia, *Kesh*, Kush, or Ethiopia, &c. The battle-scenes of Ramses II. on the south wall do not, as far as they are seen, equal these in interest. Here also is a list of the king's conquests and possessions, and on the west side of a wall which joins this one at right angles, forming the side of a court of the southern approach to the temple, is a representation of the capture of Askelena or Ascalon, and an inscription recording the treaty between Ramses II. and the Kheta, concluded in the twenty-first year of his reign. The back of the hypostyle hall is formed by a ruined propylon bearing the name of Amenophis III., and then at a distance of about 50 feet is another propylon, entirely ruined. In the space between these propyla, which was a court, stands a beautiful obelisk of red granite, upwards of 70 feet high, raised by Thothmes I. The fragments of its fellow, which was more to the north, strew the ground. Behind the second of these propyla is another granite obelisk, 108 feet high, and according to M. Mariette the loftiest known (*Monuments of Upper Egypt*, 170). This great obelisk of El-Karnak is a monument of Queen Hatshepu of Dynasty XVIII., and an inscription on its pedestal records the period which elapsed (nineteen months) from the time that it was begun to be cut in the quarry until its completion in the queen's sixteenth year. The fellow of the great obelisk, which stood to the south of it, has been broken, and its fragments occupy its place. Beyond the great obelisk is the chief sanctuary, a structure almost entirely of granite, divided into two apartments, which was built under Philip Aridæus, in the place, no doubt, of one destroyed by Cambyses or Ochus. The space between the hypostyle hall and this sanctuary is extremely ruined, the huge stones being piled up in heaps as though an earthquake had overthrown the temple. But this destruction was probably due to human violence. Behind the sanctuary are fragments of a very ancient part of the temple, bearing the name of Usurtesen I., Dynasty XII. Considerably farther is a large oblate building of the time of Thothmes III., which affords a remarkable example of architectural caprice, its columns having inverted shafts and capitals, and its cornices being likewise inverted. Behind this and a stone wall of inclosure are ruined chambers, and far beyond, directly behind the centre of the great temple, in the crude brick wall of inclosure, is a handsome portal, never finished, bearing the name of Nectanebes II.

The southern approach to the temple of El-Karnak from that of El-Uksur is, as before mentioned, by a ruined avenue of sphinxes, which ends near the great structure, and two other avenues begin. The westernmost of these, which is of colossal rams, conducts to a temple situate not far to the south-west of the first court of the great temple: we approach it through a stately portal bearing in its inscriptions the name of Ptolemy Energetes I. The front of the temple, before which was another avenue of rams, is a propylon, which is almost uninjured. Behind it is a court having a double row of columns on each side and at the end, and again behind this is a hall supported by eight columns, and many small chambers. This temple was dedicated to Khuns, the third member of the Theban triad. It was begun under Dynasty XX., and continued by the high-priest kings. A small edifice having sculptures of the time of the Greek and Roman rule stands on the west of the court of this temple.

The avenue of sphinxes which branches off at the same place as the avenue of rams leading to the temple of Khuns takes an easterly direction and ends where another begins at right angles to it, which connects the southern courts leading to the great temple with a separate inclosure. The latter contains a lake which has the shape of a horseshoe, and the remains of the temple of Mut. At the northern extremity of the avenue, which is of criosphinxes, is a propylon forming the front of a large court ending in a second propylon, which, like the other, is much ruined. Beyond this, but not in exactly the same direction, after a vacant space, the approach continues through two smaller propyla, the second of which is nearly destroyed. Each fronts a court, and at the end of the second of these courts was the great side entrance to the temple. The first and second propyla were, like the criosphinxes, monuments of King Har-em-heb, or Horus, of Dynasty XVIII., and were partly built of materials of a temple or palace of the sun-worshipping kings whom he overthrew. The third propylon is more ancient, for it bears the name of Thothmes III. and Amenophis II., as well as of subsequent kings; the age of the fourth is not certain; the name of Ramses II. occurs here, but it may have been founded before his time. There is an inclosure in the angle formed eastward by the third and fourth propyla with the great temple, which contains a sacred lake.

Adjoining the great crude-brick wall of inclosure at its north-eastern portion is another containing the ruins of an important temple. The chief approach is through a stately portal of the Ptolemaic period, in the crude-brick wall. The temple to which it conducted was very beautiful and costly, as we can judge from its remains, which show with how much violence it was destroyed. It seems to have been founded under Dynasty XVIII. There are two small temples or chapels, one of the time of Achoris and the other of that of Nectanebes I. and II., in the same inclosure. Another crude-brick inclosure of small dimensions, near the south-east corner of that of the great temple, contains some unimportant remains of a small edifice.

This brief description will convey some idea of the magnitude of the temple of Amen-ra at Thebes, with its appendages; but no one who has not seen that wonderful assemblage of ruins can picture to himself the massiveness of its castle-like propyla, the grandeur of its hall of columns, the beauty of its great obelisk, and the sublimity of its heaped-up ruins. Of the city of Thebes there are scarcely any remains. Doubtless its edifices were of perishable materials.

Beginning our examination of the monuments of the western bank, where was the great suburb of the Memnonia, from the northward, the first object of interest is the Setheum, a small temple of Setee I., which the natives call Kasr-Er-Rubeyk, at the ruined village of El-Kurneh. A portico, originally supported by ten columns, of which two have fallen, extends along the whole front of the building. Three entrances lead to the interior of the temple: the middle one of these is the door of a hall having twelve columns. From this apartment we pass into several small chambers, which are of little interest, like the ruined chambers which we enter from the northern door. The southern door is the entrance of a separate part of the edifice, which contains a small hall supported by two columns, and three chambers behind it, the middle one of which was a sanctuary or chapel, devoted, as its sculptures show, to the worship of Ramses I., the father of Setee I. The inscriptions of the temple tell us that it was dedicated to Amen-ra by its founder Setee I., and continued by his son Ramses II., and his grandson Menptah. It was the funereal chapel of the tombs of Ramses I. and Setee I.

The great temple of Ramses II, which may be called the Rameseum of El-Kurneh, but is commonly though incorrectly known as the Memnonium, is situate at a distance of about a mile to the westward of the Setheum, and is like it on the edge of the desert, which here is much farther from the Nile. Notwithstanding that its condition is much more ruined than that of other edifices of Thebes, the beautiful architecture of what remains, and the historical interest of its spirited sculptures, render it altogether second alone in its attractions to the great pile of El-Karnak. A propylon, 225 feet in width, of which a great part has been thrown down, forms the front of the edifice. Through its portal we enter a spacious court 180 feet wide and 142 long. It had originally a double colonnade on either side, every column of which has been destroyed, while the side walls have been entirely demolished and the end wall partially. On the back of the propylon are sculptured a battle and other scenes of a campaign in the king's eighth year. In this court is one of the most wonderful objects at Thebes, a colossal statue of Ramses II., broken in pieces, exceeding in its weight and equalling in its dimensions any other known Egyptian statue. It was of a single block of red granite, and must have been transported hither from the quarries of Syene, notwithstanding that its weight was, according to Sir Gardner Wilkinson's computation, about 887 tons, 5½ cwt. (*Modern Egypt and Thebes*, ii. 144, 145). It was 60 feet in height, representing the king seated on his throne, and was placed on the left side of the entrance to the second court. Of that court, happily, there are more remains than of the first. Its width was about 170 feet and its length about 140, so that it was not much smaller than the other court. It had a double colonnade on each side and at the end, and but a single colonnade at the front. These were of columns having capitals of the form of the papyrus bud, except eight of the ten forming the front row, that is, all of that colonnade but the two extreme columns, and, in like manner, the corresponding ones of the opposite row, which were Osiridean pillars, formed of a square block, having in front a figure of Ramses as Osiris. Many of the columns and pillars have been demolished; but those which yet stand enable us to judge how magnificent this part of the temple must have been. On what remains of the front wall of the court, that is, on its northern half, are very remarkable sculptures. Here is a great scene representing a battle between the Egyptians, led by Ramses II., and the Kheta or Hittites, near the strong city of Ketesh. The king of Egypt is portrayed routing the chariots of the enemy, who flee in disorder towards Ketesh, across a double moat, beyond which and beneath the city a strong force of regular infantry endeavours to protect their retreat. This was doubtless the decisive action of the campaign against the confederates, which must be regarded as the most important of the wars which distinguished the reign of Ramses II. Higher up on the same wall is a procession of priests bearing small statues of kings, the first of which is that of Menes, the earliest sovereign of Egypt, the second of a Munt-hotp, of Dynasty XI., and the subsequent ones of the kings of Dynasties XVIII. and XIX., as far as Ramses II., with whom the series ends.

Next to the second court is a hypostyle hall, which is the most admirable part of the temple. It measures 100 feet in length and 133 in breadth, and originally contained forty-eight columns in eight longitudinal rows, each consisting of six columns. A central avenue is formed by twelve lofty columns, about 36 feet high, which have capitals of the shape of the papyrus flower; while the columns on each side, about 24 feet high, have capitals of the shape of the bud of the same flower. The elegance of the form and the justness of the proportions of all these columns is not equalled in any other Egyptian temple, and render this hall one of the most beautiful structures of its kind. Happily, although much injured, it has suffered less from violence than the first and second courts. On its front wall, to the left as one enters, are curious sculptures, representing the rout of a hostile force, and the capture of a town, the walls of which the Egyptians ascend by means of scaling ladders: Ramses II. and six of his sons lead the army. On the end wall are religious subjects, and a series of the sons and daughters of Ramses II., whose legitimate offspring they seem to have been, twenty-six in number, twenty-three sons and three daughters. At the temple of Wadee-es-Suboo'a, in Nubia, a much larger number of children of this king were represented.

Beyond the hypostyle hall are two smaller chambers, the first of which is entered by a doorway in the middle of the end wall of the hall. It is supported by eight columns, and has on its walls representations of mythological subjects. It is chiefly remarkable, however, for its astronomical ceiling, one of the most precious records of ancient Egyptian science. Behind this is a ruined chamber, which seems to have been of the same dimensions. The other apartments which must have adjoined these are entirely demolished. This temple was the chapel of the king's tomb. The description which Diodorus Siculus gives from Hecatæus of Abdera of the Tomb of Osymandyas agrees best with the Rameseum of El-Kurneh; and the mention of the sacred library is in accordance with the character of the sculptures of the first chamber beyond the hypostyle hall, as well as with the statement in several papyri that they were written by the scribes in this temple, in which, or attached to which, was a kind of college (Lepsius, *Chronologie der Aegypter*, i. 39, 53).

To the south-west of the Rameseum of El-Kurneh, at a distance of less than half a mile, a mound just within the cultivable plain marks the site of a magnificent temple of Amenophis III., which may be called the Amenophium, and which, there is reason to believe, was destroyed by Cambyses. Of the obelisks and colossi which stood on either side of the approach of the Amenophium, all are thrown down except the two gigantic statues, one of which is known as the Vocal Memnon. The latter indeed, was broken, but afterwards restored. These colossi stand about a quarter of a mile to the south-east of the mound where are the scanty remains of the temple. They are of hard gritstone, monolithic, and about 47 feet in height, with pedestals about 12 feet high. They represent Amenophis III. seated on his throne. Smaller though colossal standing statues of the king's mother, Queen Mut-em-wa, and of his wife, Queen Tai, rest against the space between the sides of the throne and the legs of the great statues, one at either extremity; while there are remains of two other statues of Queen Tai, of smaller size, standing between the feet of each colossus. The colossi are a little less than 60 feet apart, a distance judiciously chosen, so that they should neither seem smaller than they actually are, by being placed too far from each other, nor should be so near as to appear but a double statue.

The Vocal Memnon is the more northern of the two statues. It was broken in the midst either by the barbarism of Cambyses, or by an earthquake, more probably the former (comp. Paus. *Attic.* i. 42), but long afterwards repaired. It presents in consequence a very shattered appearance, and the other colossus gives us a better idea of what the pair must anciently have been. Many Greek and Latin inscriptions on the Vocal Statue record the visits of those who were with Hadrian, and of others, and relate that they heard the voice of Memnon. There is thus satisfactory evidence to show that some sound was frequently heard here at sunrise; and the only dispute is whether it was produced by a physical cause, or was an imposture of the priests. That it was a natural occurrence does not seem impossible from the examples we have of sounds resembling that which is described as having been heard here by the ancients.

Less than half a mile from the mound of the Amenophium, in a south-westerly direction, within the desert, is the group of temples known as those of Medeenet-Haboo. This name is that applied by the Arabs to a town, which appears to be that called Papa in the Roman times. The ruins of its houses obstruct the temples, more especially the larger of the two. The smaller temple is nearer to the river, to the eastward of the other. We first enter a ruined court, which was never completed, and which had a colonnade of which two columns alone yet stand, at its end, a little before the first propylon of the temple, which bears the names of Ptolemy Lathyrus and Auletes among the sculptures of its gateway. Beyond this is a court which had a colonnade on each side, and a propylon, much smaller than the other at the end. Most of its columns have fallen, and the propylon has also suffered much. On the latter we see the names of Tahraka, or Tirhakah the Ethiopian, and later sovereigns. Beyond this is another court, and then the chambers of the temple. The chief of these is an isolated sanctuary, with a gallery around it having square pillars and fluted columns like those of certain of the tombs at Benee-Hasan. The sanctuary is ornamented with sculptures of sovereigns of Dynasty XVIII., including Queen Hatshepu.

To the south of this temple is a very remarkable structure, which differs from any other ancient monument in Egypt. It is supposed to have been a palace.[1] After passing between what seem to have been lodges, we arrive at the main part of the edifice. This consists of two towers on each side of a court, ending in another tower, beneath which is a gateway conducting to the great temple. On the front of each of the two towers first mentioned Ramses III. is represented slaying his enemies before Amen-ra, and below is a series of captured chiefs. The inscriptions that remain tell us that these are the chiefs of the Kheta, or Hittites, the Amari, or Amorites, the Takkaru, or Teucrians, the Shardana of the sea, or Sardones, the Tuirsha of the sea, or Etruscans, and of other peoples. On the walls of the chambers are curious sculptures usually supposed to represent the private life of Ramses III., but probably of a mythological import. Among these the king is portrayed playing at a game like that of draughts with a goddess, while another stands by him.

The great temple of Medeenet-Haboo is directly behind the palace through which was, as already mentioned, the approach to it, and is a monument of the same king, Ramses III., a sovereign inferior alone as a conqueror to Ramses II., the greatest ruler of Egypt. Both the magnificence of its architecture, and the high interest of its sculptures, render it one of the most interesting edifices at Thebes.

The first propylon cannot be less than 200 feet wide. It is partly destroyed, and much of it is hidden by the remains of the town. On its wings the king is represented slaying prisoners before the gods, and acts of worship are also depicted. The court, of which this propylon is the front, is about 110 feet in length and 135 in breadth, and has a colonnade on either side, forming a gallery. The gallery on the right side consists of seven Osiridean pillars, that on the left of eight columns having capitals of the form of the papyrus-flower, affording a remarkable example of the irregularity of Egyptian architecture. At its end is a second propylon, on the left wing of which Ramses III. is represented bringing captives of the Takkaru, or Teucrians, before Amen-ra. Passing through the granite portal of this propylon we enter the second or peristyle court, the finest part of the temple. This court measures about 123 feet in length, and about 133 or somewhat more in width, thus exceeding in size the first court, contrary to the usual practice of ancient Egyptian architects. It has a single colonnade at the front and on either side, and a double one at the end. The colonnade at the front and that facing it are each of eight Osiridean pillars, while that behind the latter is of columns with capitals of the papyrus-bud, and the side colonnades consist each of five similar columns, one of which, on the left side, has fallen. The Christian inhabitants of the town, the ruins of whose church are seen in the court, defaced many of the sculptures, and particularly the Osiridean pillars; nevertheless the general effect is not lost, and one is struck by a simple grandeur, which is unsurpassed in any similar Egyptian structure. The sculptures of the walls are of especial interest. On the back of the left wing of the propylon a series of sculptures relating to the wars of Ramses III. begins and extends along the wall on the left side of the court. The rout of the Rebu or Lebu, the Libyans, is depicted, the triumphal return of the king, the bringing of prisoners before him on the field of battle, and the like; and besides these are subjects portraying ceremonies. On the right side-wall is a curious representation of the celebration of the Panegyry of Amen-ra Ka-mut-f, which, from the detail in which it is given, affords us considerable insight into the manner in which such solemnities were kept (*Anc. Eg.*, iv. pl. 76). On the end wall, and on part of each side wall, are depicted the many children of Ramses III. A door in the end wall conducts to the inner part of the temple, which occupies but little less space than the two courts just described. It is in a very ruined condition.

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[1] The size and character of the only chambers in the temples which could have been used for habitation render it most improbable that any but priests and scribes resided in them; and it is most likely that the royal abodes were usually extensive pavilions constructed of no stronger materials than the houses of the people, and this view the representations of the tombs seem to support. The temples, however, were called palaces.

The sculptures of the exterior of this edifice next claim our attention, none of which have been mentioned except those which occupy the face of the first propylon. On the north-eastern wall is a remarkably interesting series of scenes in the wars of Ramses III., equalling in the importance of their subjects and the boldness with which they are executed any other records of the kind in Egypt. In the first representation, which is to the extreme right, we see Ramses III. going to war; in the second is depicted the rout of the Tamhu, a Libyan people; and in the third, prisoners of the Tamhu and Mashuasha, also Libyans, are brought before the king, while scribes count the hands, &c., which have been cut from the slain, showing their number to have been 12,535. Then weapons are counted for distribution to the troops. Then we see troops setting forth. The next scene is a great battle with the Takkaru or Teucrians, whose army is defeated by the Egyptians. The Takkaru fight in chariots of two horses and in waggons drawn by four oxen. Mercenaries or allies of the Shardana, Sardones, fight in the army of Egypt. The scene which follows this is one of the most spirited of Egyptian sculptures, and if compared with similar Assyrian reliefs, shows the great superiority of the best Egyptian art over that of Assyria. The king, who is passing through a marshy country in his chariot, encounters three lions, and having smitten two of them with his javelins, turns round to meet the third which is about to spring. The next subject, the most remarkable of the series, represents the sea-fight, in which the Egyptian fleet defeated that of the Shardana and the Takkaru, while Ramses and his army fought them from the shore. Ramses then receives the praises of his warriors, and the hands of the slain are brought before him and numbered. Next he leads prisoners, who are of the Takkaru and Rebu, before the gods of Thebes. The other battle-scenes of the series represent the capture of strong places, the carrying away of captives, &c. On the end wall the king is portrayed setting forth on an expedition, and on the other side wall, the south-west, is a long calendar, which appears to occupy the whole wall. This temple was no doubt connected in purpose with the royal tomb. Not far from the Rameseum, to the southward, is a small Ptolemaic temple containing three chambers. Farther in the same direction is a great lake. More than half a mile in a south-westerly direction from the lake is another small temple of Roman times, having an isolated sanctuary and other chambers.

The private and royal tombs must now be briefly noticed, but from their great number, and the variety of the paintings which occupy their walls, it will not be possible to give as detailed an account of them as has been given of the other monuments. Two temples which are situate in the necropolis likewise require a notice. The tombs, as before mentioned, occupy some of the space at the foot of the mountains, or are excavated in their sides towards the valley, and in two isolated hills, except the Tombs of the Kings, which are cut in the sides of two secluded valleys to the westward.

Beginning from the north, we first see the entrances of grottoes in the low spur of the Libyan chain behind the Setheum. Several of these have a series of square apertures, leaving pillars to support the roof, so as to form a kind of portico, behind which is a chamber or chambers, having pits, from which open other chambers for sepulture. Some grottoes here, and others extending towards the Rameseum, are inhabited by the people of El-Kurneh, whose village is ruined. At the foot of the mountains, as well as on their least steep sides, here and throughout the necropolis, are the entrances of many mummy-pits. On the spur above mentioned are brick pyramids, for the most part nearly destroyed; and in the wide tract beyond, the Asaseef, where the mountains recede, are very remarkable sepulchres of the time of Dynasty XXVI. These are extensive excavations, profusely sculptured almost entirely with hieroglyphics, having before their entrances open courts hewn in the rock, and entered through crude-brick propyla, from which walls of inclosure of the same material extend around the courts. The largest of these, and indeed of all those known at Thebes, is the tomb of Pet-amen-apt, a priest whose date is not fixed, but who probably lived after the fall of the Ramessides. Sir Gardner Wilkinson says that "the area of the actual excavation is 22,217 square feet, and with the chambers of the pits 23,809, though, from the nature of its plan, the ground it occupies is nearly one acre and a quarter" (*Modern Egypt and Thebes*, ii. 222). Almost all the passages and chambers are covered with hieroglyphic inscriptions on a small scale, and the few sculptures are of a religious character At the end of the Asaseef is a temple which was approached by a very long avenue of sphinxes now entirely demolished. The temple is at the base of a steep cliff, and is partly excavated in the rock, and partly built of masonry. The built portion is almost wholly destroyed. A portal of red granite which formed its entrance yet remains, bearing the name of Thothmes III., cut over the erased name of Queen Hatshepu. A second granite portal stands behind this, almost close to the rock. At some distance to the left of this are two small chambers, one of which is remarkable for the form of its roof, which is vaulted by horizontal stones, of which the two uppermost meet in the centre, all being cut internally, so as to form an arch. The excavated part of the temple consists of an oblong chamber of moderate dimensions, another of smaller size with a cell on each side, and at the end a sanctuary. All these, except the sanctuary, are of the time of Queen Hatshepu and Thothmes III., and have vaulted roofs. The sanctuary bears Ptolemaic sculptures, affording a remarkable contrast to the delicate style of those of the chambers which lead to it, and it is flat-roofed. This temple was probably sepulchral.

The isolated hill of the Sheykh 'Abd-El-Kurneh (probably a mistake for 'Ábid-El-Kurneh, meaning "the Devotee of El-Kurneh"), presents a singular appearance from the plain, as on that side it is honeycombed by the entrances of tombs. Several of these, like some of those first mentioned, have porticoes before them hewn in the rock, and many have very interesting paintings, representing scenes of domestic life, funeral ceremonies, arts, trades, &c., in their chapel or chapels. These have unfortunately suffered greatly from the disgraceful Vandalism of European travellers, and the cupidity of the natives which they have encouraged. Farther towards Medeenet-Haboo is a similar isolated hill, called Kurnet-Mara'ee, which contains a few grottoes of the same description, and in the valley between this and the main mass of mountain are many other interesting grottoes. At one extremity of this valley, at some distance behind the Rameseum, is a small edifice with a high inclosure of crude-brick walls. It is a temple of Athor, of the Ptolemaic period, and has a small portico and three chambers, in one of which, the side chamber to the left, is a curious sculpture, of which the subject is the judgment of a soul by Osiris. Hence we may infer that this was a temple attached to the necropolis. Beyond the other extremity of this valley is the secluded valley called that of the Tombs of the Queens, from its containing the sepulchres of queens and princesses of Dynasties XVIII., XIX., and XX. These are similar to the Tombs of the Kings, but are not large, nor are the subjects on their walls which seem generally of little interest, well preserved.

A long and winding valley, the entrance to which is as opening in the mountains behind the Setheum, leads to two other valleys, that of the Tombs of the Kings, and the Western Valley. Both these contain royal sepulchres, but those of the former are the more important. The sepulchres in the Valley of the Tombs of the Kings are twenty-five in number. Nineteen are the mausolea of kings, of a queen with her consort, and of a prince, all of Dynasties XIX. and XX. One tomb is without sculpture, and there is likewise an unsculptured passage running for a considerable distance into the mountain, which may be regarded as an uncompleted tomb. M. Mariette has found the tombs of functionaries in this valley (*Mon.*, 234). Their plan is always the same in its main particulars, but they differ greatly in extent, in consequence of having been begun at a king's accession, or even before (for one of them is the tomb of an heir-apparent), and continued throughout his reign, like the pyramids of Memphis. Their paintings and painted sculptures likewise do not present remarkable varieties, for they are almost wholly of a religious character, and principally refer to the future state. These subjects are taken from the Book of the Lower Hemisphere, treating of the course of the sun in the twelve hours of the night, and so in the nether world. They are interesting for the manner in which they illustrate the Egyptian religion, and for the beauty of their execution; but their intricate nature forbids any detailed description of them in the present article. The plan of one of the most interesting sepulchres may, however, be described. The tomb of Setee I., commonly called Belzoni's, since that explorer first opened it since ancient times, is in the freshest state of preservation, except in its outer part, although the miserable barbarism of modern travellers is yearly lessening its beauty. We enter by a staircase, and pass along a steep passage, which ends in a deep pit, now filled up. Thus far the subjects and inscriptions which occupy the walls are unfinished, showing that the tomb was not completed. Immediately beyond the pit, the part discovered by Belzoni begins with a hall 26 feet by 27, supported by four square pillars, the walls of which are covered with very beautiful painted sculptures, including the celebrated procession of the four races. To the right of this is another chamber, supported by two columns, the decorations of which were never begun, having only been drawn in outline. From the left side of the former chamber we descend a flight of steps, which leads to a passage, another flight of steps, and then another passage, ending in a chamber 17 feet by 14, from which we pass into a hall 27 feet square, having six square pillars, and on either side a small chamber. This forms the portico of the great sepulchral hall, the most splendid part of the tomb, which is of an oblong form, 19 feet in length and 30 in breadth, with an arched roof. In the midst, in a depression, was a splendid sarcophagus of alabaster, now in the Soane Museum, and on its removal blocks of stone were found filling up the entrance of an inclined descent, which was cleared for 300 feet by Belzoni, without its termination being discovered. It is not impossible that the king was buried in a chamber at the end of this passage. The great sepulchral hall is covered with beautiful painted sculptures, and on its ceiling are astronomical or astrological representations, resembling the astronomical ceiling of the Rameseum of El-Kurneh. A door in the left side of the sepulchral hall leads to a chamber which has two square pillars, and on the same side is a cell; there is another chamber on the opposite side. A large apartment, which was left unfinished, is behind that in which was the sarcophagus, and is the last of those contained in the tomb, if the inclined descent does not lead to other unknown ones. From the entrance to the end of this chamber is distance of about 300 feet.

The tomb of Ramses III. is among the most splendid of the royal sepulchres. Its length a little exceeds 400 feet, but from the nature of the rock its sculptures are less delicately executed than those of the tomb of Setee I. In cells on either side of its passage, a little within the entrance, are interesting paintings illustrating manners and customs, in one of which is the celebrated representation of the harpers.

The tombs which have been founa in the Western Valley are only four in number, and but two of these contain paintings, those of Amenophis III. and of King Ai, the sun-worshipper who succeeded Khu-n-aten. The former is decorated with paintings in a very good style, but unfortunately they have sustained much damage; the latter is historically interesting as a record of an obscure king, but its paintings are of poor execution.

Nowhere, perhaps, are we so forcibly struck by the feeling of the ancient Egyptians with respect to death and the future state as in the Valley of the Tombs of the Kings, and in the sepulchres themselves. The desolateness of the spot, apart from all signs and sounds of life, fitted it for the solemn use to which it was assigned; and those long dark passages, and lofty chambers, on whose walls we see the awful punishments of the wicked and the rewards of the good, fitly unveil the most secret mysteries of the Egyptian religion.

Not far south of Thebes, on the western bank, is the large village of Arment, the old Hermonthis, where stands a picturesque temple built by Cleopatra. It has two courts with colonnades, and three chambers around which was also a colonnade, of which but one column now stands. It is of small dimensions, having been the "Typhonium" attached to the great temple of Mentu, the divinity of the place, which has been razed. On the other bank of the river, a little higher, at Tód, anciently Tuphium, is a small Ptolemaic temple. Not far beyond, and about 20 miles above Thebes, by the course of the stream, are the "Gebeleyn," or "Two Mountains," on the western side of the river, where the sandstone begins. The town of Isnè, the ancient Sne, called by the Greeks Latopolis, is likewise situate on the western bank, about twelve miles higher, and is remarkable as containing a very fine Egyptian monument, the portico of its great temple of Kneph. This is in the heart of the modern town, and was much choked with rubbish until cleared by Mehemet Ali. It is supported by twenty-four lofty and massive columns, six in front, and four deep, having capitals of various forms, of which those alone in corresponding positions on opposite sides are of the same description, a deviation from regularity of which we do not see examples previous to the Greek rule. The columns and walls are covered with minute sculptures of the bad style of the period when the portico was erected, —that of the Cæsars. It contains the hieroglyphic names of Claudius, Vespasian, Titus, and other emperors as late as Severus. The back is, however, more ancient, for it bears the name of Ptolemy Philometer, being the front of the older temple of which nothing more is known for certain to remain. Upon the ceiling is a zodiac, from which this monument was supposed to have been of very great antiquity before the interpretation of hieroglyphics had been discovered. On the other bank of the Nile, on the site of Contra Latopolis, is a small temple of the Ptolemaic and Roman periods.

A few miles above Isnè, where both the Libyan and Arabian chains approach the river, are the curious remains of Eilethyia (so written in Egyptian geography). There is a small temple of the Ptolemaic time, and two little sacred edifices of the period of the Pharaohs, but the most interesting monuments are the tombs and the fort. The former, which are excavated in a hill, are very remarkable as illustrating history as well as everyday life, husbandry, &c.; and in one of them is the very curious inscription of its occupant Aahmes, chief of the mariners, recording his services to early kings of Dynasty XVIII. The fort is a large inclosure of crude-brick,[1] which was a place of importance as early as the Shepherd war, for it is mentioned as the "Fort of Suben," that is of Eileithyia, in a part of the inscription above mentioned, relating to the time of that war. The goddess of the place was Suben or Lucina (Eileithyia), who was especially regarded as the protector of Upper Egypt.

Having proceeded about twelve miles to the southward we reach the large village of Adfoo or Edfu, which represents the town called by the Greeks Apollinopolis Magna, the great temple of which yet stands in a comparatively perfect state, and is one of the most stately monuments of ancient Egypt, although of a time at which art had greatly declined. It was dedicated to Har-hut, the god of the place, whom the Greeks called Agathodæmon. Mounds of rubbish around it, as well as the huts of the village, injured its effect, until it was lately cleared by M. Mariette.

The great propylon which forms the front of the temple measures about 226 feet in width, and is, like the rest of the edifice, in a good state of preservation. The sculptures upon its face represent acts of worship by Ptolemy Auletes, who is portrayed slaying prisoners.

The portal between the wings of this propylon is the entrance to the temple, of which the first part is a great court about 161 feet long and 140 broad, with a colonnade along its front and each side, of columns with various capitals supporting covered galleries. At the end is a portico having eighteen columns, six in front and three deep, about 82 feet broad and 46 long, measured within, beyond which are a hall and passages and other chambers, the most important of which is an isolated sanctuary. The wall of the great court is continued so as to inclose the further portion of the temple, leaving a passage around it. The sculptures show that it was begun by Ptolemy Philopator and completed at the end of the Greek monarchy, though an insignificant additional subject was added by Claudius. Not far from the great temple is a smaller one of the sort called Typhonia, containing two chambers, around which runs a gallery supported by Typhonian columns.

About twenty-three miles above Adfoo the mountains on either side, which had for some distance confined the valley to a narrow space, reach the river and contract its course. They are low, but steep and picturesque, and in their western side are seen the entrances of excavations. They are called Gebel-es-Silsileh, a name derived from the earlier Silsilis. The most interesting of the excavations is a rock-temple in which is portrayed the defeat of a negro nation by King Har-em-heb, or Horus, of Dynasty XVIII.; here, also, are subjects depicting acts of worship paid to Nilus and Sebek. To the southward of this, and also facing the river, are the entrances of several excavated tombs, the representations in which are not of a remarkable character. Beyond these are three chapels of the time of Dynasty XIX. On the opposite side are very important quarries, where much of the materials of the great temples was cut, especially under the Eighteenth and subsequent Dynasties.

Beyond Gebel-es-Silsileh, although the mountains recede, the tract of cultivated land is extremely narrow, and sometimes the desert touches the river: this is partly owing to the sinking of the level of the stream, which, as already mentioned, was very anciently restrained by some barrier at Silsilis. About eleven miles above that place is the extremely picturesque temple of Ombos, placed on a rocky eminence called "Kóm-Umboo," "the Hill of Umboo." It stands within a great inclosure of crude-brick walls, which we see on every side, except that towards the river. There is a portal in this wall of the time of Queen Hatshepu and Thothmes III. The great temple is double, one-half having been dedicated to the worship of Sebek, and the other to that of Har-oer, or Aroëris. It consists of a portico of fifteen columns, of which two have fallen, the foremost being connected by a wall of intercolumniation having two entrances, and behind, there is a smaller portico and remains of chambers, including the two sanctuaries. The earliest name here is that of Ptolemy Philometor (*Modern Egypt and Thebes*, ii. 282), unless Champollion be right in saying that the name of Epiphanes is also found in the temple (*Lettres*, 173), and it appears to have been completed by Ptolemy Auletes. There were also remains here of a smaller Ptolemaic temple which have been washed away by the river.

Nothing remarkable occurs between Ombos and Syene, a distance of about twenty miles. The valley is confined to a very narrow space by the mountains, which take bold forms on both sides near the latter place. Just before we reach it, we see the island of Elephantine, where is the famous Nilometer of the Roman time. The town of Aswán, which represents the ancient Syene, stands amid palm-trees on the eastern bank opposite to Elephantine. It is a considerable place, of greater political than commercial importance, and has succeeded to an older town of the same name, the ruins of which occupy the river's bank and a granite hill to the south. Among them may be mentioned a pier, which has a well, most probably the Nilometer constructed by 'Amr, the Muslim conqueror of Egypt. In the ruined town is also a small temple of Roman date. Farther to the south is its extensive Arab cemetery, which is full of curious tombstones bearing inscriptions in Cufic characters. In the granite hills to the eastward are the quarries whence were taken the obelisks and very many of the statues which adorned the Egyptian temples.

The bed of the river above Aswán is obstructed by numerous rocks and islands of granite, one of the latter of which, that of Saheyl, is interesting on account of the numerous hieroglyphic tablets and inscriptions at its southern part. This island is almost a mile and a half above Aswán, and at the distance of another mile from it begin the rapids called the First Cataract, caused by the granite rocks, which almost entirely choke the river. The cataract is so inconsiderable, that during the inundation boats favoured by a strong northerly wind can pass it without aid, though at other times it is necessary to hire natives, who drag them through, but then the principal rapid has a fall of only five or six feet (*Modern Egypt and Thebes*, ii. 294), and that is not perpendicular. Nevertheless the roaring of the troubled stream, and the red granite islands and rocks which stud its surface, through which the boat threads its way, give the scene a wild picturesqueness, until we reach the open stream, less than two miles farther, and the beautiful isle of Philæ suddenly rises before the eyes, completely realizing our highest idea of a sacred place of ancient Egypt.

Philæ is beyond the proper limits of Egypt, but as it is usual to describe it in noticing Aswán and the rapids, some account will here be given of its very beautiful and interesting monuments. The island is very small, being only a quarter of a mile long, and about 500 feet broad. On its granite rock is a little alluvial soil and some vegetation, with a few date-palms, but its verdure has been exaggerated, and to this it little owes its beauty. It was highly reverenced by the ancient Egyptians as a burial-place of Osiris. On the east side is a small but very picturesque temple, now hypæthral, of the Greek and Roman time, and unfinished. It is 48 feet in width and 63 in length, and has 14 columns with capitals of various forms, connected by intercolumnal walls. The great temple of Isis stands to the westward of this. Its front is formed by a propylon, before which is a kind of court, to be afterwards described. The portal bears the name of Nectanebes II., but the wings were added by the Ptolemies, making the entire width about 122 feet. Through the portal we enter a court, on the right side of which is a gallery fronted by columns, behind which are several small chambers, and on the left side is a separate small temple of Athor, the main entrance to which is by a door and passage in the left wing of the great propylon. This small temple begins with a portico having four columns with the faces of Athor sculptured in high relief upon each of their sides above the capitals. Beyond this are three chambers behind one another, above the door of the first of which is a Greek dedication by Ptolemy Euergetes II., and the two Cleopatras. The temple was, however, begun by Epiphanes. The court of the great temple, that of Isis, is bounded by a second propylon of smaller dimensions than the first, forming the entrance to the portico, which is a very elegant structure raised on ten columns, eight of which are at the back and one on each side. It is partly hypæthral, an open space being left between the two columns last mentioned. The beautiful forms of the columns and the bright remains of colour on them and the walls, with the effect of the sunlight through the aperture of the roof, produce a charming effect. Behind this hall are several small apartments, one of which, reached by a staircase, contains very curious sculptures relating to the story of Osiris. The temple appears to have been begun by Ptolemy Philadelphus (whose name is the earliest found there), and was continued under the Roman emperors. The court before the temple remains to be noticed. It is bounded by two galleries with columns in front. One of these is about 250 feet long, and is built close to the western side of the isle, terminating at a small temple of Athor near its southern end. This edifice, which is much ruined, was supported by columns with faces of Athor above their capitals, of which six stand; it was raised by Nectanebos II. The eastern gallery, which is shorter than the other, is not parallel with it, and thus shows that this court was not part of the great temple, but rather an approach to it. The other remains are of minor importance, and the same may be said of the ruins of a temple on the neighbouring large island of Bigè.

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[1] For an account of the Egyptian system of fortification, see Wilkinson in *Trans. Soc. Lit.*, n. s., iv.; and *Popular Account of Ancient Egyptians*, i. 407-409.

A few words must be said respecting the eastern and western deserts. The latter is remarkable for two valleys besides those called the Oases. The first of these valleys is that of the Natron Lakes to the westward of the Delta, containing four monasteries, the remains of the famous anchorite settlement of Nitriæ. To the southward of this, and parallel to it, is a sterile valley called the Bahr-bela-Ma, or "River without Water." Yet farther to the southward is the Little Oasis (Oasis Parva), about 100 miles from the Nile in 29° E. long., nearly due west of the town of Bahnesè. It contains remains of little interest. Within 200 miles due south of this oasis is another, of which the usual apellation is Wáh ed-Dakhileh, where, near the town of El-Kasr, is an Egyptian temple of the Roman period. This, according to Sir Gardner Wilkinson, is the most flourishing of the oases. About half-way between this oasis and the Nile at Thebes lies the Great Oasis (Oasis Magna). Here, near the town called El-Khárigeh, the ancient Hibe, is a great temple of Amen built by Darius I., and in the same oasis are other ruins of the period of the Ptolemies and Cæsars. The Oasis of Jupiter Ammon, that of Seewah, is not far from the coast at a great distance to the westward, and it is not properly included in Egypt. Various Arab tribes occupy this desert, besides the settled inhabitants of the oases.

In the eastern desert must be mentioned the town of Es-Suweys, or Suez (15,000 inhabitants), anciently Arsinoe, at the head of the gulf to which it gives its name. To the southward, a little below 29° lat., are the secluded Coptic convents of St Antony and St Paul, near the sea. Farther south are the porphyry quarries of Gebel-ed-Dukhán, extensively worked under the Romans, and the granite quarries of Gebel-el-Fateereh. Considerably more to the south, at El-Hammámát, on the old way from Coptos to Philoteras Portus, are the Breccia Verde quarries, which were much worked from very early times, and have interesting hieroglyphic inscriptions. At Gebel Zabárah are emerald mines, now abandoned as unproductive. At the various mines, and on the routes to them and to the Red Sea, are some small temples and stations, ranging from the Pharaonic to the Roman period. Along the shore of the sea are the sites of several ancient ports, the most important of which were Myos Hormos and Berenice, and also the modern town of El-Kuseyr. The northern part of this desert is occupied by the Ma'ázee Arabs and smaller tribes as far as the Kuseyr road, beyond which are the 'Abábdeh, an African tribe very different from the Arabs in appearance; and to the south of these, to the east of Lower Nubia, is the Bisháree tribe, a people also of African race.

STATISTICS.[1]

[In Egypt, as has been well said, *L'État c'est le Khedive*. So far as the country itself is concerned the khedive is its personal, absolute, and independent sovereign; but his relations with the Porte are somewhat less simple. When Selim I. of Turkey conquered Egypt at the beginning of the 16th century, the Memlook power was still too strong for complete subjection, and Selim was obliged to allow his new subjects liberal terms. Egypt still retained practical autonomy, the government being in the hands of a council of Memlook beys, presided over by a pasha whose duty it was to look to the annual tribute paid to the Porte, but who possessed little or no actual power. This system was continued till the French occupation, and was re-established when the English army evacuated the country. The Memlooks were still the virtual governors of Egypt, until their massacre by Mehemet Ali. The ambitious designs of this pasha opened the eyes of the Porte to the dangers incurred by so lax a control of a governor unshackled by the council of beys. Menaced with the loss of Syria as well as Egypt, the cause of the sultan was espoused by four of the Great Powers; and the Treaty of 1840, confirmed by the Convention of 1841 limited Mehemet Ali's power to the vice-royalty of Egypt, hereditable by the eldest male of his family, ordered the continuation of the customary tribute, restricted the military and naval strength of the viceroy, and imposed certain other conditions, thus reducing Egypt once more to the state of a Turkish province. But in the reign of the present ruler a change has taken place in the relations between the sultan and his viceroy. A series of expensive negotiations with the Porte, ending with the raising of the tribute from £376,000 to £675,000, procured for Ismail Pasha the title of Khedive, and the right of succession from father to son. The limitation of the Egyptian army and other restrictions which still remained were removed in 1872 by another firmán, confirming all the rights previously granted, and giving the khedive every substantial attribute of sovereignty, except only the *jus legationis*. The khedive is therefore virtually an independent sovereign, holding his power on the easy tenure of tribute and military aid in case of war.

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[1] For much of the information contained in the present section, the writer is indebted to the industrious work of Mr J. C. M'Coan, *Egypt as it is*, though he has thought it necessary to check it with official reports and other authorities: but it must always be remembered that Egyptian like all Oriental statistics can be accepted only with reserve.

The real work of governing is entirely performed by the present energetic and able sovereign. The merely formal business is transacted by a Privy Council and eight ministers—the agents, not the rulers, of the khedive. The Privy Council, presided over by the Prince Hérétier Mehemet Tawfik Pasha, and consisting of the ministers, the Sheykh el-Islám, and some other functionaries, examines and reports to the khedive on the work of the several departments. The eight ministries are those of (1) Finance, (2) Foreign Affairs, (3) Interior, (4) War, (5) Marine, (6) Commerce, (7) Public Works and Agriculture, and (8) Public Instruction. Besides these there are the sub-departments of the Customs and Post-Office.

The provincial administration (exclusive of the separate governors of the eight "cities") is divided among the mudeers of the fourteen prefectures, the Feiyoom now being one, each subdivided into departments and communes, or cantons including several villages, governed by ma-moors, názirs, or sheykhs el-beled, appointed by the Government and assisted and checked by councils of agriculture and an administrative council for each canton.

In 1867 the Assembly of Notables was revived, consisting of village sheykhs, &c., elected by the communes and meeting once a year to receive from the Privy Council a report of the twelvemonth's administration. Although the Assembly has not yet attained to the full dignity of parliamentary power, it has considerable weight in the control of state measures.

By the Convention of 1841 the Egyptian army was limited to 18,000 men, but this was raised to 30,000 by the firmán of 1866, and now all restrictions have been done away. The present force may be placed at an average peace strength of 30,000 men, regulated, however, on a short service system, so that not more than half this number are generally at one time with the colours. This army consists of 18 regiments of infantry, 3 battalions each; 4 battalions of riflemen; 4 regiments of cavalry, 6 squadrons each; 4 of field artillery, 6 batteries each (2 mounted); 3 of garrison artillery; and 3 battalions of pioneers. The infantry are armed with the Remington rifle; the cavalry with revolver and lance, or sabre and carbine; the field artillery with 100 Krupp guns and 50 smooth-bore. Besides these there is a reserve of 30,000 men, and an irregular contingent of 60,000 mounted Bedawees. The army is raised by conscription, irregular levies being held every two or three years. All Egyptians of any creed are liable to conscription, except only the inhabitants of Cairo and Alexandria; but immunity may be purchased by payment of a tax. The monthly pay ranges from 20 piastres (= 4s. 2d.) for a private, to £5 (Egyptian) for a captain, £40 for a full colonel, and £75 for a full general. Under the training of French and American officers, the army has been brought into an admirable state of discipline and efficiency.

The Egyptian navy hardly deserves notice. It consists at present of 2 frigates, 2 corvettes, 4 gunboats, and 2 sloops, all unarmoured.

Mehemet Ali devoted considerable attention to the establishment of colleges and military schools, besides sending young men to Europe for purposes of scientific study. In Cairo and its environs he founded several elementary schools of a higher order than the native schools of the same class; a school of languages; a printing press at Boolák, from which many valuable publications have issued; and a school of medicine at Kasr-el-'Eynee, between Cairo and Masr-el-'Ateekah, which has done excellent work. At El-Khankah and in its neighbourhood he placed a military hospital, a school of medicine, a veterinary college, an infantry school, and a school of music; at El-Geezeh a cavalry school; and at Turá one of artillery. These and similar establishments were well designed and ably carried out. When Mehemet Ali's ambitious designs were defeated in 1840 by the action of the Powers, his educational reforms languished, and under 'Abbas the schools were closed and everything returned to the old system. Said Pasha endeavoured to revive Mehemet Ali's improvements; but it was reserved for the present khedive entirely to carry out his grandfather's designs. Besides the revived and newly created military schools, there are two systems of education in Egypt—by the schools established and supported by the Government, and by the old system of mosque education and Arab primary schools,—besides the numerous establishments of the non-Muslim communities. The Government schools are nine in number—the Polytechnic, Book-keeping and Surveying, Law and Languages, Industrial, Medical, Midwifery, two preparatory schools at Cairo, and one at Alexandria. Besides these the Government supports a school for the blind, a normal school, two girls' schools, three industrial schools, and 23 municipal schools. At the Polytechnic School the course extends over six years, and includes the higher mathematics, chemistry, physics, geology, mechanics, geography, history, drawing, Arabic, and English or French.

Of the mosque colleges, the greatest, not only in Egypt but in the whole Mohammadan world, is the Azhar, where over 11,000 students, coming from every quarter of the Muslim empire, are instructed by 325 sheykhs in the old curriculum of Muslim acquirement. The Arab primary schools, 4000 or 5000 in number, are the regular providers of education for the felláheen, who pay either nothing at all, or a merely nominal sum, for being taught to read and recite the Korán, and sometimes writing and very elementary arithmetic. How greatly the educational system in Egypt has been enlarged of late years may be judged from the fact that, under Said Pasha it hardly cost the Government £4000 a year, whilst the educational budget (exclusive of the military schools) now reaches the sum of £40,000, to which the khedive adds £12.500, making a total of £52,500.

Of the schools of non-Muslim communities the Copts have 16, the Greeks 4, the Armenians 1, and the Jews several academies. Besides these there are two undenominational "Universal Schools," of foreign foundation, where a moderate education, without religious instruction of any kind, is given to all comers, and many schools founded by the American Board of Missions, and Miss Whately's admirable British Mission School. The proportion of girls' schools is extremely small, but their existence, and the fact that they receive the warmest support of one of the wives of the khedive, is a hopeful sign.

The public works carried out in Egypt during the present reign would fill a long catalogue, without reckoning the Suez Canal, for an account of which see CANAL, vol. iv. p. 789. Railway communication has been established between Alexandria, Cairo, Ismaïlia, Suez, Damietta, the Feiyoom, and Asyoot, the various lines covering over 1200 miles. A Soodán railway, from Wadee Halfeh to Hannek, and from near Dunkalah to Khartoom, involving costly and difficult engineering for a length of more than 1000 miles, has been begun with the view of shortening the passage to India, and bringing the produce of the rich southern soil into easier connection with Cairo; these works are, however, at present at a standstill. The canal system has been greatly enlarged and improved, but a still better result is anticipated from the barrage of the Nile, a plan projected by M. Mougel and now about to be carried out for the khedive by Mr Fowler. In 1871 the work of building a breakwater to defend the New Harbour at Alexandria from the seas caused by the constant south-west winds was begun. The outer breakwater extends above two miles across the mouth of the harbour, inclosing an area of 1400 acres of calm water. The structure rises 7 feet above the highest sea-level, and is of a uniform width of 20 feet. Harbour works have also been constructed at Suez. At a cost of over £180,000, fourteen fine lighthouses have been erected, seven on the Mediterranean and seven on the Red Sea, whereas at the beginning of the reign of the khedive there was but one. Telegraph lines (begun by the enterprise of Said), have been set throughout Egypt, covering nearly 6000 miles, and putting Alexandria into direct communication with Khartoom; and this branch of the public service is managed by English officials. Submarine telegraphs also bring Egypt into communication with Candia and thence with Constantinople and Otranto, and with Malta and thence with England, France, &c. The post-office was bought by the Government in 1865, and under the management of an English post official has been greatly improved. In about 70 towns and villages offices have been established, and several mails a day are despatched from the chief places.

The manufactures of Egypt have been in a declining state for several centuries. Mehemet Ali tried to promote them, by establishing large manufactories of cotton, silk, and woollen goods, tarbooshes, &c., and, especially in Upper Egypt, sugar-refineries. Ibrahim Pasha was much opposed to his father's policy, and in pursuance of his own views he laid out extensive plantations of olive and other trees, erected powerful steam-engines for the irrigation of his lands, and on all his estates endeavoured to encourage agriculture. It cannot be doubted that had he lived the correctness of his conviction that Egypt is an agricultural, not a manufacturing, country would under his rule have been fully verified. Mehemet Ali introduced cotton and largely cultivated it; the Turkish grandees found that from it they could extract more gain than from other field produce, and large tracts were speedily devoted to its culture. The necessity, however, of excluding the waters of the Nile has caused several destructive inundations; and so long as the cotton growth remained a monopoly of the pasha it was no means of enrichment to the producer. Now, however, that the monopoly is abolished, the trade in cotton is greatly increasing, and this produce will undoubtedly become every year a more important item in the wealth of the country. The old restrictions upon agriculturists have been more or less done away; and the Government, whilst not wholly abandoning Mehemet Ali's views on manufactures, is yet alive to the paramount importance of affording every encouragement to agriculture.

The cotton crop in 1875 extended over 871,847 feddáns (=acres, nearly) and produced 2,615,541 quintals (of 110lb) of ginned staple, 1,954,555 ardebbs (of 5 bushels) of seed, and 3,749,446 loads of cotton sticks, altogether reaching a total value of about twelve millions and a quarter. The wheat crop in the same year was estimated at 6,662,632 ardebbs, of the value of E£7,995,158; maize (durah), 10,502,715 ardebbs, = E£8,193,000; beans, 4,575,273 ardebbs, = E£1,575,273; barley, 3,103,085 ardebbs, = E£2,394,000; rice, 98,521 ardebbs, = E£738,908. The other crops of Egypt are chiefly clover, sugar-cane, flax, hemp, tobacco, hinnè, and indigo.

The revenue is derived chiefly from the land-tax, the tax on date-trees, trade licences, the customs, the tobacco duty, railways, and the Mukabalah (of which an account will be given), and village annuities. Of these the land-tax is the principal item, amounting to nearly half the total revenue; but this will be considerably reduced when the Mukabalah comes to an end (in 1885). The whole revenue may at present roughly be placed at £10,500,000. It is very difficult to estimate the exact amount of direct taxation on the population. One writer places it at 25s. per head per annum; whilst a recent report states that, including the Mukabalah, the annual payment of taxes has lately reached £4! It is certain the taxation at present exceeds the possible returns of the land, and that the felláheen are compelled to borrow money to pay the taxes. The items of expenditure may thus be roughly summarized:—general public administration, £1,300,000; civil list, £600,000; tribute to the Porte, £700,000; army, £700,000; the rest being devoted to the payment of the debt.

The following is an abridgment of the Egyptian budget for 1876:—

Revenue.	Purses.
Land tax	839,500
Tax on Date-trees	36,934
Licences	82,346
Mukabalah	314,858
Customs	124,737
Railways	192,207
Locks, ports, &c,	32,813
Salt	50,000
Tobacco	51,453
Octroi, various duties, &c,	345,276
Soodán revenues	36,000
	2,100,654

Expenditure.	Purses.
Tribute to Constantinople	133,635
Civil list of the Khedive	60,000
Allowance to the Prince Hérétier	6,000
Allowance to Halim Pasha	11,700
Appointments of the Cabinet Ministers, &c.	219,158
Various pensions and other expenditure	72,618
Conseil d'État, Court of Appeal, Court of First Instance at Cairo, and Chamber of Notables	3,242
Irregular troops	5,792
Egyptian Museum, Ismailia Canal, Archives, Provisions, Stores, &c.	6,636
Customs	5,822
Foreign Agents	2,881
Appointments and expenses of the Provinces of Upper and Lower Egypt	36,546
Appointments and expenses of Cairo, Alexandria, Damietta, Rosetta, Suez, &c., with Octroi	79,304
Expenses of the Rooznámeh	32,960
Locks, barrages, Soodán Railway, &c.	44,581
Interest on Rooznámeh Bonds	18,960
Interest on Suez Canal Shares	19,500
Annuities and loans (redemptions and interest)	962,151
	1,751,451

During the last fifteen years Egypt has acquired the enormous national debt of about £80,393,000. The attempt to Europeanize the country has entailed a vast expenditure. Public works have been carried out at an altogether unnecessary rate of speed, and European contractors have been employed who have not scrupled to drive bargains exceedingly favourable to themselves and ruinous to the Egyptian Exchequer. To these causes of expenditure must be added the dishonesty and extravagance of the Government officials, the waste of money on works which have proved unproductive and useless, and the heavy damages given against the khedive in the extraordinary award of the late emperor Napoleon as arbitrator in the dispute with the Suez Canal Company. To meet the heavy expenses resulting from these causes, five loans have from time to time been raised.

The first was borrowed by Said Pasha in 1862, and amounted to only £3,292,800 nominal, to be repaid in thirty years, interest 7 per cent., and sinking fund 1 per cent. The present viceroy then raised the 1864 loan of £5,804,200 nominal, with interest and sinking fund at 7 and 3·87 per cent., redeemable in 15 years. The next loan, of 1868, redeemable in 1898, was for £11,890,000 nominal (of which only £7,193,334 was received), with apparent interest and sinking fund of 7 and 1 per cent., really 11·34 and 1·68 per cent. on amount received, or altogether 13¼ per cent.

annual charge. The loan of 1873 was for the nominal amount of £32,000,000 at 7 and 1 per cent. interest and sinking fund; but, as only £20,062,658 was received, the interest and sinking fund became really 11 and 1·62 per cent. The actual amount received was, however, slightly increased by part being paid in Egyptian Treasury bonds. Besides these, in 1866 a railway loan had been raised, of the nominal amount of £3,000,000 at 7 per cent. This was repaid in 6 annual instalments of £500,000 each, the last being in January 1874. Two loans secured on the Daïra estates of the khedive have been transferred to the state for value received; these are the Anglo-Egyptian loan of 1865 for £3,000,000 at 9 per cent. interest, with sinking fund of 3·27 per cent; and the Mustafa-Pasha loan of 1867 for £2,080,000 at 9 and 3·4 per cent. interest and sinking fund. The khedive raised also a personal loan secured on his private estates (Daïra) in 1870; £5,000,000 was received, for which £7,142,860 was to be paid back in twenty years, with interest at 7 per cent on this nominal amount. "None of the Egyptian loans," Mr Cave observes, "cost less than 12 per cent. per annum, while some cost more than 13½ per cent. per annum, and the railway loan even 26·9 per cent. per annum, including sinking funds."

These loans hardly sufficed to meet the necessities for which they were raised, and the exorbitant interest charged on the nominal sums, of which the khedive received little more than half, effectually crippled the resources of the country. In 1871 another fatal step was taken. A measure was passed by which a landowner might redeem half his land-tax in perpetuity by paying six years' tax in advance, either in one payment or in six yearly instalments. As, however, few but the wealthiest proprietors could afford this additional charge on their incomes, the six instalments were commuted into twelve, a discount of 8½ per cent. being allowed on each instalment. This composition tax is called the "Mukabalah." By this measure the Government, for the sake of the immediate possession of about £27,000,000, will sacrifice from 1885 onwards about £2,500,000 annually of certain revenue. For the overtaxed felláheen the change is most advantageous, if only they can avail themselves of it; for the Government it nearly resembles suicide.

In 1875 the khedive procured a temporary respite from his difficulties by the sale of the Suez Canal shares to the British Government; and then, at last aware of the critical state of his finances, and of the incompetence of Easterns to mend it, His Highness requested the British Government to provide him with some experienced financier to carry out a thorough reform. In December the Right Honourable Stephen Cave, M.P., accompanied by Colonel Stokes, R.E., and clerks, was sent out, and after some months' examination wrote an elaborate report on the Egyptian finances. But after Mr Cave's departure, and the publication of his report, Egyptian credit fell still lower, till in 1876 the khedive, finding himself totally unequal to meet the demands of his creditors, and weary of renewing bonds at ruinous rates, suspended payment for a time. A French scheme was then urged upon him with so much insistance that on May 7 he adopted it in a decree which announced the consolidation of all the state and Daïra loans, and the distribution of a bonus of 25 per cent. to holders of treasury bonds. These bonds had then reached a sum exceeding £20,000,000, and were held chiefly by French firms. The arrangement speaks for itself. It was immediately quashed by the firm action of the English Stock Exchange; and the Right Honourable G. J. Goschen, M.P., and M. Joubert were sent out to attempt the adjustment of the affairs of Egypt. The result was a scheme which the khedive accepted, and which may shortly be described as follows: the private Daïra debt was separated from the state debt; the three small loans of 1864, 1866, and 1867 were reserved to be paid off by the Mukabalah; the bonus on the treasury bonds was cut down to 10 per cent.; and £17,000,000 was converted into a preference stock, secured on railways and harbour dues. The state debt was thus divided into three classes:—unified debt of £59,000,000, interest per cent., reduced till 1885 by a sinking fund of 1 per cent; preference stock, £17,000,000, interest 5 per cent.; and the three short loans, interest 7 per cent., redeemable at 80 instead of 100, and to be paid off by the Mukabalah. Besides these, there is the private Daïra debt of the khedive. The scheme is perhaps the best that can be devised under the present perplexing conditions; and if the Egyptian Government can maintain its revenue and will hold to its engagements there is every probability that the debts will be paid off at the appointed times. When the Mukabalah falls in in 1885 the three short loans will (presumably) have been paid off. The preference debt is to be redeemed in 65 years by the operation of a sinking fund of £35,744 a year, and the unified debt in the same time and after a similar manner. With a view to insure the carrying out of these reforms, the khedive has appointed English and French comptrollers-general, who are intrusted with the collection of the revenue and the appropriation of it to the purposes settled by the financial scheme. A European Commission of the Public Debt has also been appointed for receiving the revenue devoted to the payment of the debt charges; and another commission, composed of three Europeans and two natives, controls the railways and the port of Alexandria. So long as the present arrangement is held to, and if no unforeseen decrease takes place in the revenue, the financial position of Egypt may be considered hopeful. The khedive has been the subject of much censure at the hands of his bond-holders. It must however be remembered that he received but half of the sums supposed to have reached him. Of the £45,000,000 received he has paid back over £30,000,000 in interest, &c., and £10,000,000 went in the Suez Canal indemnity, so that only £4,000,000 could have been squandered. That the khedive is no financier is obvious; but he seems honestly determined to pay his debts, and if there was any dishonesty in the matter of the loans it was not on the khedive's side.

The principal exports from Egypt are cotton, cereals, and sugar. In 1875, 163,912,836 lb of raw cotton was exported to Great Britain, at the value of £6,668,340; and the total cotton export is estimated at over two millions and a half of quintals. Of beans, 490,257 ardebbs were exported in 1875; of wheat, 836,997 ardebbs; of sugar, 986,000 quintals. Maize, barley, flax, natron, dates, hinnè, and other produce form less important items in the list of exports. The total value of exports is estimated at between twelve and thirteen million of pounds. The imports are estimated at about five millions and a half of pounds and consist chiefly of manufactured goods, coals, oil, wine, machinery, &c. Of the whole commerce about 70 per cent. is with Great Britain. There is also a considerable transit trade, which, however, has necessarily diminished since the opening of the Suez Canal.

The Egyptian measures are—the fitr, or space measured by the extension of the thumb and first finger; the shibr, or span; and the cubit (of three kinds, = 22⅔, 25, and 26⅔ inches). The measure of land is the feddán, very nearly equal to the English acre, subdivided into 24 keeráts, and each of these into 330 (formerly 333⅓) kasabehs, or rods, the kasabeh being a square measure with side of 22 kabdehs, each equalling 6¼ inches. The ardebb is equal to about 5 bushels, and is divided into 6 weybehs, and each weybeh into 24 rubas.

The weights are these:—

64 kambahs (or grains of wheat), or 48 habbehs (or grains of barley) = 1 dirhem (= 48 gr. Troy).
12 dirhems = 1 wukeeyeh or ounce (= about 575 gr.)
12 wukeeyehs = 1 ratl or pound (= 15 oz. 13 dr. avoir.)
2¾ ratls = 1 wukkah or oke (= 2¾ lb.)
36 wukkahs = 1 kantár or cwt. (= 99 lb.)
24 keeráts = 1 mithkál or weight of a deenár (= 72 gr.)

The French metrical system has been established by the khedive, but has not yet been generally adopted.

The standard unit of currency is the kirah, or piastre (= about 2½d.), which is coined in gold pieces of 5, 10, 20, 25, 50, 100 piastres; silver of 1, 2½, 5, 10, 20 piastres.

Copper coins of 5, 10, 20 paras (or faddahs, 40 to the piastre) and 1 piastre are also coined. The kees, or purse, of 500 piastres, is equal to about £5, 2s. 6d. The khazneh, or treasury, consists of 1000 purses. 97½ piastres are given for the English pound sterling. Besides the regular Egyptian currency, European coins of all kinds are commonly employed in Egypt, especially the English sovereign, the French Napoleon, the Venetian sequin, the Spanish doubloon and dollar, the 5-franc piece, and the Constantinople coins. (R. L. P.)] (R. S. P.)

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EHRENBREITSTEIN, a small town in Prussia, in the circle of Coblentz, situated on the right bank of the Rhine, and connected with the town of Coblentz by a bridge of boats, is of importance as possessing a magnificent fortress erected upon a precipitous rock 401 feet above the Rhine. The castle which occupied the site of the modern building is said to have been presented in 636 by the Franconian king Dagobert to the archbishops of Treves. It was twice taken by the French—in 1631 and 1799; and at the peace of Lunéville in 1801 they blew it up before evacuating it. At the second Peace of Paris the French paid 15,000,000 francs to the Prussian Government for its restoration, and the works begun in 1816 were completed in ten years. The town possesses a few ships, and has a wine and carrying trade. In 1875 the population, including the garrison, was 4901. See COBLENTZ.

EIBENSTOCK, a town in Saxony, in the circle of Zwickau, is situated on the borders of Bohemia, 16 miles S.S.E. of Zwickau. It possesses chemical and tobacco manufactories, and tin and iron works. Lace-making was introduced in 1775 by Clara Angermann. It has also a large cattle market. Population in 1875, 6553.

EICHENDORFF, JOSEPH, FREIHERR VON (1788–1857), a German poet and romance-writer, was born at Lubowitz, near Ratibor, in Prussia. He studied law at Halle and Heidelberg from 1805 to 1808. After a visit to Paris he went to Vienna, where he resided until 1813, when he joined the Prussian army as a volunteer. When peace was concluded in 1815 he left the army, and in the following year he was appointed to a judicial office at Breslau. He subsequently held similar offices at Dantzic, Königsberg, and Berlin. Retiring from the public service in 1844, he afterwards resided successively in Dantzic, Vienna, Dresden, and Berlin. He died at Neisse on the 26th November 1857. Eichendorff was one of the most distinguished of the later members of the German romantic school. His genius was essentially lyrical, and he was deficient in the distinctive dramatic faculty. On this account he is most successful in his shorter romances and dramas, where constructive power is least called for. His first work, a romance entitled *Ahnung und Gegenwart*, appeared in 1815. This was followed at short intervals by several others, among which the foremost place is by general consent assigned to *Aus dem Leben eines Taugenichts* (Berlin, 1824), which has often been reprinted. Of his dramas may be mentioned *Ezzelin von Romano*, a tragedy (1828); *Meierbeths Glück und Ende*, a tragedy (1828); and *Die Freier*, a comedy (1833). He also translated Calderon's *Geistliche Schauspiele* (1846) from the Spanish. Eichendorff's lyric poems were of a very high order, and many of them were set to music by composers of eminence. In the later years of his life he published several valuable works on subjects in literary history and criticism, such as *Ueber die ethische und religiöse Bedeutung der neueren romantischen Poesie in Deutschland* (1847), *Der deutsche Roman des 18. Jahrhundert in seinem Verhältniss zum Christenthum* (1851), and *Geschichte der poetischen Literatur Deutschlands* (1856). An edition of his collected works in six volumes appeared at Leipsic in 1870.

EICHHORN, JOHANN GOTTFRIED (1752–1827), an eminent scholar, historian, and writer on biblical criticism, was born at Dörrenzimmern, in the duchy of Hohenlohe-Oehringen, on the 16th October 1752. Here his father was minister, but shortly after the birth of Johann he was appointed superintendent of the state school in Weikersheim. At his father's school and at the gymnasium at Heilbronn young Eichhorn received his early education. In 1770 he entered the university of Göttingen, where he remained till 1774. In 1774 he received the rectorship of the gymnasium at Oehrdriff, and in the following year was made professor of Oriental languages at Jena. On the death of Michaelis in 1788 he was elected ordinary professor of philosophy at Göttingen, where he lectured not only on the Oriental languages and on the exegesis of the Old and New Testaments, but also on general history. In 1811 he was made doctor of theology, in 1813 joint-director of the Royal

Scientific Society of Gottingen, and in 1819 Geheimer Justizrath of Hanover. His health was shattered by an attack of inflammation of the lungs in the year 1825, but he regularly continued his prelections to a large number of students until attacked by fever on the 14th June 1827. He died on the 27th of that month. Eichhorn is the author of a good many historical works, but it is as a biblical critic that he is best known. He may almost be said to have originated the science of biblical criticism, for he first properly recognized its scope and the problems it had to solve, and began many of its most important discussions. He was the first to see the necessity of finding a firm historical foundation for everything in Christianity that was to be accepted as fact. Preliminary to his endeavours towards this end, he took for granted that all the so-called supernatural facts relating to the Old and New Testaments were explicable on natural principles. He sought to judge them from the stand-point of the ancient world, and to account for them by the superstitious beliefs which were then generally in vogue. He did not perceive in the biblical books any religious ideas of much importance for modern times; they interested him merely historically, and for the light they cast upon antiquity. The supernatural element which they contained he attributed partly to the artificial delusions of magic, and partly to the natural delusions of a superstitious time. He regarded as ungenuine many books of the Old Testament and some of the Epistles, and he was the first to suggest that the Gospels were compiled by later writers from documents which have now perished. He did not appreciate as sufficiently as Strauss and the Tübingen critics the difficulties which a natural theory has to surmount, nor did he support his conclusions by such elaborate and minute discussions as they have deemed necessary, but he may be justly denominated the founder of their school of biblical criticism.

His principal works were—*Geschichte des Ostindischen Handels vor Mohammed*, Gotha, 1775; *Allgemeine Bibliothek der biblischen Litteratur* (10 vols. Lpz. 1787–1801); *Einleitung in das Alte Testament* (5 vols. Gött. 1824); *Einleitung in das Neue Testament* (5 vols. Gött. 1824–27); *Einleitung in die apokryphischen Schriften des Alten Testaments* (Gött. 1798); *Commentarius in apocalypsin Joannis* (2 vols. Gött. 1791); *Die Uebr. Propheten* (3 vols. Gött. 1816–20); *Allgemeine Geschichte der Cultur und Literatur des neuern Europa* (2 vols. Gött. 1796–99); *Literärgeschichte* (1st vol. Gött. 1799, 2d ed. 1813, 2d vol. 1814); *Geschichte der Literatur von ihrem Anfange bis auf die neuesten Zeiten* (6 vols. Gött. 1805–12); *Uebersicht der Französischen Revolution* (2 vols. Gött. 1797); *Weltgeschichte* (3d ed. 5 vols. Gött. 1819–20); *Geschichte der drei letzten Jahrhunderte* (3d ed. 6 vols. Hanover, 1817–18); *Urgeschichte des erlauchten Hauses der Welfen* (Hanover, 1817).

EICHHORN, Karl Friedrich (1781–1854), a son of the preceding, and a learned writer on jurisprudence, was born at Jena on the 20th November 1781. He entered the university of Göttingen in 1797. In 1805 he obtained the professorship of law at Frankfurt-on-the-Oder, holding it till 1811, when he accepted the same chair at Berlin. On the call to arms in 1813 he became a captain of horse, and he received at the end of the war the decoration of the Iron Cross. In 1817 he was offered the chair of law at Göttingen, and, preferring it to the Berlin professorship, taught at Göttingen with great success till ill health compelled him to resign in 1828. His successor in the Berlin chair having died in 1832, he again entered on its duties, but resigned it two years afterwards. In 1832 he also received an appointment in the ministry of foreign affairs, which, with his labours on many state committees and his legal researches and writings, occupied him till his death in July 1854. Eichhorn is regarded as one of the principal authorities on German constitutional law. His chief work is *Deutsche Staats- und Rechtsgeschichte*, 4 vols. In company first with Savigny and Göschen, and then with Rüdorf, he edited the *Zeitschrift für geschichtliche Rechtswissenschaft*. He is the author besides of *Einleitung in das deutsche Privatrecht mit Einschluss des Lehnrechts* and the *Grundsätze des Kirchenrechts der kath. und evang. Religionspartei in Deutschland*.

EICHSTÄDT, or Eichstätt, originally Eistet, a town in the Bavarian district of Franconia, is situated in a deep valley on the Altmühl, about 35 miles south of Nuremberg. It is inclosed by walls, and has a very antique appearance. It is the seat of a bishop, and since 1838 of the appeal court of Middle Franconia. The making of stoneware, iron smelting, brewing, and weaving constitute its chief industries. It possesses a good many educational institutions. Among its principal buildings are the palace occupied by the dukes of Leuchtenberg, with its beautiful park, and containing a celebrated Brazilian cabinet; the town-house; the cathedral, containing some beautiful paintings and windows, and the grave of Wilibald, the first bishop and founder of the town; and the church of St Walpurgis, under whose altar the bones of the saint of that name are said to rest. Near the town is the famous stronghold Wilibaldsburg, occupying the site of a Roman castle, and built for a bishop's residence by St Wilibald in 740.

Eichstädt was founded by St Wilibald in 745. The bones of St Walpurgis were brought to the town in 871, and from that time it became a great resort of pilgrims. Through the death of Count von Hirschberg in 1305, the bishopric became one of the richest foundations of Germany. It was secularized in 1802, became a principality of E. Bavaria in the same year, and still in the same year passed into the possession of Duke Ferdinand of Tuscany, who again transferred it to Bavaria in 1805. In 1817 it was assigned to the duke of Leuchtenberg. It lost its principality in 1854. The population in 1875 was 7186.

EIDER (Icelandic, *Æður*), a large marine Duck, the *Somateria mollissima* of ornithologists, famous for its down, which, from its extreme lightness and elasticity, is in great request for filling bed-coverlets. This bird generally frequents low rocky islets near the coast, and in Iceland and Norway has long been afforded every encouragement and protection, a fine being inflicted for killing it during the breeding-season, or even for firing a gun near its haunts, while artificial nesting-places are in many localities contrived for its further accommodation. From the care thus taken of it in those countries it has become exceedingly tame at its chief resorts, which are strictly regarded as property, and the taking of eggs or down from them, except by authorized persons, is severely punished by law. In appearance the Eider is somewhat clumsy, though it flies fast and dives admirably. The female is of a dark reddish-brown colour barred with brownish-black. The adult male in spring is conspicuous by his pied plumage of sable beneath, and creamy-white above: a patch of shining sea-green on his head is only seen on close inspection. This plumage he is considered not to acquire until his third year, being when young almost exactly like the female, and it is certain that the birds which have not attained their full dress remain in flocks by themselves without going to the breeding-stations. The nest is generally in some convenient corner among large stones, hollowed in the soil, and furnished with a few bits of dry grass, seaweed, or heather. By the time that the full number of eggs (which rarely if ever exceeds five) is laid the down is added. Generally the eggs and down are taken at intervals of a few days by the owners of the "Eider-fold," and the birds are thus kept depositing both during the whole season; but some experience is needed to insure the greatest profit from each commodity. Every Duck is ultimately allowed to hatch an egg or two to keep up the stock, and the down of the last nest is gathered after the birds have left the spot. The story of the Drake's furnishing down, after the Duck's supply is exhausted, is a fiction. He never goes near the nest. The eggs have a strong flavour, but are much relished by both Icelanders and Norwegians. In the Old World the Eider breeds in suitable localities from Spitsbergen to the Farn Islands off the coast of Northumberland—where it is known as St Cuthbert's Duck. Its food consists of marine animals (mollusks and crustaceans), and hence the young are not easily reared in captivity. The Eider of the New World differs somewhat from our own, and has been described as a distinct species (*S. dresseri*). Though much diminished in numbers by persecution, it is still abundant on the coast of Newfoundland and thence northward. In Greenland also, Eiders are very plentiful, and it is supposed that three-fourths of the supply of down sent to Copenhagen comes from that country. The limits of the Eider's northern range are not known, but the late Arctic Expedition does not seem to have met with it after leaving the Danish settlements, and its place is taken by an allied species, the King-Duck (*S. spectabilis*), a very beautiful bird which sometimes appears on the British coast. The female greatly resembles that of the Eider, but the male has a black chevron on his chin and a bright orange prominence on his forehead, which last seems to have given the species its English name. On the west coast of North America the Eider is represented by a species (*S. v-nigrum*) with a like chevron, but otherwise resembling the Atlantic bird. In the same waters two other fine species are also found (*S. fischeri* and *S. stelleri*), one of which (the latter) also inhabits the Arctic coast of Russia and East Finmark and has twice reached England. The Labrador Duck (*S. labradoria*), which is now believed to be extinct (see BIRDS, vol. iii. p. 735), also belongs to this group. (A. N.)

EILENBURG, a town of Prussia, in the province of Saxony, government of Merseburg, and circle of Delitzsch, is situated on an island formed by the Mulde, about 18½ miles north-east of Leipsic. The principal structures are the hospital, the infirmary, three churches, and the castle. From the last-mentioned, formerly known as Ilburg, and in the time of Henry the Fowler an important post of defence against the Sorbs and Wends, the town received its name. The industries include the manufacture of chemicals, cloth, quilting, calico, cigars, and agricultural implements, bleaching, dyeing, wax-refining, brick-making, and trade in cattle. In the neighbourhood is the iron-foundry of Erwinhof. The population was 10,312 in 1875

EINBECK, or EIMBECK, a town of Prussia, in the landrost of Hildesheim, and province of Hanover, formerly chief town of the principality of Grubenhagen, is situated on the Ilme, 39 miles south of Hanover. It possesses a cathedral, five churches, a Jewish synagogue, a pro-gymnasium and other schools, and several endowed institutions. Among the manufactures are linen and woollen goods, spun stockings, carpets, sugar, leather, cigars, chemicals, and beer, for which last the place was once famous. Population in 1875, 6384.

Einbeck owes its rise to the frequent pilgrimages made in early times to the "Blood of the Saviour" at the cathedral chapel. It was a fortified Hanse town, and in 1542 joined the Smalcaldic League. On March 24, 1626, it was taken by Pappenheim, and on October 14, 1641, by Piccolomini; and during the Seven Years' War it was repeatedly occupied by the French.

EINSIEDELN, a town in the canton of Schwyz, in Switzerland, situated in the valley of the Sihl, eight miles N.N.E. of Schwyz. The Benedictine abbey of Einsiedeln, founded about the middle of the 9th century, was several times partially or wholly destroyed by fire. The present edifice, in the Italian style, was erected in 1704–19, and stands at an elevation of 2985 feet above sea-level. It contains a library of 40,000 volumes, 1190 manuscripts, and 1015 incunabula, and in connection with it are a priests' seminary, a gymnasium, and a lyceum. The emperors Otto the Great and Henry II. made valuable presents to the abbey, and in 1274 Rudolf of Hapsburg created the abbot a prince. The treasury was plundered by the French in 1798. The abbey has for centuries been noted for its sacred image of the Virgin, which brings to it yearly an average of 150,000 pilgrims, chiefly on the 14th of September. Most of the buildings of Einsiedeln are inns for the entertainment of the pilgrims, with whom the inhabitants traffic in missals, sacred pictures, rosaries, crucifixes, and medallions. The Reformer Zwingli preached at Einsiedeln in 1516–18, and not far from the town is the house where Paracelsus is said to have been born. Population about 7650.

EISENACH, the chief town of the Eisenach circle and of the administrative department of Saxe-Weimar-Eisenach, lies in a romantic district at the north-west end of the Thuringian wood. It is situated on the Hörsel, at the junction of the Thuringian and Werra railways, and 44 miles west from Weimar. In its neighbourhood is the Wartburg, where Luther on his return from the Diet of Worms was imprisoned, and where from May 1521 to March 1522 he devoted himself to the translation of the Bible. On a high rock on the south side of the town are the ruins of the castle of Mädelstein. Eisenach is the birth-place of Sebastian Bach, and he and Luther were educated at its gymnasium, then the Latin school. Among the public buildings may be mentioned the tower of St Nicholas, the castle, rebuilt in 1742, and the town-house, erected in 1641. Eisenach has a manufactory for cotton cloth, and a large woollen and several other mills. Population in 1875, 16,163.

EISENBERG, a town in the west circle of the duchy of Saxe-Altenburg, and 24 miles W.S.W. of Altenburg. It is very old, and has changed possessors more than once, but was joined to Saxe-Altenburg in 1826. It possesses an old castle and a beautiful church. Its industries are principally woollen and porcelain manufactures, linen-weaving, and shoe-making. Population in 1875, 5509.

EISENBURG, or VAS VÁRMEGYE, a county of Western Hungary, on the Styrian frontier, inclosed on the north, east, and south by the counties of Sopron, Veszprim, and Szala, and on the west by the Styrian circle of Gratz. Its area is 1536 geogr. square miles. Though mountainous in the west and south, the land is generally fertile. The chief river is the Raab, which receives the Pinka, Sorok, Gyöngyüs, and other streams. The natural and agricultural products consist of coals, mineral waters, quicksilver, corn, wine, fruit, and tobacco. Game, wild fowl, and fish are also plentiful. The population in 1870 amounted to 331,602, of whom nearly three-fourths were Roman Catholics, the rest chiefly Protestants and Jews. According to nationality about 140,000 are Magyars, 120,000 Germans, and the remainder Croatians and Slovaks. The principal town is Szombathely or Stein-am-Anger.

EISENSTADT, or KIS-MARTON, a royal free town of East Hungary, in the vármegye or county of Sopron or Oedenburg, in 47° 51′ N. lat. and 16° 30′ E. long., is situated at the foot of the Leitha mountain range, not far from the west bank of Lake Neusiedl, 26 miles S.E. of Vienna. The town is famous as being the seat of Prince Esterházy, whose castle of Kis-Marton is one of the finest palaces in Hungary. It was built by Prince Paul, palatine of Hungary, in 1683, but was improved and added to in 1805. The park, which is very large, has a fine orangery, and several conservatories, containing many thousand varieties of exotic plants. The town itself is walled round, and has three main streets, with an old church, a town-hall, hospitals, and monasteries of the Brothers of Charity and of the Franciscans. To the north of the town there are extensive zoological gardens. The population in 1870 amounted to 2476.

EISLEBEN (Latin, *Islebia*), the chief town of the Mansfield circle, in the government of Merseburg, province of Saxony, Prussia, is situated on the railway from Halle to Nordhausen and Cassel, 18 miles west from Halle. It consists of an old and a new town, the former being surrounded by walls. In the vicinity are extensive copper and silver mines, and the town itself possesses smelting furnaces, several breweries, and manufactories of linen, tobacco, and saltpetre. Among its principal buildings are—the old castle; the church of St Andrews, which contains numerous monuments of the counts of Mansfield; the church of St Paul and St Peter, in which is the font where Luther was baptized; the Royal Gymnasium, founded by Luther shortly before his death in 1546; and the hospital. Eisleben is celebrated as the place where Luther was born and died. The house in which he was born was burned in 1689, but was rebuilt in 1693 as a free school for orphans; that in which he died has lately been renovated, and his death-chamber is still preserved.

The first mention of Eisleben dates from the 11th century. During the insurrection of the peasants in 1525, it was partly destroyed, and it was immediately after this that the new town was founded. In 1780, when the countship of Mansfield became extinct, Eisleben came into the possession of Saxony, and in 1815 of Prussia. The population in 1875 was 14,378.

EISTEDDFOD, YR (plural *Eisteddfodau*), the national bardic congress of Wales, the objects of which are to encourage bardism and music and the general literature of the Welsh, to maintain the Welsh language and customs of the country, and to foster and cultivate a patriotic spirit amongst the people. This institution, so peculiar to Wales, is of very ancient origin.[1] The term *Eisteddfod*, however, which means "a session" or "sitting," was probably not applied to bardic congresses before the 12th century.

The Eisteddfod in its present character appears to have originated in the time of Owain ap Maxen Wledig, who at the close of the 4th century was elected to the chief sovereignty of the Britons on the departure of the Romans. It was at this time, or soon afterwards, that the laws and usages of the Gorsedd were codified and remodelled, and its motto of "Y gwir yn erbyn y byd" (The truth against the world) given to it. "Chairs" (with which the Eisteddfod as a national institution is now inseparably connected) were also established, or rather perhaps resuscitated about the same time. The chair was a kind of convention where disciples were trained, and bardic matters discussed preparatory to the great Gorsedd, each chair having a distinctive motto. There are now existing four chairs in Wales,—namely, the "royal" chair of Powys, whose motto is "A laddo a leddir" (He that slayeth shall be slain); that of Gwent and Glamorgan, whose motto is "Duw a phob daioni" (God and all goodness); that of Dyfed, whose motto is "Calon wrth galon," (Heart with heart); and that of Gwynedd, or North Wales, whose motto is "Iesu," or "O Iesu! na'd gamwaith" (Jesus, or Oh Jesus! suffer not iniquity).

The first Eisteddfod of which any account seems to have descended to us was one held on the banks of the Conway in the 6th century, under the auspices of Maelgwn Gwynedd, prince of North Wales. Maelgwn on this occasion, in order to prove the superiority of vocal song over instrumental music, is recorded to have offered a reward to such bards and minstrels as should swim over the Conway. There were several competitors, but on their arrival on the opposite shore, the harpers found themselves unable to play, owing to the injury their harps had sustained from the water, while the bards were in as good tune as ever. King Cadwaladr also presided at an Eisteddfod about the middle of the 7th century.

Griffith ap Cynan, prince of North Wales, who had been born in Ireland, brought with him from that country many Irish musicians, who greatly improved the music of Wales. During his long reign of 56 years he offered great encouragement to bards, harpers, and minstrels, and framed a code of laws for their better regulation. He held an Eisteddfod about the beginning of the 12th century at Caerwys in Flintshire, "to which there repaired all the musicians of Wales, and some also from England and Scotland." For many years afterwards the Eisteddfod appears to have been held triennially, and to have enforced the rigid observance of the enactments of Griffith ap Cynan. The places at which it was generally held were Aberffraw, formerly the royal seat of the princes of North Wales; Dynevor, the royal castle of the princes of South Wales; and Mathrafal, the royal palace of the princes of Powys; and in later times Caerwys in Flintshire received that honourable distinction, it having been the princely residence of Llewelyn the Last. Some of these Eisteddfodau were conducted in a style of great magnificence, under the patronage of the native princes. At Christmas 1107, Cadwgan, the son of Bleddyn ap Cynfyn, prince of Powys, held an Eisteddfod in Cardigan Castle, to which he invited the bards, harpers, and minstrels, "the best to be found in all Wales;" and "he gave them chairs and subjects of emulation according to the custom of the feasts of King Arthur." In 1176 Rhys ab Gruffydd, prince of South Wales, held an Eisteddfod in the same castle on a scale of still greater magnificence, it having been proclaimed, we are told, a year before it took place, "over Wales, England, Scotland, Ireland, and many other countries."

On the annexation of Wales to England, Edward I. deemed it politic to sanction the bardic Eisteddfod by his famous statute of Rhuddlan. In the reign of Edward III. Ifor Hael, a South Wales chieftain, held one at his mansion. Another was held in 1451, with the permission of the king, by Griffith ab Nicholas at Carmarthen, in princely style, where Dafydd ab Edmund, an eminent poet, signalized himself by his wonderful powers of versification in the Welsh metres, and whence "he carried home on his shoulders the silver chair" which he had fairly won. Several Eisteddfodau were held, one at least by royal mandate, in the reign of Henry VII. In 1523 one was held at Caerwys before the chamberlain of North Wales and others, by virtue of a commission issued by Henry VIII. In the course of time, through relaxation of bardic discipline, the profession was assumed by unqualified persons, to the great detriment of the regular bards. Accordingly in 1567 Queen Elizabeth issued a commission for holding an Eisteddfod at Caerwys in the following year, which was duly held, when degrees were conferred on 55 candidates, including 20 harpers. From the terms of the royal proclamation we find that it was then customary to bestow "a silver harp" on the chief of the faculty of musicians, as it had been usual to reward the chief bard with "a silver chair." This was the last Eisteddfod appointed by royal commission, but several others of some importance were held during the 16th and 17th centuries, under the patronage of the earl of Pembroke, Sir Richard Neville, and other influential persons. Amongst these the last of any particular note was one held in Bewper Castle, Glamorgan, by Sir Richard Basset in 1681.

During the succeeding 130 years Welsh nationality was at its lowest ebb, and no general Eisteddfod on a large scale appears to have been held until 1819, though several small ones were held under the auspices of the Gwyneddigion Society, established in 1771,—the most important being those at Corwen (1789), St Asaph (1790), and Caerwys (1798).

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[1] According to the Welsh Triads and other historical records, the *Gorsedd* or assembly (an essential part of the modern Eisteddfod, from which indeed the latter sprung) is as old at least as the time of Prydain the son of Aedd the Great, who lived many centuries before the Christian era. Upon the destruction of the political ascendency of the Druids, the Gorsedd lost its political importance, though it seems to have long afterwards retained its institutional character as the medium for preserving the laws, doctrines, and traditions of bardism.

At the close of the Napoleonic wars, however, there was a general revival of Welsh nationality, and numerous Welsh literary societies were established throughout Wales, and in the principal English towns. A large Eisteddfod was held under distinguished patronage at Carmarthen in 1819, and from that time to the present they have been held, almost without intermission, annually, several of them being under royal patronage. The following is a list of the principal Eisteddfodau since that date:—

1820, Wrexham; 1821, Carnarvon; 1822, Brecon; 1823, Carmarthen; 1824, Welshpool; 1826, Brecon; 1828, Denbigh; 1832, Beaumaris; 1834, Cardiff; 1835, Llanerchymedd; 1836, Liverpool; 1838, Merthyr; 1839, Liverpool; 1840, Abergavenny; 1842, Swansea; 1845, Abergavenny; 1849, Aberffraw; 1850, Rhuddlan; 1851, Tremadoc; 1853, Liverpool and Portmadoc; 1854, Festiniog; 1855, Dinas Mawddwy, Machraeth, and Morriston; 1858, Llangollen (memorable for its archaic character, and the attempts then made to revive the ancient ceremonies and restore the ancient vestments of druids, bards, and ovates); 1859, Merthyr; 1860, Denbigh; 1861, Conway and Aberdare; 1862, Carnarvon; 1863, Swansea and Rhyl; 1864, Llandudno; 1865, Aberystwith; 1866, Chester; 1867, Carmarthen; 1868, Ruthin; 1869, Llanerchymedd; 1870, Rhyl; 1871, Towyn; 1872, Portmadoc; 1873, Mold; 1874, Bangor; 1875, Pwllheli; 1876, Wrexham; and 1877, Carnarvon.

Besides those, innumerable local Eisteddfodau have been been held during the last 50 years.

To constitute a provincial Eisteddfod it is necessary that it should be proclaimed by a graduated bard of a Gorsedd a year and a day before it takes place. A local one may be held without such a proclamation. A provincial Eisteddfod generally lasts three, sometimes four days, during which thousands of persons of all classes and from all parts of Wales and many English towns attend. Many of these being unacquainted with the Welsh language, a large portion of the public proceedings are conducted in English. A president and a conductor are appointed for each day. The proceedings commence with a Gorsedd meeting, opened with sound of trumpet and other ceremonies, at which candidates come forward and receive bardic degrees after satisfying the presiding bard as to their fitness. At the subsequent meetings the president gives a brief address; the bards follow with poetical addresses; adjudications are made, and prizes and medals with suitable devices are given to the successful competitors for poetical, musical, and prose compositions, for the best choral and solo singing, and singing with the harp or "Pennillion singing"[1] as it is called, for the best playing on the harp or stringed or wind instruments, as well as occasionally for the best specimens of handicraft and art. In the evening of each day a concert is given, generally attended by very large numbers. The great day of the Eisteddfod is the "chair" day—usually the third or last day—the grand event of the Eisteddfod being the adjudication on the chair subject and the chairing and investiture of the fortunate winner. This is the highest object of a Welsh bard's ambition. The ceremony is an imposing one, and is performed with sound of trumpet. See CELTIC LITERATURE, vol. v. pp. 318, 319, and for authorities, p. 327. (R. W.*)

EJECTMENT, in English law, was an action for the recovery of the possession of land, together with damages for the wrongful withholding thereof. In the old classification of actions, as real or personal, this was known as a mixed action, because its object was twofold, viz., to recover both the realty and personal damages. The form of the action as it prevailed in the English courts down to the Common Law Procedure Act, 1852, was a series of fictions, among the most remarkable to be found in the entire body of English law. The following outline is condensed from the work of Mr Sergeant Adams:—A, the person claiming title to land, delivers to B, the person in possession, a declaration in ejectment, in which C and D, fictitious persons, are plaintiff and defendant. C states that A has devised the land to him for a term of years, and that he has been ousted by D. A notice signed by D informs B of the proceedings, and advises him to apply to be made defendant in D's place, as he, D, having no title, does not intend to defend the suit. If B does not so apply, judgment will be given against D, and possession of lands will be given to A. But if B does apply, the court allows him to defend the action only on condition that he admits the three fictitious averments—the lease, the entry, and the ouster—which, together with title, are the four things necessary to maintain an action of ejectment. This having been arranged, the action proceeds, B being made defendant instead of D. The names used for the fictitious parties were John Doe, plaintiff, and Richard Roe, defendant, who was called the casual ejector. The explanation of these mysterious fictions is this. The writ of *ejectione firmæ* was invented about the beginning of the reign of Edward III. as a remedy to a lessee who for years had been ousted of his term. It was a writ of trespass, and carried damages, but in course of time the courts of common law added thereto "a species of remedy neither warranted by the original writ nor demanded by the declaration, viz., a judgment to recover the term and a writ of possession thereupon." The next step was to extend the remedy to cases of disputed title to freeholds. This was done indirectly by the claimant entering on the land and there making a lease for a term of years to another person; for it was only a term that could be recovered by the action, and to create a term required actual possession in the granter. The lessee remained on the land, and the next person who entered even by chance was accounted an ejector of the lessee, who then served upon him a writ of trespass and ejectment. The case then went to trial as on a common action of trespass; and the claimant's title, being the real foundation of the lessee's right, was thus indirectly determined. These proceedings might take place without the knowledge of the person really in possession; and to prevent the abuse of the action a rule was laid down that the plaintiff in ejectment must give notice to the party in possession, who might then come in and defend the action. When the action came into general use as a mode of trying the title to freeholds, the actual entry, lease, and ouster which were necessary to found the action were attended with much inconvenience, and accordingly Lord Chief-Justice Rolle during the Protectorate substituted for them the fictitious averments already described. The action of ejectment is now only a curiosity of legal history. Its fictitious suitors were swept away by the Common Law Procedure Act of 1852. A form of writ was prescribed, in which the person in possession of the disputed premises by name and all persons entitled to defend the possession were informed that the plaintiff claimed to be entitled to possession, and required to appear in court to defend the possession of the property or such part of it as they should think fit. In the form of the writ and in some other respects ejectment still differed from other actions. But now by the Judicature

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[1] According to Jones's *Bardic Remains*, "To sing 'Pennillion' with a Welsh harp is not so easily accomplished as may be imagined. The singer is obliged to follow the harper, who may change the tune, or perform variations ad libitum, whilst the vocalist must keep time, and end precisely with the strain. The singer does not commence with the harper, but takes the strain up at the second, third, or fourth bar, as best suits the 'pennill' he intends to sing. Those are considered the best singers who can adapt stanzas of various metres to one melody, and who are acquainted with the twenty-four measures according to the bardic laws and rules of versification."

Act, 1875, all actions are begun and carried on in the same manner, and an action for the recovery of land will, with very few exceptions, proceed in the same manner as any other action.

EKATERINBURG, or **Yekaterinburg**, a town of Asiatic Russia, at the head of a department in the province of Perm, on the Siberian highway, about 238 miles to the south-east of Perm, in 56° 49′ N. lat. and 60° 35′ E. long. It is situated near the eastern skirt of the Ural Mountains, and occupies both banks of the Isset, which is there crossed by a dam and forms a valuable reservoir for industrial purposes. In 1834 it was made the seat of a suffragan bishop, and it has long been the head-quarters of the administration of the mines, not only for the immediate neighbourhood, but also for the Bogosloff, Goroblagodat, Perm, Zlatoustoff, and Kam-Votkin districts. The streets are broad and regular, and several of the houses of palatial proportions. There are two cathedrals—St Catherine's founded in 1758, and Epiphany in 1774, with more than a dozen churches and a monastery, two gymnasiums, a departmental school, a city infirmary, a workmen's hospital, an almshouse, a children's home, a prison, a theatre, and a museum opened in 1853. Besides the Government mint for copper coinage, which dates from 1735, the Government engineering works, and the imperial factory for the polishing of malachite, jasper, marble, porphyry, and other ornamental stones, the industrial establishments comprise tallow-factories, soap-works, glue-works, rope-works, distilleries, potteries, and carriage factories. The trade is very extensive, especially in cattle, grain, iron, woollen and silk stuffs, and colonial wares; and besides a weekly market there are two annual fairs. The population in 1860 numbered 19,832, mostly belonging to the Greek Church, only 47 being Catholics, 198 Protestants, and 36 Mahometans; in 1871 it had increased to 25,233.

Ekaterinburg took its origin from the mining establishments founded on the spot by Peter I. in 1723, and received its name in honour of Catharine I. Its development was greatly promoted in 1763 by the Siberian highway, which till then had passed by Verkhoturie, being diverted so as to pass through it; and the gradual extension of mining operations in the district has maintained its prosperity. In 1781 the town was transferred from the Tobolsk department to the government of Perm, and in 1863 passed from the jurisdiction of the Administration of Mines to the ordinary civil jurisdiction.

EKATERINODAR, the chief town of the Russian government of Kuban, on the right bank of the Kuban, near the confluence of the Karasuk, in 45° 3′ N. lat. and 38° 30″ E. long., 1400 miles from St Petersburg and 555 north west of Tiflis. It is badly built on a swampy site exposed to the inundations of the river; and its houses, with few exceptions, are slight structures of wood and plaster. Six churches, a gymnasium, two schools, and a hospital are the principal public buildings. None of the industrial establishments, which comprise soap-works, tanneries, brick-works, and potteries, are of more than local importance; but there is a fair trade in horses, cattle, sheep, wool, and fish. In the neighbourhood is a large garden and orchard maintained by the Government for the encouragement of horticulture. The town dates from the reign of Catherine II., when in 1792 the Zaporogian Cossacks were transferred to the Kuban district. In 1860 the population amounted to 9620, mainly Cossacks; in 1871 it was 17,022.

EKATERINOSLAFF, or **Ekaterinoslavskaya Gubernie**, a government of Southern Russia, which lies partly to the W. of the Dnieper, stretches E. to the Donetz and the Kalmius, and in the S. reaches the Sea of Azoff between the mouths of the Berda and the Kalmius. It is watered by the Dnieper for 220 miles, and bounded by the Donets for 132. The district of Rosstoff, lying round the head of the Gulf of Taganrog, though naturally a portion of the Country of the Don, is also assigned to Ekaterinoslaff. According to the military survey, the area of the government is 26,095 square miles, or 59,185 square versts; according to Schweizer, only 25,644 square miles, or 58,338 square versts. Its surface is a steppe-like plain, relieved here and there by considerable elevations, and traversed by deep ravines and river courses. The most important range of hills, or those forming the water-shed between the tributaries of the Donetz and the independent affluents of the Sea of Azoff, attains no greater height than 530 feet above sea-level. A line drawn from near the mouth of the Orel parallel with the Dnieper as far as the town of Ekaterinoslaff, and thence to the village of Karakub on the Kalmius, divides the government into two geological districts, of which the south-western is distinguished by crystalline and the north-eastern by sedimentary rocks. Of the former the predominant variety is gneiss, interrupted by numerous upheavals of granite, syenite, diorite, and serpentine. The latter belong to several different formations. Carboniferous strata occupy the greater part of the districts of Slavianoserbsk and Bakhmut and part of Pavlogradsk and Alexandrofsk; Permian strata occur within a very limited area in Bakhmutsk; Cretaceous strata form a narrow strip along the northern boundary of the government from Bakhmutsk to the confluence of the Orelka and the Orel; and Tertiary strata extend through nearly all the district of Novomoskoff and the southern part of Pavlogradsk. The mineral deposits of the government are of great value. Anthracite and coal are distributed along the northern Donetz, the Lugan, the Miuschik, the Kalmius, and various other streams. The quantity of coal obtained in 1861 exceeded 1,200,100 puds. Iron ore is present in the same districts, and is successfully worked in several places, as at the Government establishments on the Lugan. Excellent whetstone is procured in the Slavionoserbsk district, and transported throughout Russia. Asbestos, millstones, gypsum, marl, and rock salt, as well as building materials, are among the minor products. There are altogether about 200 lakes in the government, the largest, which is called the Soleni Liman or Salt Lagoon, though the water is fresh, has an area of nearly three square miles; and next in size is the Temernitz lake near Rostoff. The soil is for the most part very fertile, and agriculture is the principal occupation. Wheat is the staple cereal, and forms an important article of export; but rye, barley, and millet are cultivated for local consumption and distillation. Since about 1850 the culture of flax has attained considerable importance; wild rape-seed is also exported, and in small quantities hemp and the sunflower are grown. The sloe thorn is very abundant, and the fruit is manufactured into a wine called Terevka. The German colonists of Khorlitz and Alexandrovka and the Greeks of Mariupol cultivate tobacco—the former principally a poor American variety for local consumption, the latter Turkish for export. Potatoes are grown only in gardens, as to plant them in the fields is regarded as prejudicial. Horticulture is poorly developed, but there are beautiful public gardens at Taganrog and Ekaterinoslaff, the Petrofski park in the former city being also the oldest in the government. About 7,209,000 acres, or 45 per cent. of the territory of the government, is devoted to pasturage; and in 1861 there were 2,670,000 sheep, 730,000 neat, 200,000 horses. Only about two per cent. of the surface is occupied by wood, and even that is almost exclusively confined to the river courses, especially of the Samara and the Dnieper. The trees are almost exclusively deciduous, oak predominating, and elm, larch, black poplar, poplar, and aspen occurring.

In 1860 the total population was 1,138,740, and in 1867, 1,281,482. At the former date there were about 35,000 Greeks, more than 23,000 Jews, more than 20,000 Germans, 19,000 Armenians, 9000 Moldavians and Wallachians, 7000 Poles, 7000 Lithuanians, 500 Servians, and 5000 Gipsies; while the Little Russians and the Great Russians stood to each other in the ratio of 83 to 17. Upwards of 5500 were Russian dissenters or Raskolniks, 20,318 Protestants, and 7040 Catholics. Two cities only, Rostoff and Taganrog had more than 20,000 inhabitants; four, Ekaterinoslaff, Nakhichevan, Bakhmut, and Petrokovka, had upwards of 10,000; and several, such as Novomoskofsk, Pavlograd, Mariupol, and Azoff had more than 5000.

Ekaterinoslaff, a town of European Russia, capital of the above government, is situated on the right bank of the Dnieper, at a height of 210 feet above the sea, 984 miles from St Petersburg and 600 from Moscow, in 48° 21′ N. lat. and 34° 4′ E. long. If the suburb of Novi Koindak be included, it extends for upwards of four miles along the river, and its average breadth is about 1½ miles. The oldest part lies very low, and is consequently much exposed to floods. Contiguous to the town on the north-west is the royal village of Novi Maidani or the New Factories, and in the south-east Kazannaya Mandrikovka. Only about 200 houses are built of stone. The bishop's palace, eight churches, a Raskolnik place of worship, a synagogue and four Jewish oratories, a gymnasium, a library, and several benevolent institutions, make up the list of the public buildings. The house now occupied by the Nobles' Club was formerly occupied by Potemkin. Among the industrial establishments are brickworks, foundries, flour-mills, and numerous tallow-boileries and soap-works. The general trade is rather restricted by the position of the town above the rapids of the Dnieper; but there is a very extensive trade in wood. Three yearly markets are held, at the largest of which the movement amounts to upwards of 2,200,000 roubles. Population in 1861, 18,881, of whom 3472 were Jews; in 1871, 24,267.

On the site of the town of Ekaterinoslaff there formerly stood the Polish castle of Koindak, built in 1635 by the French general Beauplan. The Cossacks, having destroyed the castle, founded the villages of Old and New Koindak and Polvitza. In 1786, the town was established by Potemkin, and in the following year the empress, Catherine II., with her own hand laid the foundation stone of the Cathedral of the Transfiguration. The schemes of Potemkin for the extension of the city were neglected after his death, and Paul I. changed the very name into Novo Rossiesk. The original name was restored in 1802, and the city raised to its present rank. In 1830, the cathedral was built on the site originally proposed, but according to a less extensive scale.

EKHMIN, or **Akhmin**, a town of Upper Egypt, a short distance from the right bank of the Nile, between two and three miles above Suhag. It is a place of about 3000 or 4000 inhabitants, has several mosques and two Coptic churches, maintains a weekly market, and manufactures shawls and checked cotton. Outside of the walls are the ruins of two ancient temples, one of which, identified by an inscription of the 12th year of the emperor Trajan as that of Pan, was regarded by Abulfeda as among the most important in Egypt.

Ekhmin, in Coptish Khmin or Shmin, is the ancient Chemmis or Panopolis, chief town of the Chemmite nome in the Thebaid, and, according to Strabo, inhabited by skilful stone-cutters and linen-weavers. It was reputed one of the oldest cities in the country. Herodotus particularly mentions a temple of Perseus, and asserts that the inhabitants celebrated gymnastic games in honour of this hero; but it has not been ascertained to which of the Egyptian gods this account should be assigned. Panopolis probably decayed with the rise of Thebes, and long after it suffered greatly at the hands of the Arab invaders. At the time of Pococke's visit in 1738, it was still the seat of a powerful emir, who extended his protection to the Coptic Catholics; but the dynasty is long ago extinct, leaving nothing but its traditions and sepulchres behind. Nonnus, the Greek poet, was born at Chemmis in 410, and Nestorius died and was buried there about 447.

EKRON, in the Septuagint and Apocrypha Accaron (Ἀκκαρών), a royal city of the Philistines, identified with the modern Syrian village of Akir, five miles from Ramlah, on the southern slope of a low ridge separating the plain of Philistia from Sharon. Though included by the Israelites within the limits of the tribe of Judah, and mentioned in Judges xix. as one of the cities of Dan, it was in Philistine possession in the days of Samuel, and apparently maintained its independence. According to the narrative of the Hebrew text, here differing from the Septuagint and Josephus, it was the last town to which the ark was transferred before its restoration to the Israelites. Its maintenance of a sanctuary to Beelzebub is mentioned in 2 Kings i. At the time of the Crusades it was still a large village; but now, according to Porter, it contains only 50 mud houses, and has no visible remains of antiquity except two finely built wall

ELAGABALUS. See **Heliogabalus**.

ELAM. This is the name given in Scripture to the province of Persia called Susiana by the classical geographers, from Susa or Shushan its capital. In one passage, however (Ezra iv. 9), it is confined to Elymais, the north-western part of the province, and its inhabitants distinguished from those of Shushan, which elsewhere (Dan. viii. 2) is placed in Elam. Strabo (xv. 3, 12, &c.) makes Susiana a part of Persia proper, but a comparison of his account with those of Ptolemy (vi. 3, 1, &c.) and other writers would limit it to the mountainous district to the east of Babylonia, lying between the Oroatis and the Tigris, and stretching from India to the Persian Gulf. Along with this mountainous district went a fertile low tract of country on the western side, which also included the marshes at the mouths of the Euphrates and Tigris and the north-eastern coast land of the Gulf. This low tract, though producing large quantities of grain, was intensely hot in summer; the high regions, however, were cool and well watered. The whole country was occupied by a variety of tribes, all speaking agglutinative dialects allied to each other and to the so-called Accadian language of primitive Chaldea, but in very different stages of civilization. The most important of the tribes were the natives of southern Susiana, called Anzan in the cuneiform inscriptions, who established their capital at Susa, and founded a powerful monarchy there at a very early date. Strabo (xi. 13, 3, 6), quoting from Nearchus, seems to include them under the Elymæans, whom he associates with the Uxii, and places on the frontiers of Persia and Susa; but Pliny more correctly makes the Eulæus the boundary between Susiana and Elymais (*N. H.*, vi. 29–31). The Uxii are described as a robber tribe in the mountains adjacent to Media, and their name is apparently to be identified with the title given to the whole of Susiana in the Persian cuneiform inscriptions, *Uwaja*, or "Aborigines." Uwaja is probably the origin of the modern Khuzistan, though Mordtmann would derive the latter from خوز "a sugar-reed." Immediately bordering on the Persians were the Amardians or Mardians, in whom we may see the Apharsathchites and Apharsites of Ezra iv. 9, as well as Khapirti or Khalpriti, the name given to Susiana in the Protomedic cuneiform texts, which are written in the agglutinative dialect of the Turanian Medes and northern Elamites. Khapirti appears as Aipir in the inscriptions of Mal-Amir. Passing over the Messabatæ, who inhabited a valley which may perhaps be the modern Máh-Sabadan, as well as the level district of Yamutbal or Yatbur (with its capital Duran or Deri) which separated Elam from Babylonia, and the smaller districts of Characene, Cabandene, Corbiana, and Gabiene mentioned by classical authors, we come to the fourth principal tribe of Susiana, the Cissii (*Æsch.*, *Pers.*, 16; Strab. xv. 3, 2) or Cossæi (Strab. xi. 5, 6; xvi. 11, 17; Arr., *Ind.*, 40; Polyb. v. 54, &c.), the Cassi of the cuneiform inscriptions. So important were they, that the whole of Susiana was sometimes called Cissia after them, as by Herodotus (iii. 91; v. 49, &c.). In fact, Susiana was only a late name for the country, dating from the time when Susa had been made a capital of the Persian empire. The Accadians called it Numma, "the highlands" (compare the Vogul *numan*, "high"), or 'Subarti, with the same meaning, and of this the Semitic *Elamu* (from עלת) was only a translation. Such was also the signification of the native Khapir or Aipir, also written Khubur, which is made synonymous with 'Subarti (comp. Eber, Gen. xi. 14). The Assyrian inscriptions have disposed of the suggestion, first made by J. Müller and Lassen, that Elam is a corrupt form of the Indo-European Airyama.

The principal mountains of Elam were on the north, called Charbanus and Cambalidus by Pliny (vi. 27, 31), and belonging to the Parachoathras chain. In the inscriptions they have the general name of "mountains of the east," which extended into Media, where "the mountain of Nizir," or "the mountain of the world," the present mount Elwend, was believed to be the spot on which the ark had rested, and the cradle of mankind. There were numerous rivers flowing into either the Tigris or the Persian Gulf. The most important were the Ulai or Eulæus (*Kúran*) with its tributary the Pasitigris, the Choaspes (*Kerkhah*), the Coprates (river of *Diz* called Itito in the inscriptions), the Hedyphon or Hedypnus (*Jerráhi*), and the Oroatis (*Hindyan*), besides the monumental Surappi and Ukni, or "white river," perhaps to be identified with the Hedyphon and Oroatis, which fell into the sea in the neighbourhood of the Caldai of Bit-Yagina, of Khindar, and of the Gambulai, in the marshy region at the mouth of the Tigris. Shushan or Susa, the capital, now marked by the mounds of *Shush*, stood near the junction of the Choaspes and Eulæus (see SUSA); and Badaca, Madaktu in the inscriptions, lay between the *Shapur* and the river of *Diz*. Among the other chief cities mentioned in the inscriptions, may be named Naditu, Khaltemas, Din-sar, Bubilu, Bit-imbi, Khidalu, and Nagitu on the sea coast. Here, in fact, lay some of the oldest and wealthiest towns, the sites of which have, however, been removed inland by the silting up of the shore. The monumental Dilvun, for instance, which according to Sargon was an island 30 *caspu* from the land, is now probably represented by *Bunder Dellim*.

The civilization of southern Elam was of very great antiquity. The Accadai or "Highlanders," who founded the cities and civilization of primæval Chaldea, descended from its mountains, carrying with them the picture-writing which afterwards developed into the cuneiform syllabary. An examination of the syllabary shows us that the only animals with which they were acquainted were the ass, the ox, the sheep, the gazelle, the antelope, the bear, the wild bull, the dove, the snake, the fly, the flea, the moth, the bee, and different species of fish,—horses, called the "animals of the east," being a subsequent importation. Neither the palm nor the vine were known before their emigration into Babylonia; indeed, Strabo states that the vine was first introduced into Susiana by the Macedonians. The different tribes of the country were constantly invading Babylonia, and from time to time imposed their dominion upon it. About 2280 B.C. (according to the date furnished by Assur-bani-pal), the Elamite king Cudur-nankhundi carried away the image of the goddess Nana from Babylonia to Shushan, and in Gen. xiv. we find Chedorlaomer or Cudur-lagamar suzerain of the Babylonian princes. Cudur-mabug, the son of Simti-Silkhak, king of Yamutbal, founded a dynasty in Chaldea, which lasted for two generations, his son Rim-Agu or Eri-Acu (Arioch) of Larsa being afterwards conquered by Khammuragas. Khammuragas himself was a Cassite, and the dynasty he founded at Babylon, which he made for the first time the capital of the country, continued for several centuries, and was only overthrown at last by the Assyrian monarch, Tiglath-Adar, in 1270 B.C. Another Cassite dynasty had ruled Babylonia at a very much earlier time, and one of its kings, Agu-kak-rimi, had restored the great temple of Bel at Babylon. Elamite raids recommenced within a few years after the overthrow of the second Cassite dynasty, Elamites from time to time appear as kings of Babylonia, and about 1200 B.C. the whole country was ravaged and desolated by the Elamite Cudur-nankhundi II. Revenge for this, however, was shortly afterwards taken by the Babylonian Nebuchadrezzar. Subsequently, we find Elam and Babylon in alliance against the growing power of Assyria, and in the 8th and 7th centuries B.C., when Babylonia was alternately under the sway of the Assyrian princes and of Chaldean and other adventurers from the districts on the Persian Gulf, Elam played a large part in its political history. Tiglath-Pileser II., in 745 B.C., first overran the sea-coast as far as the Ukni, and in 721 Sargon met Khumba-nigas the elamite in battle at Duran, and drove him across the Assyrian frontier. After the establishment of the Assyrian empire in the west and north, the reduction of Babylonia to a dependent province became a necessity, and this involved the weakening and final conquest of the powerful kingdom of Elam itself. The struggle lasted through the reigns of four Assyrian kings, Sargon, Sennacherib, Esarhaddon, and Assur-bani-pal, and the overthrow of Elam was eventually effected only by the help of internal discord and civil war. In 710, Sutruk-nankhundi was driven from Yatbur and Rasi, on the Babylonian frontier, and his Babylonian ally Merodach-baladan left to his fate. In 704 the Elamites and Babylonians were defeated at Cis by Sennacherib, and in the following year the Cassi in the north-east were reduced to submission. In 697 B.C., the fleet of Sennacherib pursued Merodach-Baladan and his followers to Nagitu and Khilman, at the mouth of the Eulæus, where the Elamites had given them shelter; the emigrants and their Susian allies were scattered, and the towns burned. Meanwhile, Cudur-nankhundi, the Elamite monarch, had marched into Babylonia; he was driven back, however, by Sennacherib, 34 of his cities were destroyed, and he himself fled from Madaktu to Khaidala. Three months after he died, and his brother and successor, Umman-minan, at once began to collect allies from all sides, and to prepare for resistance. The terrible defeat at Khalule in 692, however, broke the power of Elam, and made Babylonia an Assyrian province. Umman-aldas I. remained on friendly terms with Esarhaddon, but his murder by his two brothers, Urtaki and Teumman, caused the war-party to recover its ascendency, and Urtaki made an unsuccessful raid into Babylonia. On his death, his brother Teumman succeeded, in virtue of the law by which the crown passed to the brother and not to the sons of the deceased monarch, and almost immediately provoked a quarrel with Assur-bani-pal by demanding the surrender of his nephews, who had taken refuge at the Assyrian court. The Assyrians followed the Elamite army to Shushan, where a battle was fought on the Eulæus, in which the Elamites were defeated, Teumman was captured and slain, and Umman-igas, the son of Urtaki, made king, his younger brother Tammaritu being assigned the district of Khidalu. Umman-igas afterwards assisted in the revolt of Babylonia, but Tammaritu raised a rebellion against him, defeated him in battle, cut off his head, and seized the crown. Tammaritu marched to Babylonia; while there, his officer Indabigas, made himself king at Shushan, and drove Tammaritu to the coast, where he fled to Assur-bani-pal. Indabigas was himself defeated and killed by a new pretender, Umman-aldas II., who was opposed, however, by three other rivals, two of whom maintained themselves in the mountains until the Assyrian conquest of the country, when Tammaritu was first restored and then imprisoned, Elam being wasted with fire and sword. The return of Umman-aldas led to a fresh Assyrian invasion; the Elamite king fled from Madaktu to Dur-undasi, Shushan and other cities were taken, and the Elamites utterly routed on the banks of the Itite. The whole country was reduced to a desert, Shushan was plundered and razed to the ground, 32 statues of its kings "of silver, gold, bronze, and alabaster" being carried off, and Susiana was made an Assyrian province in 640 B.C. The language of the Hebrew prophets seems to imply that Elam recovered its independence, but was again conquered by Nebuchadrezzar; on the fall of the Babylonian empire it passed to Persia, the Susian king Abradatas, mentioned in Xenophon's romance of the *Cyropædia* (vi.), being probably unhistorical. Darius formed it into a satrapy, with a tribute of 300 talents (Hdt. iii. 91). Shushan or Susa was rebuilt, and became the capital of the empire. Twice at least, however, the Susianians attempted to revolt in the early part of the reign of Darius, under Assina or Atrines, the son of Umbadara, and Martiya, the son of Issainsakris, who called himself Immanes; but they gradually came to be completely Aryanized, and their old agglutinative dialects were in course of time supplanted by the Aryan Persian from the south-east.

Among the Elamite divinities may be mentioned Lagamar or Lagamal, and Armannu, the secret title of Susinak, "the god of Shushan," who was believed to go every year to Dilvun. His oracle stood just outside the city, and his image was held too sacred to be seen by the eyes of a mortal.

See Loftus, *Chaldea and Susiana*, 1857, Oppert in the *Transactions of the Oriental Congress*, 1854, and *Records of the Past*, vii. 79, 1877; and Sayce on the "Cuneiform Inscriptions of Elam and Media" in the *Transactions of the Society of Biblical Archæology*, iii. 2, 1874. (A. H. S.)

ELAND (*Boselaphus oreas*) is the largest and most valuable member of the antelope family. It is fully equal to the horse in size, standing six feet high at the shoulders, and measuring nine feet from the nose to the root of the tail. In robustness of build it resembles the ox, and forms the type of the bovine subdivision of antelopes. Its neck is thick, and is furnished with a prominent dewlap, fringed with long hair. Except on the ridge of the back the fur is short, and is usually of a reddish fawn colour above and white beneath. Its horns are about 20 inches in length, nearly straight, and in the male are surrounded throughout the greater part of their length with a spiral wreath; in the female they are more slender, and the spiral ridge is indistinct or absent. The eland is a native of South Africa, where it roams in considerable herds over the open plains, "rejoicing," says a recent traveller, "in the belts of shaded hillocks, and in the isolated groves of *Acacia capensis*, which, like islands in the ocean, are scattered over many of the stony and gravelly plains of the interior." It is slow in its movements as compared with the other antelopes, and is readily captured, while in disposition it is exceedingly gentle, and thus seems eminently adapted for domestication. It breeds readily in confinement, and herds of elands have already been introduced into various parks in Britain. Its flesh is highly prized as an article of food, resembling beef, it is said, in grain and colour, but being more delicate and better flavoured. The eland is remarkable for the quantity of fat which it takes on, exceeding in this respect all other large game. The carcase of a single individual weighs from 1500 to 2000 lbs. The eland was formerly abundant in the neighbourhood of Cape Town, but is now rarely found within the colony, and should man not succeed meanwhile in domesticating it, there is reason to fear that a valuable source of animal food will be lost to him by the speedy extermination of the eland.

EL-ARAISH, L'ARAISH, or in French LARACHE, a town of Morocco on the Atlantic coast, about 45 miles S. of Tangier, is picturesquely situated on a rocky height to the south of the embouchure of the Wady Loukhus or Lixus. It is the seat of a military governor, and has a number of well-kept though practically useless defences. The impress of Spanish occupation is still evident, and all the main points described in the 17th century by Pidou de Saint Olon can easily be distinguished—such as the church, the fort of St Jacques, the castle of St Etienne with its four cupolas, the Jew's Tower, and the castle of Notre Dame d'Europe, now the Kasba or citadel. The market-place is surrounded with arcades of monolithic sandstone pillars. In spite of the bar at the entrance of the river preventing the passage of all vessels of more than 150 tons, the port is one of the most frequented on that part of the coast. The exports, gradually increasing in value, consist mainly of millet, drà, and other cereals, canary-seed, beans, pease, cork, and wool. In 1875, 136 vessels entered and cleared, 26 being British and 58 Spanish. The population of the town at the same date was estimated at 5000, of whom nearly 4000 were Mahometans, about 1000 Spanish-speaking Jews, and 60 Christians.

Though the name of El-Araish is comparatively modern, and is mentioned neither by El-Bikri nor by Edrisi, it seems not improbable from a passage in Scylax that the site of the town was occupied by a Libyan settlement at an early date; and about 3½ miles up the river there still exist on the hill of Tchemmish very considerable ruins of the Punico-Roman city of Lixus. The modern town was finally taken from the Portuguese in 1689 by Mulei Ismael after a five months' siege; in 1785 it was attacked by the French, and in 1829 saw the destruction of the Morocco fleet by the Austrians. A convent in connection with the Spanish mission was maintained till 1822

See Barth, *Wanderungen durch die Kustenländer des Mittelmeeres*, 1849; Rohlfs *Adventures in Morocco*, 1874; Tissot, "Itinéraire de Tanger à R'bat," in *Bull. de la Soc. de Géogr.*, 1876.

ELASTICITY

1. ELASTICITY of matter is that property in virtue of which a body requires force to change its bulk or shape, and requires a continued application of the force to maintain the change, and springs back when the force is removed, and, if left at rest without the force, does not remain at rest except in its previous bulk and shape. The elasticity is said to be perfect when the body always requires the same force to keep it at rest in the same bulk and shape and at the same temperature through whatever variations of bulk, shape, and temperature it be brought. A body is said to possess some degree of elasticity if it requires any force to keep it in any particular bulk or shape. It is convenient to discuss elasticity of bulk and elasticity of shape sometimes separately and sometimes jointly.

2. Every body has some degree of elasticity of bulk. If a body possesses any degree of elasticity of shape it is called a solid; if it possesses no degree of elasticity of shape it is called a fluid.

3. All fluids possess elasticity of bulk to perfection. Probably so do all homogeneous solids, such as crystals and glasses. It is not probable that any degree of fluid pressure (or pressure acting equally in all directions) on a piece of common glass, or rock crystal, or of diamond, or on a crystal of bismuth, or of copper, or of lead, or of silver, would make it denser after the pressure is removed, or put it into a condition in which at any particular intermediate pressure it would be denser than it was at that pressure before the application of the extreme pressure. Malleable metals and alloys, on the other hand, may have their densities considerably increased and diminished by hammering and by mere traction. By compression between the dies used in coining, the density of gold may be raised from 19·258 to 19·367, and the density of copper from 8·535 to 8·916;[1] and Mr M'Farlane's experiments quoted below (section 78), show a piece of copper wire decreasing in density from 8·91 to 8·835 after successive simple tractions, by which its length was increased from 287 centimetres to 317 centimetres, while its modulus of rigidity decreased from 443 to 426 million grammes per square centimetre. Later experiments, recently made for this article by the same experimenter, have shown *augmentation* of density from 8·85 to 8·95, produced by successive tractions which elongated a piece of copper wire from weighing 16·4 grammes per metre to weighing 13·5 grammes per metre, the wire having been first annealed by heating it to redness in sand, and allowing it to cool slowly. Augmentation of density by traction is a somewhat surprising result, but not altogether so when we consider that the wire had been reduced to an abnormally small density by the previous thermal treatment (the "annealing"). The common explanation of these changes of density in metals, which attributes them to porosity, is probably true; by porosity being understood a porous structure with such vast numbers of the ultimate molecules in the portions of the solid substance between pores or interstices that these portions may be called homogeneous in the sense that a crystal or a liquid can be called homogeneous (compare section 40 below).

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[1] *Seventh Annual Report of the Deputy-Master of the Mint*, p. 49, quoting as authority Percy's *Metallurgy of Copper*. London, 1861.

4. The elasticity of shape of many solids is not perfect: it is not known whether it is perfect for any. It might be expected to be perfect for glass and rock crystal and diamond and other hard, brittle, homogeneous substances; but experiment proves that at all events for glass it is not so, and shows on the contrary a notable degree of imperfection in the torsional elasticity of glass fibres. It might be expected that in copper and soft iron and other plastic metals the elasticity of shape would be very imperfect; experiment shows, on the contrary, that in copper, brass, soft iron, steel, platinum, provided the distortion does not exceed a certain limit in each case, elasticity of shape is remarkably perfect, much more perfect than in glass. It is quite probable that even in the softer metals—zinc, tin, lead, cadmium, potassium, sodium, &c.—the elasticity of shape may be as perfect as in the metals mentioned above, but within narrower limits as to degree of distortion. Accurate experiment is utterly wanting, to discover what is the degree of imperfection, if any, of the elasticity of any metal or alloy, when tested within sufficiently narrow limits of distortion.

5. The "viscosity of metals" described below (sections 21–25) does not demonstrate any imperfectness of elasticity according to the definition of section 1, which is purely statical. The viscosity of solids *may* (for all we yet know by experiment) depend, as does the viscosity of fluids, upon a resistance varying with the velocity of the change, and *vanishing when the velocity of the change is zero*, that is to say, when the body is at rest in any configuration; if so, the elasticity of the substance concerned is perfect within the limits of the experiment in question. If, on the other hand (as the discovery of elastic fatigue described below seems to indicate may be to some degree the case), the loss of energy from the vibrations in the experiments described is due to a dependence of the elastic resilient force upon previous conditions of the substance in respect to strain, the "viscosity" would be continuous with a true imperfectness of static elasticity. Here, then, we have a definite question which can be answered by experiment only:—Consider a certain definite stress applied to a solid substance; as, for example, a certain "couple" twisting a wire or rod; or a certain weight pulling it out, or compressing it lengthwise; or a certain weight placed on the middle of a beam supported by trestles under its ends. Let it be applied and removed a great many times, and suppose it to be seen that after each application and removal of the stress the body comes to rest in exactly the same configuration as after the previous application or removal of the stress. If now the body be left to itself with the stress removed, and if it be found to remain at rest in the same configuration for minutes, or hours, or days, or years after the removal of the stress, a part of the definition of perfect elasticity is fulfilled. Or, again, if the stress be applied, and kept applied with absolute constancy, and if the body remain permanently in a constant configuration, another item of the definition of perfect elasticity is proved. When any such experiment is made on any metal, unless some of the softer metals (section 4) is to be excepted, there is certainly very little *if any* change of configuration in the circumstances now supposed. The writer believes, indeed, that nothing of the kind has hitherto been discovered by experiment, provided the stress has been considerably less than that which would break or give a notable permanent twist, or elongation, or bend, to the body, that is to say, provided the action has been kept decidedly within the limits of the body's elasticity as commonly understood (sections 7-20). Mr J. T. Bottomley, with the assistance of a grant of money from the British Association, has commenced making arrangements for secular experiments on the elasticity of metals, in the tower of the university of Glasgow, to answer this question in respect to permanence or non-permanence through minutes, or hours, or days, or years, or centuries. If several gold wires are hung side by side, one of them bearing the smallest weight that will keep it approximately straight, another wire $\frac{1}{20}$ of the breaking weight, another wire $\frac{2}{20}$ of the breaking weight, and so on; the one of them bearing $\frac{19}{20}$ of the breaking weight will probably, in the course of a few hours or days, show very sensible elongation. Will it go on becoming longer and longer till it breaks, or will the time-curve of its elongation be asymptotic? Even with considerably less than $\frac{19}{20}$ of the breaking weight there will probably be a continually augmenting elongation, but with asymptotic time-curve indicating a limit beyond which the elongation never goes, but which it infinitely nearly reaches in an infinite time. It is not probable that a gold wire stretched by $\frac{1}{10}$ of its present breaking weight, or by $\frac{1}{4}$ of its present breaking weight, or even by $\frac{1}{2}$ of its present breaking weight, would break in a thousand or in a million years. The existence of gold ornaments which have been found in ancient tombs and cities, and have preserved their shapes for thousands of years without running down glacier-wise (as does brittle pitch or sealing-wax in the course of a few years in moderately warm climates), seems to prove that for gold (and therefore leaves no doubt also for many other metals) the time-curve is asymptotic, if indeed there is any slow change of shape at all after the application of a moderate stress well within the limits of elasticity. Egyptian and Greek statues, Etruscan vases, Egyptian obelisks, and other stone monuments with their engraved hieroglyphics, flint implements and boulders, and mountains with the geological evidence we have of their antiquity, prove for stones, and pottery, and rocks of various kinds, a permanence for thousands and millions of years of resistance to distorting stress.

6. The complete fulfilment of the definition of perfect elasticity is not proved by mere permanence of the extreme configurations assumed by the substance when a stated amount of the stress is alternately applied and removed. This condition might be fulfilled, and yet the amount of elastic force might be different with the same palpable configuration of the body during gradual augmentation and during gradual diminution of the stress. That it is so in fact is proved by the discovery of viscosity referred to below; but it is not yet proved that if, after increasing the stress to a certain definite amount, the body is brought to rest in the same palpable configuration as before, the amounts of stress required to hold it in this configuration are different in the two cases. If they are (section 1) the elasticity is imperfect; if they are not the elasticity is perfect within the limits of the experiment (compare section 36 below).

7. Limits of Elasticity—*Elasticity of Shape.*—The degree of distortion within which elasticity of shape is found is essentially limited in every solid. Within sufficiently narrow limits of distortion every solid shows elasticity of shape to some degree—some solids to perfection, so far as we know at present. When the distortion is too great, the body either breaks or receives a permanent bend (that is, such a molecular disturbance that it does not return to its original figure when the bending force is removed). If the first notable dereliction from perfectness of elasticity is a breakage, the body is called brittle,—if a permanent bend, plastic or malleable or ductile. The metals are generally ductile; some metals and metallic alloys and compounds of metals with small proportions of other substances, are brittle; some of them brittle only in certain states of temper, others it seems essentially brittle. The steel of before the days of Bessemer and Siemens is a remarkable instance. When slowly cooled from a bright

red heat, it is remarkably tough and ductile. When heated to redness and cooled suddenly by being plunged in oil or water or mercury, it becomes exceedingly brittle and hard (glass-hard, as it is called), and to ordinary observation seems incapable of taking a permanent bend (though probably careful observation would prove it not quite so). The definition of steel used to be *approximately pure iron capable of being tempered glass-hard, and again softened to different degrees by different degrees of heat.* Now, the excellent qualities of iron made by Bessemer's and Siemens's processes are called steel, and are reckoned best when *incapable of being tempered glass-hard*, the possibility of brittleness supervening in the course of any treatment which the metal may meet with in its manufacture being an objection against the use of what was formerly called steel for ship's plates, ribs, stringers, &c., and for many applications of land engineering, even if the material could be had in sufficient abundance.

8. LIMITS OF ELASTICITY (CONTINUED)—*Elasticity of Bulk.*—If we reckon by the amount of pressure, there is probably no limit to the elasticity of bulk in the direction of increase of pressure for any solid or fluid; but whether continued augmentation produces continued diminution of bulk towards zero without limit, or whether for any or every solid or fluid there is a limit towards which it may be reduced in bulk, but smaller than which no degree of pressure, however great, can condense it, is a question which cannot be answered in the present state of science. Would any pressure, however tremendous, give to gold a density greater than 19·6, or to copper a density greater than 9·0, after the pressure is removed (section 3 above)? But whether the body be fluid or a continuous non-porous solid, it probably recovers the same density, however tremendously it may have been pressed, and probably shows perfect elasticity of bulk (section 3 above) through the whole range of positive pressure from zero to infinity, provided the pressure has been equal in all directions like fluid pressure. As for negative pressure, we have no knowledge of what limit, if any, there may be to the amount of force which can be applied to a body pulling its surface out equally in all directions. The question of how to apply the negative pressure is inextricably involved with that of the body's power to resist. The upper part of the mercury of a barometer adhering to the glass above the level corresponding to the atmospheric pressure is a familiar example of what is called negative pressure in liquids. Water and other transparent liquids show similar phenomena, another of which is the warming of water above its boiling point in an open glass or metal vessel varnished with shellac. Attempts to produce great degrees of this so-called negative pressure are baffled by what seems an instability of the equilibrium which supervenes when the negative pressure is too much augmented. It is a very interesting subject for experimental inquiry to find how high mercury or water or any other liquid can be got to stand above the level corresponding to the atmospheric pressure in a tall hermetically sealed tube, and how many degrees a liquid can, with all precautions, be warmed above its boiling point. In each case it seems to be by a minute bubble forming and expanding somewhere at the boundary of the liquid, where it is in contact with the containing vessel, that the possible range of the negative pressure is limited, judging from what we see when we carefully examine a transparent liquid, or the surface of separation between mercury and glass, in any such experiment. The contrast of the amounts of negative pressure practically obtainable or obtained hitherto in such experiments on liquids (which are at the most those corresponding to the weight of a few metres of the substance), with that obtainable in the case of even the weakest solids, is remarkable; and as for the strongest, consider for instance (sec. 32 below) 17 nautical miles of steel pianoforte wire hanging by one end. When a cord, or rod, or wire of any solid substance hangs vertically, the negative pressure (for example, 23,000 atmospheres in the case just cited) in any transverse section is equal to the weight of the part hanging below it. It is an interesting question not to be answered by any experiment easily made or even devised,—How much would the longitudinal pull which can be applied to a cord, rod, or wire without breaking it be augmented (probably augmented, but possibly diminished) by lateral pull applied all round the sides so as to give equal negative pressure in all directions?

9. LIMITS OF ELASTICITY (CONTINUED)—*Elasticity of Shape for Distortions not Uniform through the Substance, and for Compound Distortions; and Elasticity corresponding to Co-existent Distortion and Change of Bulk*:—

Example 1.—A round wire twisted, or a cylindrical shaft transmitting revolutional motive in machinery, presents, as we shall see (sec. 64), an instance of simple distortion, but to different degrees in different parts of the substance, increasing from the axis where it is zero, uniformly to the surface where it is greatest.

Example 2.—Elongation of a wire or rod by direct pull, is (sec. 23) an instance of a compound distortion co-existing with a rarefaction of the substance, both distortion and rarefaction uniform throughout.

Example 3.—Shortening of a column by end pressure is an instance of a similar compound distortion combined with condensation of the substance, both distortion and condensation uniform throughout.

Example 4.—Flexure of a round wire or of a bar, or beam, or girder, of any shape of normal section, by opposite bending couples applied at the two ends, is an instance in which one-half of the substance is stretched, and the other half shortened with exactly the same combination of distortions and changes of bulk as in examples 2 and 3. The strain is uniform along the length of the bar, but varies in the cross section in simple proportion to distance from a certain line (sec. 62) through the centre of gravity of the sectional area, which, in the case of a round bar, is the diameter perpendicular to the plane of curvature.

The limits of elasticity in the cases of these four examples are subjects of vital importance in practical mechanics, and a vast amount of careful and accurate observation and experiment, which has given much valuable practical information regarding them, has been gone through by engineers, in their necessary dealings with questions regarding strength of materials. Still there is great want of definite scientific information on the subject of limits of elasticity generally, and particularly on many elementary questions (section 21 below), which force themselves upon us when we endeavour to analyze the molecular actions concerned in such cases as the four examples now before us. Some principles of much importance for guidance in practical as well as theoretical deductions from observations and experiments on this subject were set forth twenty-nine years ago by Professor James Thomson, in an article published in the *Cambridge and Dublin Mathematical Journal* for November 1848. Nothing is to be gained either in clearness or brevity by any other way of dealing with it than reproducing it *in extenso*. It is accordingly given here, with a few changes made in it with its author's concurrence.

It constitutes the following sections, 10–20.

"*On the strength of materials, as influenced by the existence or non-existence of certain mutual strains*[1] *among the particles composing them.* By James Thomson, M.A., College, Glasgow.

10. "My principal object in the following paper is to show that the absolute strength of any material composed of a substance possessing ductility (and few substances, if any, are entirely devoid of this property) may vary to a great extent, according to the state of tension or relaxation in which the particles have been made to exist when the material as a whole is subject to no external strain.

11. "Let, for instance, a round bar of malleable iron, or a piece of iron wire, be made red hot, and then be allowed to cool. Its

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[1] [*Note added Nov.* 1877.] More nearly what is now called *stress* than what is now called *strain* is meant by "strain" in this article, which was written before Rankine's introduction of the word stress, and distinct definition of the word strain (see chap. i. of Mathematical Theory below).

may now be regarded as being all completely relaxed. t, one end of the bar be fixed, and the other be made to y torsion, till the particles at the circumference of the trained to the utmost extent of which they can admit, ndergoing a permanent alteration in their mutual con-

In this condition, equal elements of the cross section or afford resistances proportional to the distances of the from the centre of the bar; since the particles are dis- m their positions of relaxation through spaces which are nal to the distances of the particles from the centre. The hich the bar now resists, and which is equal to the sum of es due to the resistances of all the elements of the section, hich is commonly assumed as the measure of the torsional of the bar. For future reference, this couple may be by L, and the angle through which it has twisted the of the bar by Θ.

The twisting of the bar may, however, be carried still nd during the progress of this process the outer particles in virtue of their ductility, those towards the interior ely reaching their elastic limits, until, when the twisting sufficiently continued, all the particles in the section, ose quite close to the centre, have been strained beyond tic limits. Hence, if we suppose[2] that no change in the of the substance composing the material has resulted from ng of its particles past one another, and that therefore elements of the section of the bar afford the same resist- matter what their distances from the centre may be, it is rove that the total torsional resistance of the bar is $\frac{4}{3}$ of was in the former case; or, according to the notation dopted, it is[3] now $\frac{4}{3}$ L.

f, after this, all external stress be removed from the bar, sume a position of equilibrium, in which the outer particles rained in the direction opposite to that in which it was and the inner ones in the same direction as that of the the two sets of opposite couples thus produced among the of the bar balancing one another. It is easy to show line of separation between the particles strained in tion and those in the other is a circle whose radius is adius of the bar. The particles in this line are evidently no strain[4] when no external couple is applied. The bar with its new molecular arrangement may now be subjected, *as often as we please*,[5] to the couple $\frac{4}{3}$ L without undergoing any farther alteration. Its strength to resist torsion, in the direction of the couple L has therefore been considerably increased. Its strength to resist torsion in the opposite direction has, however, by the same process, been much diminished; for as soon as its free extremity has been made to revolve backwards through an angle[6] of $\frac{2}{3}$ Θ from the position of equilibrium, the particles of the circumference will have suffered the utmost distortion of which they can admit without undergoing permanent alteration. Now, it is easy to prove that the couple required to produce a certain angle of torsion is the same in the new state of the bar as in the old.[7] Hence the ultimate strength of the bar when twisted backwards is represented by a couple amounting to only $\frac{2}{3}$ L. But, as we have seen, it is $\frac{4}{3}$ L when the wire is twisted forwards. That is, then, *The wire in its new state has twice as much strength to resist torsion in one direction as it has to resist it the other.*

14. "Principles quite similar to the foregoing, are applicable in regard to beams subjected to cross strain. As, however, my chief object at present is to point out the existence of such principles, to indicate the mode in which they are to be applied, and to show their great practical importance in the determination of the strength of materials, I need not enter fully into their application in the case of cross strain. The investigation in this case closely resembles that in the case of torsion, but is more complicated on account of the different ultimate resistances afforded by any material to tension and to compression, and on account of the numerous varieties in the form of section of beams which for different purposes it is found advisable to adopt. I shall therefore merely make a few remarks on this subject.

15. "If a bent bar of wrought iron or other ductile material be straightened, its particles will thus be put into such a state that its strength to resist cross strain, in the direction towards which it has been straightened, will be very much greater than its strength to resist it in the opposite direction, each of these two resistances being entirely different from that which the same bar would afford were its particles all relaxed when the entire bar is free from external strain. The actual ratios of these various resistances depend on the comparative ultimate resistances afforded by the substance to compression and extension, and also, in a very material degree, on the form of the section of the bar. I may, however, state that in general the variations in the strength of a bar to resist cross strain, which are occasioned by variations in its molecular arrangement, are much greater even than those which have already been pointed out as occurring in the strength of bars subjected to torsion.

16. "What has already been stated is quite sufficient to account for many very discordant and perplexing results which have been arrived at by different experimenters on the strength of materials. It scarcely ever occurs that a material is presented to us, either for experiment or for application to a practical use, in which the particles are free from great mutual strains. Processes have already been pointed out by which we may at pleasure produce certain peculiar strains of this kind. These, or other processes producing somewhat similar strains, are used in the manufacture of almost all materials. Thus, for instance, when malleable iron has received its final conformation by the process termed *cold swaging*, that is, by hammering it till it is cold, the outer particles exist in a state of extreme compression, and the internal ones in a state of extreme tension. The same seems to be the case in cast iron when it is taken from the mould in which it has been cast. The outer portions have cooled first, and have therefore contracted, while the inner ones still continued expanded by heat. The inner ones then contract as they subsequently cool, and thus they, as it were, pull the outer ones together. That is, in the end the outer ones are in a state of compression and the inner ones in the opposite condition.

17. "The foregoing principles may serve to explain the true

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e assume the existence of a definite '*elastic limit*,' or a limit within two particles of a substance be displaced, they will return to their lative positions when the disturbing force is removed. The opposite to which Mr Hodgkinson seems to have been led by some interesting tal results, will be considered at a more advanced part of this paper."

dded October 1877.] This supposition may be true for some solids; it not true for solids generally. A piece of copper or of iron taken in a strained condition certainly becomes "harder" when strained beyond its of elasticity, that is to say, its limits of elasticity become wider; ar result will probably be found in ductile metals generally. Thus nce of the outer elements will be greater than those of the inner the case described in the text, until the torsion has been pushed so ing about the greatest hardness in all the elements at any consider- ce from the axis. It may be that before this condition has been e hardening of the outer elements will have been overdone, and they egun to lose strength, and to have become friable and fissured. The t forth in the text is not, however, vitiated by the incorrectness of on introduced merely for the sake of numerical illustration.

ove this, let r be the radius of the bar, η the utmost force of a unit he section to resist a strain tending to make the particles slide past r, or to resist a shearing strain, as it is commonly called. Also, let of the bar be supposed to be divided into an infinite number of con- ular elements,—the radius of any one of these being denoted by x a by $2\pi x dx$.

hen only the particles at the circumference are strained to the utmost, therefore, the forces on equal areas of the various elements are pro- o the distances of the elements from the centre, we have $\eta\frac{x}{r}$ for the unit of area at the distance of x from the centre. Hence the total tan- e of the element is

$$=2\pi x dx\,.\,\eta\frac{x}{r},$$

uple due to the same element is

$$=x\,.\,2\pi x dx\,.\,\eta\frac{x}{r}=2\pi\eta\frac{1}{r}\,.\,x^3dx\,;$$

re the total couple, which has been denoted above by L, is

$$=2\pi\eta\frac{1}{r}\int_0^r x^3dx\,,$$

$$L=\frac{1}{2}\pi\eta r^3\quad.\quad.\quad.\quad.\quad.\quad.\quad.\quad(a).$$

n the bar has been twisted so much that all the particles in its rd their utmost resistance, we have the total tangential force of the $\pi x dx\,.\,\eta$, and the couple due to the same element

$$=x\,.\,2\pi x dx\,.\,\eta=2\pi\eta\,.\,x^2dx\,.$$

total couple due to the entire section is

$$=2\pi\eta\int_0^r x^2dx=\frac{2}{3}\pi\eta r^3\,.$$

uantity is $\frac{4}{3}$ of the value of L in formula (a). That is, the couple bar resists in this case is $\frac{4}{3}$ L, or $\frac{4}{3}$ of that which it resisted in the e."

least they are subject to *no strain of torsion*, either in the one direction ther; though they *may* be subject to a strain of compression or extension in the direction of the length of the bar." [That they are so is proved by experiments made for the present article by Mr Thomas Gray in October 1877.] "This, however, does not fall to be considered in the investigation of the text."

[5] "This statement, if not strictly, is at least extremely nearly true, since from the experiments made by Mr Fairbairn and Mr Hodgkinson on cast-iron (see various *Reports of the British Association*), we may conclude that the metals are influenced only in an extremely slight degree by time. Were the bars composed of some substance, such as sealing wax, or hard pitch, possessing a sensible amount of viscidity, the statement in the text would not hold good."

[6] [*Note added October* 1877.] This assumes that the limits of elasticity in a substance which has already been strained beyond its limits of elasticity are equal on the two sides of the shape which it has when in equilibrium without disturbing force—a supposition which may be true or may not be true. Experiment is urgently needed to test it; for its truth or falseness is a matter of much importance in the theory of elasticity.

[7] "To prove this, let the bar be supposed to be divided into an infinite number of elementary concentric tubes (like the so-called annual rings of growth in trees). To twist each of these tubes through a certain angle, the same couple will be required, whether the tube is already subject to the action of a couple of any moderate amount in either direction or not. Hence, to twist them all, or, what is the same thing, to twist the whole bar, through a certain angle, the same couple will be required whether the various elementary tubes be or be not relaxed, when the bar as a whole is free from external strain."

same as an important fact observed by Mr Eaton Hodgkinson in the course of researches in regard to the strength of cast iron (Report of the British Association for 1837, p. 362).[1] He found, contrary to what had been previously supposed, a small strain, however small, in comparison to that which would produce rupture, was sufficient to produce a set, or permanent change of form, in the beams on which he experimented. Now this is just what would be expected, in accordance with the principles which I have brought forward, for if, for some of the causes already pointed out, the various parts of a beam previously to the application of an external force have been strained to the utmost, when, by the application of such force, however small, they are still farther displaced from their positions of relaxation, they must necessarily undergo a permanent alteration in their connexion with one another, an alteration permitted by the ductility of the material; or, in other words, the beam as a whole must take a set.

18. "In accordance with this explanation of the fact observed by Mr Hodgkinson, I do not think we are to conclude with him that '*the maxim of loading bodies within the elastic limit has no foundation in nature*.' It appears to me that the *defect of elasticity*, which he has shown to occur even with very slight strains, exists only when the strain is applied for the first time; or, in other words, that if a beam has already been subjected to a considerable strain, it may again be subjected to any smaller strain in the same direction without its taking a set. It will readily be seen, however, from Mr Hodgkinson's experiments, that the term 'elastic limit,' as commonly employed, is entirely vague, and must tend to lead to erroneous results.

19. "The considerations adduced seem to me to show clearly that there really exist *two elastic limits* for any material, between which the displacements or deflexions, or what may in general be termed the *changes of form*, must be confined, if we wish to avoid giving the material a set, or, in the case of variable strains, if we wish to avoid giving it a continuous succession of sets which would gradually bring about its destruction; that these two elastic limits are usually situated one on the one side and the other on the opposite side of the position which the material assumes when subject to no external strain, though they may be both on the same side of this position of relaxation;[2] and that they may therefore with propriety be called the *superior* and the *inferior limit* of the change of form of the material for the particular arrangement which has been given to its particles; that these two limits are not *fixed* for any given material, but that, if the change of form be continued beyond either limit, two new limits will, by means of an alteration in the arrangement of the particles of the material, be given to it in place of those which it previously possessed; and lastly, that the processes employed in the manufacture of materials are usually such as to place the two limits in close contiguity with one another, thus causing the material to take in the first instance a set from any strain, however slight, while the interval which may afterwards exist between the two limits, and also, as was before stated, the actual position assumed by each of them are determined by the peculiar strains which are subsequently applied to the material.

20. "The introduction of new, though necessary, elements into the consideration of the strength of materials may, on the one hand, seem annoying from rendering the investigations more complicated. On the other hand, their introduction will really have the effect of obviating difficulties, by removing erroneous modes of viewing the subject, and preventing contradictory or incongruous results from being obtained by theory and experiment. In all investigations, in fact, in which we desire to attain or to approach nearly to truth, we must take facts as they actually are, not as we might be tempted to wish them to be for enabling us to dispense with examining processes which are somewhat concealed and intricate but are not the less influential from their hidden character."

21. Passing now to homogeneous matter (sec. 38), homogeneously strained (chap. ii. of Math. Theory below), we are met by physical questions of great interest regarding limits of elasticity. Supposing the solid to be homogeneously distorted in any particular way to nearly the limit of its elasticity for this kind of distortion, will this limit be widened or narrowed by the superposition of negative or positive pressure equal in all directions producing a dilatation or a condensation? It seems probable that a dilatation would narrow the limits of elasticity, and a condensation widen them. This, however, is a mere guess: experiment alone can answer the question. Take again a somewhat less simple case. A wire is stretched by a weight to nearly its limits of longitudinal elasticity; a couple twisting it is applied to its lower end—Will this either cause the weight to run down and give the wire a permanent set, or break it? Probably,—yes; but experiment only can decide. The corresponding question with reference to a column loaded with a weight may have the same answer, but not necessarily so. Experiment again is wanting. A wire hanging stretched by a light weight, merely to steady it, is twisted to nearly its limit of torsional elasticity by a couple of given magnitude applied to its lower end: the stretching weight is increased—Will this cause it to yield to the couple and take a permanent set? Probably,—yes. [Certainly *yes*, for steel piano-forte wire experimented on by Mr M'Farlane to answer this question since it was first put in type for the present article.] If so, then the limits of torsional elasticity of a wire bearing a heavy weight are widened by diminishing or taking off the weight; and no doubt it will follow continuously that a column twisted by opposing couples at its two ends will have its limits of torsional elasticity widened by the application of forces to its two ends, pressing them towards one another. Experiments to answer these questions would certainly reward the experimenter with definite and interesting results.

22. Narrowness of Limits of Elasticity—*Solids*.—The limit of elasticity of metals, stones, crystals, woods, are so narrow that the distance between any two neighbouring points of the substance never alters by more than a small proportion of its own amount without the substance either breaking or experiencing a permanent set, and therefore the angle between two lines meeting in any point of the substance and passing always through the same matter is never altered by more than a small fraction of the radian,[1] before the body either breaks or takes a permanent set. By far the widest limits of elasticity hitherto discovered by experiment, for any substance except cork, india-rubber, jellies, are those of steel pianoforte wire. Take, for example, the piano-forte wire at present in use for deep-sea sounding. It is No. 22 of the Birmingham wire gauge, its density is 7·727, it weighs 0·34 gramme per centimetre, or 62·96 kilogrammes per nautical mile of 1852·3 metres, and therefore its sectional area and diameter are ·0044 square centimetre and ·0244 centimetre. It bears a weight of 106 kilogrammes, which is equal in weight to about 3·1 kilometres of its length, and when this weight is alternately hung on and removed the length of the wire varies by $\frac{1}{100}$ of its amount. While this elongation takes place there is a lateral shrinking, as we shall see (section 47), of from $\frac{1}{4}$ to $\frac{3}{13}$ of the same amount.

23. Consider now in the unstrained wire two lines through the substance of the wire at right angles to one another in any plane through or parallel to the axis of the wire in directions equally inclined to this line. When the wire is pulled lengthwise the two vertical angles bisected by the length of the wire become acute, and the other two obtuse by a small difference, as illustrated in the diagram fig. 2.

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[1] For further information regarding Mr Hodgkinson's views and experiments see his communications in the Transactions of the Sections of the British Association for the years 1843 (p. 97) and 1844 (p. 25), and a work by him entitled Experimental Researches on the Strength and other Properties of Cast Iron, 1846."

[2] Thus if the section of a beam be of some such form as that shown in either of the accompanying figures, the [illegible] of the two sides, as the case may be, [illegible] has been entirely removed.

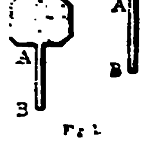

Fig. 1.

[1] The radian is the angle whose arc is equal to radius; it is equal to 57°·29…

where the continuous lines represent a portion of the unpulled wire, and the dotted lines the same portion of the wire when pulled. The change in each of the angles would be $\frac{1}{85}$ of the radian in virtue of the elongation were there no lateral shrinking, and about $\frac{1}{330}$ of the radian in virtue of the lateral shrinking were there no elongation. The whole change experienced by each of the right angles is therefore actually (section 37) $\frac{1}{85}+\frac{1}{330}$, or about $\frac{1}{68}$ of the radian, or 0°·84. This is an extreme case. In all other cases of metals, stones, glasses, crystals, the substance either breaks or takes a permanent bend, probably before it experiences any so great angular distortion as a degree; and except in the case of steel we may roughly regard the limits of elasticity as being something between $\frac{1}{1000}$ and $\frac{1}{100}$ in respect to the linear elongation or contraction, and from $\frac{1}{80}$ of a degree to half a degree in respect to angular distortion.

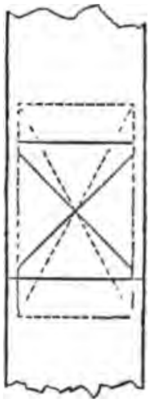

Fig. 2.

24. On the other hand, gelatinous substances, such as india-rubber and elastic jellies, have very wide limits of elasticity. A vulcanized india-rubber band, for instance, is capable of being stretched, again and again, to eight times its length, and returning always to nearly its previous condition when the stress is removed. A shape of transparent jelly presents a beautiful instance of great degrees of distortion with seemingly very perfect elasticity. All these instances, india-rubber and jellies, show with great changes of shape but slight changes of bulk. They have, in fact, all, as nearly as experiment has hitherto been able to determine, the same compressibility as water.

25. Cork, another body with very wide limits of elasticity (very imperfect elasticity it is true) is singular, among bodies seemingly homogeneous to the eye, in its remarkably easy compressibility. It is, in fact, the only seemingly homogeneous solid which shows to the unaided eye any sensible change of bulk under any practically applicable forces. A small homogeneous piece torn out of a cork may, by merely pressing it between the fingers, be readily compressed to half its bulk, and a large slab of cork in a Bramah press may be compressed to $\frac{1}{10}$ of its bulk. An ordinary bottle cork loaded with a small piece of metal presents a very interesting appearance in an Oersted glass compressing vessel; first floating, and when compressed to 20 or 30 atmospheres sinking, and shrivelling in bulk very curiously; then on the pressure being removed, expanding again, but not quite to previous bulk, and floating up or remaining down according to the amount of its load.

The divergencies presented by cork and gelatinous bodies in opposite directions from the regular elasticity of hard solids form an interesting subject, to which we shall return later (section 48).

26. *Liquids.*—In respect to liquids, there are no limits of elasticity so far as regards the magnitude of the positive pressure applied or conceivably applicable; but in respect to the magnitude of negative pressure, and in respect to the magnitude of the change of bulk, whether by negative or positive pressure, there are probably very decided and not very wide limits. Thus water, though condensed $\frac{1}{11\cdot 5}$ of its bulk by 2000 atmospheres in Perkins's[1] experiments corrected roughly for the compression of his glass "piezometer," which is very nearly at the rate of $\frac{1}{21000}$ per atmosphere found (section 75 below) more accurately by subsequent experiments for moderate pressures up to 20 or 30 atmospheres, may be expected to be compressed by much less than $\frac{1}{3}$ of its volume under a pressure of 7000 atmospheres. How much it or any other liquid is condensed by a pressure of 10,000 atmospheres, or by 20,000 atmospheres, is an interesting subject for experimental investigation.

27. *Gases.*—In respect to rarefaction, and in respect to *proportionate* condensation, gases present enormously wider limits of elasticity than any liquids or solids,—in fact no limit in respect to dilatation, and in respect to condensation a definite limit only when the gas is below Andrews's "critical temperature." If the gas be kept at any temperature above that critical temperature, it remains homogeneous, however much it be condensed; and therefore for a fluid above the critical temperature there is, in respect to magnitude of pressure, no superior limit to its elasticity. On the other hand, if a fluid be kept at any constant temperature less than its critical temperature, it remains homogeneous, and presents an increasing pressure until a certain density is reached; when its bulk is further diminished it divides into two parts of less and greater density (the part of less density being called vapour, that of greater density being called liquid, if it is not solid) and presents no further increase of pressure until the vaporous part shrinks to nothing, and the whole becomes liquid (that is to say, homogeneous fluid at the greater of the two densities) or else becomes solid—the question whether the more dense part is liquid or solid depending on the particular temperature below the critical temperature at which the whole substance is kept during the supposed experiment.

28. The thermo-dynamic reasoning of Professor James Thomson, which showed the effect of change of pressure in altering the freezing point of a liquid, leads to analogous considerations regarding the effect of continuous increase or continuous decrease of pressure upon a mass consisting of the same substance partly in the liquid and partly in the solid state at one temperature. The three cases of transition from gas to liquid, from gas to solid, and from liquid to solid, present us with perfectly definite limits of elasticity,—the only perfectly definite limits of elasticity in nature of which we have any certain knowledge.

29. *Viscosity of Fluids and Solids.*—Closely connected with limits of elasticity, and with imperfectness of elasticity, is viscosity, that is to say, resistance to change of shape depending on the velocity of the change. The full discovery of the viscosity of liquids and gases is due originally to Stokes; and his hypothesis that in fluids the force of resistance is in simple proportion to the velocity of change of shape has been subsequently confirmed by the experimental investigations of Helmholtz, Maxwell, Meyer, Kundt, and Warburg. The definition of a fluid given in section 2 above may, by section 1, be transformed into the following:—A fluid is a body which requires no force to keep it in any particular shape, or—A fluid is a body which exercises no permanent resistance to a change of shape. The resistance to a change of shape presented by a fluid, evanescent as it is when the shape is not being changed (or vanishing when the velocity of the change vanishes), is essentially different from that permanent resistance to change of shape, the manifestation of which in solids constitutes elasticity of shape as defined in section 1. Maxwell's admirable kinetic theory of the viscosity of gases points to a full explanation of viscosity, whether of gases, liquids, or solids, in the consideration of configurations and arrangements of relative motions of molecules, permanent in a solid under distorting stress, and temporary in fluids or solids while the shape is being changed, in

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[1] *Transactions of Royal Society*, June 1826, "On the Progressive Compression of Water by high degrees of force, with some trials of its effects on other liquids," by J. Perkins. Communicated by W. H. Wollaston, M.D., V.P.R.S.

virtue of which elastic force in the quiescent solid, and viscous resistance to change of shape in the non-quiescent fluid or solid, are produced.

30. *Viscosity of Metals and Fatigue of their Elasticity.*—Experimental exercises performed by students in the physical laboratory of the university of Glasgow, during the session 1864–65, brought to light some very remarkable and interesting results, proving a loss of energy in elastic vibrators (sometimes as much as two or three per cent. of energy lost in the course of a single vibration in one direction) incomparably greater than anything that could be due to imperfections in their elasticity (section 1), and showing also a very remarkable fatigue of elasticity, according to which a wire which had been kept vibrating for several hours or days through a certain range came to rest much quicker when left to itself than when set in vibration after it had been at rest for several days and then immediately left to itself. Thus it was found that the rates of subsidence of the vibrations of the several wires experimented on were generally much less rapid on the Monday mornings, when they had been at rest since the previous Friday, than on other days of the week, or than after several series of experiments had been made on a Monday. The following statement (sections 31–34) is extracted from a short article by W. Thomson, in the *Proceedings of the Royal Society* for May 18, 1865, containing some of the results of these observations.

31. "*Viscosity.*—By induction from a great variety of observed phenomena, we are compelled to conclude that no change of volume or of shape can be produced in any kind of matter without dissipation of energy. Even in dealing with the *absolutely perfect* elasticity of volume presented by every fluid, and possibly by some solids, as for instance homogeneous crystals, dissipation of energy is an inevitable result of every change of volume, because of the accompanying change of temperature, and consequent dissipation of heat by conduction or radiation. The same cause gives rise necessarily to some degree of dissipation in connection with every change of shape of an elastic solid. But estimates founded on the thermodynamic theory of elastic solids, which I have given elsewhere,[1] have sufficed to prove that the loss of energy due to this cause is small in comparison with the whole loss of energy observed in many cases of vibration. I have also found, by vibrating a spring alternately in air of ordinary pressure and in the exhausted receiver of an air-pump, that there is an internal resistance to its motions immensely greater than the resistance of the air. The same conclusion is to be drawn from the observation made by Kupffer in his great work on the elasticity of metals, that his vibrating springs subsided much more rapidly in their vibrations than rigid pendulums supported on knife-edges. The subsidence of vibrations is probably more rapid in glass than in some of the most elastic metals, as copper, iron, silver, aluminium;[2] but it is much more rapid than in glass, marvellously rapid indeed, in some metals (as for instance zinc),[3] and in india-rubber, and even in homogeneous jellies.

32. "The *frictional resistance* against change of shape must in every solid be infinitely small when the change of shape is made at an infinitely slow rate, since, if it were finite for an infinitely slow change of shape, there would be infinite rigidity, which we may be sure[4] does not exist in nature. Hence there is in elastic solids a *molecular friction* which may be properly called *viscosity of solids*, because, as being an internal resistance to change of shape depending on the rapidity of the change, it must be classed with fluid molecular friction, which by general consent is called *viscosity of fluids*. But, at the same time, it ought to be remarked that the word viscosity, as used hitherto by the best writers, when solids or heterogeneous semi-solid semi-fluid masses are referred to, has not been distinctly applied to molecular friction, especially not to the molecular friction of a highly elastic solid within its limits of high elasticity, but has rather been employed to designate a property of slow continual yielding through very great, or altogether unlimited, extent of change of shape, under the action of continued stress. It is in this sense that Forbes, for instance, has used the word in stating that 'viscous theory of glacial motion,' which he demonstrated by his grand observations on glaciers. As, however, he and many other writers after him have used the words plasticity and plastic, both with reference to homogeneous solids (such as wax or pitch even though also brittle, soft metals, &c.) and to heterogeneous semi-solid semi-fluid masses (as mud, moist earth, mortar, glacial ice, &c.), to designate the property common to all those cases of experiencing, under continued stress, either quite continued and unlimited change of shape, or gradually very great change at a diminishing (asymptotic) rate through infinite time, and as the use of the term *plasticity* implies no more than does *viscosity* any physical theory or explanation of the property, the word viscosity is without inconvenience left available for the definition I propose.

33. "To investigate the viscosity of metals, I have in the first place taken them in the form of round wires, and have chosen torsional vibrations, after the manner of Coulomb, for observation, as being much the easiest way to arrive at definite results. In every case one end of the wire was attached to a rigid vibrator with sufficient firmness (thorough and smooth soldering I find to be always the best plan when the wire is thick enough); and the other to a fixed rigid body, from which the wire hangs, bearing the vibrator at its lower end. I arranged sets of observations to be made for the separate comparison of the following cases:—

(*a*) "The same wire with different vibrators of equal weights to give equal stretching-tractions but different moments of inertia (to test the relation between viscous resistances against motions with different velocities through the same range and under the same stress).

(*b*) "The same wire with different vibrators of equal moments of inertia but unequal weights (to test the effect of different longitudinal tractions on the viscous resistance to torsion under circumstances similar in all other respects).

(*c*) "The same wire and the same vibrator, but different initial ranges in successive experiments (to test an effect unexpectedly discovered, by which the subsidence of vibrations from any amplitude takes place at very different rates according to the immediately previous molecular condition, whether of quiescence or of recurring changes of shape through a wider range).

(*d*) "Two equal and similar wires, with equal and similar vibrators, one of them kept as continually as possible in a state of vibration, from day to day; the other kept at rest, except when vibrated in an experiment once a day (to test the effect of continued vibration on the viscosity of a metal).

34. "*Results.*—(*a*) It was found that the loss of energy in

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[1] "On [illegible] Thermo-[illegible] the Properties of Solids," *Quarterly Journal of Mathematics*, April, 1855.

[2] We have since [illegible] that the precious metals are more elastic than [illegible] brass. One of the new bronze pennies gives quite [illegible] a two shilling silver piece tested in the usual manner.

[3] Torsional vibrations of a weight hung on a zinc wire subside so rapidly, that it has been found scarcely possible to count more than twenty of them in one case experimented on.

[4] Those who believe in the existence of indivisible, infinitely strong and infinitely rigid, very small bodies (finite hard atoms!) deny this.

a single vibration through one range was greater the greater the velocity (within the limits of the experiments); but the difference between the losses at low and high speeds was *much less* than it would have been had the resistance been, as Stokes has proved it to be, in fluid friction, approximately as the rapidity of the change of shape. The irregularities in the results of the experiments which up to this time I have made seem to prove that much smaller vibrations (producing less absolute amounts of distortion in the parts of the wires most stressed) must be observed before any simple law of relation between molecular friction and velocity can be discovered.

(*b*) "When the weight was increased, the viscosity was always at first much increased; but then day after day it gradually diminished and became as small in amount as it had been with the lighter weight. It has not yet been practicable to continue the experiments long enough in any case to find the limit to this variation.

(*c*) "The vibration subsided in aluminium wires much more rapidly from amplitude 20 to amplitude 10, when the initial amplitude was 40, than when it was 20. Thus, with a certain aluminium wire, and vibrator No. 1 (time of vibration one way 1·757 second), the number of vibrations counted were in three trials—

	Vibrations.		
Subsidence from 40 initial amplitude to 20	56	64	64
And from 20 (in course of the same experiments) to 10	96	98	96

The same wire and the same vibrator showed—

Subsidence from 20 initial amplitude to 10 (average of four trials)........................ } 112 vibrations.

Again, the same wire, with vibrator No. 2[1] (time of vibration one way 1·236), showed in two trials—

	Vibrations.	
Subsidence from 40 initial amplitude to 20........	54	52
And continued from 20 to 10	90	90

Again, same wire and vibrator,—

From initial amplitude 20 to 10 . . 108 (mean of eight trials).

This remarkable result suggested the question (*d*).

(*d*) "In a wire which was kept vibrating nearly all day, from day to day, after several days very much more molecular friction was found than in another kept quiescent except during each experiment. Thus two equal and similar pieces of copper wire were put up about the 26th of April, hanging with equal and similar lead weights, the upper and lower ends of the two wires being similarly fixed by soldering. No. 2 was more frequently vibrated than No. 1 for a few days at first, but no comparison of viscosities was made till May 15. Then

No. 1 subsided from 20 initial range to 10 in 97 vibrations.
No. 2 gave the same subsidence in 77 vibrations.

During the greater part of May 16 and 17, No. 2 was kept vibrating and No. 1 quiescent, and late on May 17 experiments with the following results were made:—

			Time per Vibration.
No. 1 subsided from 20 to 10 after	99 vibrations in	237 secs.,	2·4
,, ,, ,,	98 ,,	235 ,,	2·4
,, ,, ,,	98 ,,	235 ,,	2·4
No. 2 subsided from 20 to 10 after	58 vibrations in	142 ,,	2·45
,, ,, ,,	60 ,,	147 ,,	2·45
,, ,, ,,	57 ,,	139 ,,	2·45
,, ,, ,,	60 ,,	147 ,,	2·45"

[Addition, May 27, after the reading of the paper.]—No. 1 has been kept at rest from May 17, while No. 2 has been kept oscillating more or less every day till yesterday, May 26, when both were oscillated, with the following results:—

	Time per Vibration.
No. 1 subsided from 20 to 10 after 100 vibrations in 242 secs.,	2·42
No. 2 ,, ,, 44 or 45 vibrations.........	2·495

35. The investigation was continued with much smaller degrees of maximum angular distortion, to discover, if possible, the law of the molecular friction, the existence of which was demonstrated by these experiments. Two questions immediately occurred:—What is the law of subsidence of range in any single series of oscillations, the vibrator being undisturbed by external force? and (question (*a*) of § 33 above) what is the relation between the law of subsidence in two sets of oscillations having different periods, with the same elastic body in the same circumstances of elastic force, as for instance the same or similar metallic wires with equal weights hung upon them, performing torsional oscillations in different times on account of the moments of inertia of the suspended masses being different?

36. So far as the irregularities depending on previous conditions of the elastic substance allowed any simple law to be indicated, the experimental answer to the first question for degrees of angular distortion much smaller than the palpable limits of elasticity was the COMPOUND INTEREST LAW, that is to say,—*The diminutions of range per equal intervals of time or per equal numbers of oscillations bore a constant proportion to the diminishing range;* or, *The differences of the logarithms of the ranges were proportional to the intervals of time.*

The only approach to an answer to the second question yet obtained is that the proportionate losses of amplitude in the different cases are not such as they would be if the molecular resistance were simply proportional to the velocity of change of shape in the different cases. If the molecular friction followed this simple law, the proportionate diminutions of range per period would be directly as the square roots of the periods, or per equal intervals of time they would be inversely as the square roots of the periods. Instead of the proportion being so, the loss was greater with the longer periods than that calculated according to the law of square roots from its amount in the shorter periods. It was in fact as it would be if the result were wholly or partially due to imperfect elasticity, or "elastische Nach-wirkung"—elastic after-working—as the Germans call it (compare section 6 above). To form a rough idea of the results, irrespectively of the ultimate molecular theory (which is to be looked for in the proper extension of Maxwell's kinetic theory of viscosity of gases), consider a perfectly elastic vesicular solid, whether like a sponge with communications between the vesicles, or with each vesicle separately inclosed in elastic solid; imagine its pores and interstices filled up with a viscous fluid, such as oil. Static experiments on such a solid will show perfect elasticity of bulk and shape; kinetic experiments will show losses of energy such as are really shown by vibrators of india-rubber, jelly, glass, metals, or other elastic homogeneous solids, but more regular, and following more closely the compound interest law for single series and the law of relation to square roots of periods stated above for sets of oscillations in different periods. In short, according to Stokes's law of viscosity of fluids, our supposed vesicular vibrator would follow the law of subsidence of a simple vibrator experiencing a resistance simply proportional to the velocity of its motion, while no such simple law is applicable to the effects of the internal molecular resistance in a vibrating elastic solid.

37. *Hooke's Law.*—A law expressed by Hooke with Latin terseness in the words *Ut tensio sic vis* is the foundation of the mathematical theory of the elasticity of hard solids. By *tensio* here is meant not force (as is generally meant by the English word tension), but an elongation produced by force. In English, then, Hooke's law is that elongation (understood of an elastic solid) is proportional to the force producing it. It is, of course, to be extended continuously from elongation to contraction in respect to the effect, and from pull to push in respect

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[1] Of same weight as No. 1, but different moment of inertia.

to the case; and the experiments on which it is founded prove a perfect continuity from a pulling force to a smaller force in the same direction, and from the less force to zero, and from zero of pulling force to different degrees of push or positive pressure, or negative pull. Experimental proof merely of the *continuity of the phenomena through zero of force* suffices to show that, for *infinitely small* positive or negative pulls, positive or negative elongation is simply proportional to the positive or negative pull; or, in other words, positive or negative contraction is proportional to the positive or negative pressure producing it. But now must be invoked minutely accurate experimental measurement to find how nearly the law of simple proportionality holds through finite ranges of contraction and elongation. The answer happily for mathematicians and engineers is *that Hooke's law is fulfilled, as accurately as any experiments hitherto made can tell*, for all metals and hard solids each through the whole range within its limits of elasticity; and for woods, cork, india-rubber, jellies, when the elongation is not more than two or three per cent., or the angular distortion not more than a few hundredths of the radian (or not more than about two or three degrees). The same law holds for the condensation of liquids up to the highest pressures under which their compressibility has hitherto been accurately measured. [A decided but small deviation from Hooke's law has been found in steel pianoforte wire under combined influence of torsion and longitudinal pull by Mr M'Farlane in experiments made for the present article after this section was in type. See section 81.]

Boyle's law of the "spring of air" shows that the augmentation of density of a gas is simply proportional to the augmentation of the pressure, through the very wide ranges of pressure through which that law is approximately enough fulfilled. Hence the infinitesimal diminution of volume produced by a given infinitesimal augmentation of pressure varies as the square of the volume, and the *proportionate* diminution of volume (that is to say, the ratio of the diminution of volume to the volume) is proportional to the volume, or inversely proportional to the density. Andrews's experiments on the compressibility of a fluid, such as carbonic acid, at temperatures slightly above the critical temperature, and of the gas and of liquids at temperatures slightly below the critical temperature, are intensely interesting, not merely in respect to the *natural history* of elasticity, but as opening vistas into the philosophy of molecular action.

We cannot expect to find any law of simple proportionality between stress and change of dimensions, or proportionate change of dimensions, in the case of any elastic or semi-elastic "soft" solids, such as cork on one hand or india-rubber or jellies on the other, when strained to large angular distortions, or to large proportionate changes of dimensions. The exceedingly imperfect elasticity of all these solids, and the want of definiteness of the substance of many of them, renders accurate experimenting unavailable for obtaining any very definite or consistent numerical results; but it is interesting to observe roughly the forces required to produce some of the great strains of which they are capable without any total break down of elastic quality; for instance, to hang weights successively on an india-rubber band and measure the elongations. This any one may readily do, and may be surprised to find the enormous increase of resistance to elongation presented by the attenuated band before it breaks.

38. *Homogeneousness defined.*—A body is called homogeneous when any two equal, similar parts of it, with corresponding lines parallel and turned towards the same parts, are undistinguishable from one another by any difference in quality. The perfect fulfilment of this condition, without any limit as to the smallness of the parts, though conceivable, is not generally regarded as probable, for any of the real solids or fluids known to us, however seemingly homogeneous. It is held by all naturalists that there is a *molecular structure*, according to which, in *compound* bodies such as water, ice, rock-crystal, &c., the constituent substances lie side by side, or arranged in groups of finite dimensions, and even in bodies called *simple* (that is those not known to be chemically resolvable into other substances) there is no ultimate homogeneousness. In other words, the prevailing belief is that every kind of matter with which we are acquainted has a more or less *coarse-grained* texture, whether (as great masses of solid brick-work or stone-building, or as natural sandstone or granite rocks) having visible molecules, or (as seemingly homogeneous metals, or continuous crystals, or liquids, or gases) having molecules too small to be directly visible, or measurable but not *undiscoverably* small,—really, it is to be believed, of dimensions to be accurately determined in future advances of science. Practically the definition of *homogeneousness* may be applied on a very large scale to masses of building or coarse-grained conglomerate rock, or on a more moderate scale to blocks of common sandstone, or on a very small scale to seemingly homogeneous metals;[1] or on a scale of extreme, undiscovered fineness, to vitreous bodies, continuous crystals, solidified gums, as india-rubber, gum-arabic, &c., and fluids.

39. *Isotropic and Æolotropic Substances defined.*—The substance of a homogeneous solid is called *isotropic* when a spherical portion of it, tested by any physical agency, exhibits no difference in quality however it is turned. Or, which amounts to the same, a cubical portion, cut from any position in an isotropic body, exhibits the same qualities relatively to each pair of parallel faces. Or two equal and similar portions cut from *any* positions in the body, not subject to the condition of parallelism (section 38), are undistinguishable from one another. A substance which is not isotropic, but exhibits differences of quality in different directions, is called *æolotropic.*[2] The remarks of section 38 relative to homogeneousness in the aggregate, and the supposed ultimately heterogeneous texture of all substances, however seemingly homogeneous, indicate corresponding limitations and non-rigorous practical interpretations of isotropy and æolotropy.

40. *Isotropy and Æolotropy of different sets of properties.*—The substance of a homogeneous solid may be isotropic in one quality or class of qualities, but æolotropic in others. Or a transparent substance may transmit light at different velocities in different directions through it (that is, be *doubly-refracting*), and yet a cube of it may (and does in many natural crystals) show no sensible difference in its absorption of white light transmitted across it perpendicularly to any of its three pairs of faces. Or (as a crystal which exhibits *dichroism*) it may be sensibly æolotropic relatively to the absorption of light, but not sensibly double-refracting, or it may be dichroic and doubly-refracting, and yet it may conduct heat equally in all directions. Still, as a rule, a homogeneous substance which is æolotropic for one quality must be more than infinitesimally æolotropic for every quality which has directional character admitting of a corresponding æolotropy.

41. *Moduluses of Elasticity.*—A modulus of elasticity is the number obtained by dividing the number expressing a stress[3] by the number expressing the strain[4] which it produces. A modulus is called a principal modulus when

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[1] Which, however, we know, as proved by Deville and Van Troost, are porous enough at high temperatures to allow very free percolation of gases. Helmholtz and Root find percolation of platinum by hydrogen at ordinary temperature (*Berl. Sitzungsberichte*).

[2] Thomson and Tait's *Natural Philosophy*, section 676.

[3] Mathematical Theory, below chap. I. [4] *Ibid.*

the stress is such that it produces a strain of its own type.

(1.) An isotropic solid has two principal moduluses—a *modulus of compression* and a *rigidity*.

(2.) A crystal of the cubic class (fluor-spar, for instance) has three principal moduluses,—*one modulus of compression* and *two rigidities*.

(3.) An æolotropic solid having (what *no natural crystal* has, but what a *drawn wire* has) perfect isotropy of physical qualities relative to all lines perpendicular to a certain axis of its substance has three principal moduluses,—*two* determinable from its different compressibilities along and perpendicular to the axis, or from one compressibility and the "Young's modulus" (section 42) of an axial bar of the substance, or determinable from two compressibilities; and *one rigidity* determinable by measurement of the torsional rigidity of a round axial bar of the substance.

(4.) A crystal of Iceland spar has four principal moduluses,—three like those of case (3), and another rigidity depending on (want of complete circular symmetry, and) possession of *triple* symmetry of form, involving sextuple elastic symmetry, round the crystalline axis.

(5.) A crystal of the rectangular parallelepiped (or "tessaral") class has six distinct principal moduluses which, when the directions of the principal axes are known, are determinable by six single observations,—three, of the three (generally unequal) compressibilities along the three axes; and three, of the three rigidities (no doubt generally unequal) relatively to the three simple distortions of the parallelepiped, in any one of which one pair of parallel rectangular faces of the parallelepiped become oblique parallelograms.

(6.) An æolotropic solid generally has six principal moduluses,[1] which, when a piece of the solid is presented without information, and without any sure indication from its appearance of any particular axis or axes of symmetry of any kind, require just twenty-one independent observations for the determination of the fifteen quantities specifying their types, and the six numerical values of the moduluses themselves.

42. *"Young's Modulus,"* or *Modulus of Simple Longitudinal Stress.*—Thomas Young called *the modulus of elasticity* of an elastic solid the amount of the end-pull or end-thrust required to produce any infinitesimal elongation or contraction of a wire, or bar, or column of the substance multiplied by the ratio of its length to the elongation or contraction. In this definition the definite article is clearly misapplied. There are, as we have seen, two moduluses of elasticity for an isotropic solid,—one measuring elasticity of bulk, the other measuring elasticity of shape. An interesting and instructive illustration of the confusion of ideas so often rising in physical science from faulty logic is to be found in "An Account of an Experiment on the Elasticity of Ice: By Benjamin Bevan, Esq., in a letter to Dr Thomas Young, Foreign Sec. R. S." and in Young's "Note" upon it, both published in the *Transactions of the Royal Society* for 1826. Bevan gives an interesting account of a well-designed and well-executed experiment on the flexure of a bar, 3·97 inches thick, 10 inches broad, and 100 inches long, of ice on a pond near Leighton Buzzard (the bar remaining attached by one end to the rest of the ice, but being cut free by a saw along its sides and across its other end), by which he obtained a fairly accurate determination of "the modulus of ice";[2] and says that he repeated the experiment in various ways on ice bars of various dimensions, some remaining attached by one end, others completely detached, and found results agreeing with the first as nearly "as the admeasurement of the thickness could be ascertained." He then proceeds to compare "the modulus of ice" which he had thus found with "the modulus of water," which he quotes from Young's *Lectures* as deduced from Canton's experiments on the compressibility of water. Young in his "Note" does *not* point out that the two moduluses were essentially different, and that *the modulus of his definition*, the modulus determinable from the flexure of a bar, is essentially zero for every fluid. We now call "Young's modulus" the particular modulus of elasticity defined as above by Young, and so avoid all confusion.

43. *Modulus of Rigidity.*—The "modulus of rigidity" of an isotropic solid is the amount of tangential stess divided by the deformation it produces,—the former being measured in units of force per unit of the area to which it is applied in the manner indicated by the annexed diagram (fig. 3), and the latter by the variation of each of the four right angles reckoned in fraction of the radian. By drawing either diagonal of the square in the diagram we see that the distorting stress represented by it gives rise to a normal traction on every surface of the substance perpendicular to the square and parallel to one of its diagonals, and an equal normal *pressure* on every surface of the solid perpendicular to the square and parallel to the other diagonal; and that the amount of each of these normal forces[3] per unit of area is equal to the amount per unit area of the tangential forces which the diagram indicates. The corresponding[4] geometrical proposition, also easily proved, is as follows: A strain compounded of a simple *extension* in one set of parallels, and a simple contraction of equal amount in any other set perpendicular to those, is the same as a simple shear in either of the two sets of planes cutting the two sets of parallels at 45°, and the numerical measuring of this shear or simple distortion is equal to *double* the amount of the elongation or contraction, each reckoned per unit of length.

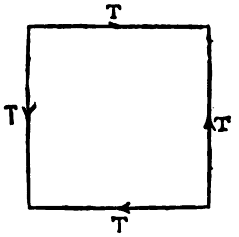

Fig. 3.

Hence we have another definition of "modulus of rigidity" equivalent to the preceding:—The modulus of rigidity of an isotropic substance is the amount of normal traction or pressure per unit of area, divided by *twice* the amount of elongation in the direction of the traction or of contraction in the direction of the pressure, when a piece of the substance is subjected to a stress producing uniform distortion.

44.[5] *Conditions fulfilled in Elastic Isotropy.*—To be elastically isotropic, a spherical or cubical portion of any solid, if subjected to uniform normal pressure (positive or negative) all round, must, in yielding, experience no deformation, and therefore must be equally compressed (or dilated) in all directions. But, further, a cube cut from any position in it, and acted on by *tangential* or distorting stress in planes parallel to two pairs of its sides, must experience simple deformation, or "shearing" parallel to either pair of these sides, unaccompanied by condensation or dilatation,[6] and the same in amount for all the three ways in which a stress may be thus applied to any one cube, and for different cubes taken from any different positions in the solid. Hence the elastic quality of a perfectly elastic, homogeneous, isotropic solid is fully defined by two elements,—its resistance to distortion and its resistance to compression. The first has been already considered (section 43). The second is measured by the amount of uniform pressure in all directions per unit area of its surface required to produce a stated very small compression. The numerical reckoning of the first is the compressing pressure divided by the diminution of the bulk of a portion of the substance which, when uncompressed, occupies the unit volume. It is sometimes called the "*elasticity of bulk*," or sometimes the "*modulus of bulk-elasticity*," sometimes the *resistance to compression*. Its reciprocal, or the amount of compression on unit of volume divided by the compressing pressure, or, as we may conveniently say, the compression per unit of volume per unit of compressing pressure, is commonly called the *compressibility*.

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[1] Mathematical Theory, chap. xvi.

[2] The result is given in the Table of Moduluses, sec. 77, below.

[3] The directions of these forces are called the "axes" of the stress. The corresponding directions in the corresponding strain are called the axes of the strain.

[4] Mathematical Theory, chap. vi.

[5] This, with several of the following sections, 44–51, is borrowed, with but slight change, from the first edition of Thomson and Tait's *Natural Philosophy*, by permission of the authors.

[6] It must be remembered that the changes of figure and volume we are concerned with are so small that the principle of superposition is

45. *Strain produced by a single Longitudinal Stress (subject of Young's Modulus).*—Any stress whatever may[1] be made up of simple longitudinal stresses. Hence, to find the relation between any stress and the strain produced by it, we have only to find the strain produced by a single longitudinal stress, which, for an isotropic solid, we may do at once thus:—A simple longitudinal stress P is equivalent to a uniform dilating tension $\frac{1}{3}P$ in all directions, compounded with two distorting stresses, each equal to $\frac{1}{3}P$, and having a common axis in the line of the given longitudinal stress, and their other two axes any two lines at right angles to one another and to it. The diagram (fig. 4), drawn in a plane through one of these latter lines and the former, sufficiently indicates the synthesis,—the only forces not shown being those perpendicular to its plane.

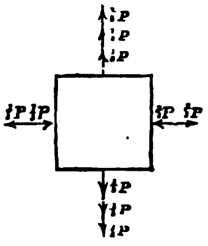

Fig. 4.

Hence if n denote the *rigidity*, and k the *modulus of compression*, or the *modulus of bulk-elasticity* (being the same as the reciprocal of the compressibility), the effect will be an equal dilatation in all directions, amounting, per unit of volume, to

$$\frac{\frac{1}{3}P}{k} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1),$$

compounded with two equal distortions, each amounting to

$$\frac{\frac{1}{3}P}{n} \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (2),$$

and having (section 43, footnote) their axes in the directions just stated for the axes of the distorting stresses.

46. The dilatation and two shears thus determined may be conveniently reduced to simple longitudinal strains by following the indications of section 43, thus:—

The two shears together constitute an elongation amounting to $\frac{\frac{1}{3}P}{n}$ in the direction of the given force P, and equal contraction amounting to $\frac{\frac{1}{6}P}{n}$ in all directions perpendicular to it. And the cubic dilatation $\frac{\frac{1}{3}P}{k}$ implies a lineal dilatation, equal in all directions, amounting to $\frac{1}{9}\frac{P}{k}$.

On the whole, therefore, we have

$$\left.\begin{array}{l}\text{linear elongation} = P\left(\frac{1}{3n}+\frac{1}{9k}\right)\text{, in the direction of the applied stress, and} \\ \text{linear contraction} = P\left(\frac{1}{6n}-\frac{1}{9k}\right)\text{, in all directions perpendicular to the applied stress.}\end{array}\right\}(3)$$

47. Hence "Young's Modulus" $= \frac{9nk}{3k+n}$, and when the ends of a column, bar, or wire of isotropic material are acted on by equal and opposite forces, it experiences a lateral lineal contraction equal to $\frac{3k-2n}{2(3k+n)}$ of the longitudinal dilatation, each reckoned as usual per unit of lineal measure. One specimen of the fallacious mathematics referred to in chap. xvi. of the mathematical theory below is a celebrated conclusion of Navier's and Poisson's that the ratio of lateral contraction to elongation by pull without transverse force is $\frac{1}{4}$. This would require the rigidity to be $\frac{3}{5}$ of the resistance to compression, for all solids; which was first shown to be false by Stokes[2] from many obvious observations, proving enormous discrepancies from it in many well-known bodies, and rendering it most improbable that there is any approach to a constancy of ratio between rigidity and resistance to compression in any class of solids. Thus clear elastic jellies and india-rubber present familiar specimens of isotropic homogeneous solids which, while differing very much from one another in rigidity ("stiffness"), are probably all of very nearly the same compressibility as water, which is about $\frac{1}{20000}$ per atmosphere. Their resistance to compression, measured by the reciprocal of this, is obviously many hundred times the absolute amount of the rigidity of the stiffest of those substances. A column of any of them, therefore, when pressed together or pulled out, within its limits of elasticity, by balancing forces applied to its ends (or an india-rubber band when pulled out), experiences no sensible change of volume, though very sensible change of length. Hence the proportionate extension or contraction of any transverse diameter must be sensibly equal to half the longitudinal contraction or extension; and such substances may be practically regarded as incompressible elastic solids in interpreting all the phenomena for which they are most remarkable. Stokes gave reasons for believing that metals also have in general greater resistance to compression, in proportion to their rigidities, than according to the fallacious theory, although for them the discrepancy is very much less than for the gelatinous bodies. This probable conclusion was soon experimentally demonstrated by Wertheim, who found the ratio of lateral to longitudinal change of lineal dimensions, in columns acted on solely by longitudinal force, to be about $\frac{1}{3}$ for glass and brass; and by Kirchhoff, who, by a well-devised experimental method, found ·387 as the value of that ratio for brass, and ·294 for iron. For copper it is shown to lie between ·226 and ·441, by experiments[3] quoted below, measuring the torsional and longitudinal rigidities of copper wires.

48. All these results indicate rigidity *less* in proportion to the compressibility than according to Navier's and Poisson's theory. And it has been supposed by many naturalists who have seen the necessity of abandoning that theory as inapplicable to ordinary solids that it may be regarded as the proper theory for an ideal *perfect solid*, and as indicating an amount of rigidity not quite reached in any real substance, but approached to in some of the

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applicable; so that if any distorting stress produced a condensation, an opposite distorting stress would produce a dilatation, which is a violation of the isotropic condition.

[1] Mathematical Theory, chap. viii.

[2] "On the Friction of Fluids in Motion, and the Equilibrium and Motion of Elastic Solids," *Trans. Camb. Phil. Soc*, April 1845. See also *Camb. and Dub. Math. Jour.*, March 1848.

[3] "On the Elasticity and Viscosity of Metals" (W. Thomson), *Proc. R. S.*, May 1865.

most rigid of natural solids (as, for instance, iron). But it is scarcely possible to hold a piece of cork in the hand without perceiving the fallaciousness of this last attempt to maintain a theory which never had any good foundation. By careful measurements on columns of cork of various forms (among them, cylindrical pieces cut in the ordinary way for bottles), before and after compressing them longitudinally in a Bramah's press, we have found that the change of lateral dimensions is insensible both with small longitudinal contractions and return dilatations, within the limits of elasticity, and with such enormous longitudinal contractions as to $\frac{1}{6}$ or $\frac{1}{3}$ of the original length. It is thus proved decisively that cork is much more rigid, while metals, glass, and gelatinous bodies are all less rigid, in proportion to resistance to compression, than the supposed "perfect solid"; and the practical invalidity of the theory is experimentally demonstrated. By obvious mechanism of jointed bars a solid may be designed which shall swell laterally when pulled, and shrink laterally when compressed, in one direction, and which shall be homogeneous in the same sense (article 40) as crystals and liquids are called homogeneous.

49. *Modulus of Simple Longitudinal Strain.*—In sections 45, 46, we examined the effect of a simple longitudinal stress in producing elongation in its own direction, and contraction in lines perpendicular to it. With stresses substituted for strains, and strains for stresses, we may apply the same process to investigate the longitudinal and lateral tractions required to produce a simple longitudinal strain (that is, an elongation in one direction, with no change of dimensions perpendicular to it) in a rod or solid of any shape.

Thus a simple longitudinal strain e is equivalent to a cubic dilatation e without change of figure (or linear dilatation $\frac{1}{3}e$ equal in all directions), and two distortions consisting each of dilatation $\frac{1}{3}e$ in the given direction and contraction $\frac{1}{3}e$ in each of two directions perpendicular to it and to one another. To produce the cubic dilatation e alone requires (section 44) a normal traction ke equal in all directions. And, to produce either of the distortions simply, since the measure (section 43) of each is $\frac{2}{3}e$, requires a distorting stress equal to $n \times \frac{2}{3}e$, which consists of tangential tractions each equal to this amount, positive (or drawing outwards) in the line of the given elongation, and negative (or pressing inwards) in the perpendicular direction. Thus we have in all

$$\left.\begin{array}{l}\text{normal traction} = (k + \frac{4}{3}n)e, \text{ in the direction of the given strain, and} \\ \text{normal traction} = (k - \frac{2}{3}n)e, \text{ in every direction perpendicular to the given strain.}\end{array}\right\} \quad (4).$$

Hence the modulus of simple longitudinal strain is $k + \frac{4}{3}n$.

50. *Weight-Modulus and Length of Modulus.*—Instead of reckoning moduluses in units of force per unit of area, it is sometimes convenient to express them in terms of the weight of unit bulk of the solid. A modulus thus reckoned, or, as it is called by some writers, the length of the modulus, is of course found by dividing the weight-modulus by the weight of the unit bulk. It is useful in many applications of the theory of elasticity, as, for instance, in this result, which is proved in the elementary dynamics of waves in an elastic solid or fluid (chap. xvii. of the Mathematical Theory, below):—the velocity of transmission of longitudinal[1] vibrations (as of sound) along a bar of cord, or of waves of simple distortion, or of simple longitudinal extension and contraction in a homogeneous isotropic solid, or of sound waves in a fluid, is equal to the velocity acquired by a body in falling from a height equal to half the length of the proper modulus[2] for the case;—that is, the Young's Modulus $\left(\frac{9kn}{3k+n}\right)$ for the first case, the modulus of rigidity (n) for the second, the modulus of simple longitudinal strain ($k + \frac{4}{3}n$) for the third, the modulus of compression k for the fourth. Remark that for air the static "length-modulus of compression" at constant temperature is the same as what is often technically called the "height of the homogeneous atmosphere."

51. In reckoning moduluses there must be a definite understanding as to the unit in terms of which the force is measured, which may be either the *kinetic unit* or the gravitation unit for a specified locality, that is, the weight in that locality of the unit of mass. Experimenters hitherto have stated their results in terms in the gravitation unit, each for his own locality,—the accuracy hitherto attained being scarcely in any cases sufficient to require corrections for the different intensities of gravity in the different places of observation.

The most useful and generally convenient specification of the modulus of elasticity of a substance is in grammes-weight per square centimetre. This has only to be divided by the specific gravity of the substance to give the *length of the modulus.* British measures, however, being still unhappily sometimes used in practical and even in scientific statements, we too often meet with reckonings of the modulus in pounds per square inch or per square foot, in tons per square inch, or of length of the modulus in feet or in British statute miles.

The reckoning most commonly adopted in British treatises on mechanics and practical statements is pounds per square inch. The modulus thus stated must be divided by the weight of 12 cubic inches of the solid, or by the product of its specific gravity into ·4335,[3] to find the length of the modulus in feet.

To reduce from pounds per square inch to grammes per square centimetre, multiply by 70·31, or divide by ·014223. French engineers generally state their results in kilogrammes per square millimetre, and so bring them to more convenient numbers, being $\frac{1}{1000000}$ of the inconveniently large numbers expressing moduluses in grammes weight per square centimetre, but it is much better to reckon in millions of grammes per square centimetre.

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[1] It is to be understood that the vibrations in question are so much spread out through the *length* of the body that inertia does not sensibly influence the transverse contractions and dilatations which (unless the substance have in this respect the peculiar character presented by cork, section 48) take place along with them.

[2] In sections 73–76 we shall see that changes of temperature produced by the varying stresses cause changes of temperature which, in ordinary solids, render the velocity of transmission of longitudinal vibrations sensibly greater than that calculated by the rule stated in the text, if we use the *static modulus* as understood from the definition there given; and it will be shown how to take into account the thermal effect by using a definite *static modulus*, or *kinetic modulus*, according to the circumstances of any case that may occur.

[3] This decimal being the weight in pounds of 12 cubic inches of water. The one great advantage of the French metrical system is that the mass of the unit volume (1 cubic centimetre) of water at its temperature of maximum density (3°·945 C.) is unity (1 gramme) to a sufficient degree of approximation for almost all practical purposes. Thus, according to this system, the density of a body and its specific gravity mean one and the same thing; whereas on the British no-system the density is expressed by a number found by multiplying the specific gravity by one number or another, according to the choice of a cubic inch, pint, quart, wine gallon, imperial gallon, cubic foot, cubic yard, or cubic mile that is made for the unit of volume; and the grain, scruple, gunmaker's drachm, apothecary's drachm, ounce Troy, ounce avoirdupois, pound Troy, pound avoirdupois, stone (Imperial, Ayrshire, Lanarkshire, Dumbartonshire), stone for hay, stone for corn, quarter (of a hundredweight), quarter (of corn), hundredweight, or ton that is chosen for unit of mass. It is a remarkable phenomenon, belonging rather to moral and social than to physical science, that a people tending naturally to be regulated by common sense should voluntarily condemn themselves, as the British have so long done, to unnecessary hard labour in every action of common business or scientific work related to measurement, from which all the other nations of Europe have emancipated themselves. Professor W. H. Miller, of Cambridge, concludes, from a very trustworthy comparison of standards by Kupffer, of St Petersburg, that the weight of a cubic decimetre of water at temperature of maximum density is 1000·013 grammes.

52. "Resilience" is a very useful word, introduced about forty years ago (when the *doctrine of energy* was beginning to become practically appreciated) by Lewis Gordon, first professor of engineering in the university of Glasgow, to denote the quantity of work that a spring (or elastic body) gives back when strained to some stated limit and then allowed to return to the condition in which it rests when free from stress. The word "resilience" used without special qualification may be understood as meaning *extreme resilience*, or the work given back by the spring after being strained to the extreme limit within which it can be strained again and again without breaking or taking a permanent set. In all cases for which Hooke's law of simple proportionality between stress and strain holds, the resilience is obviously equal to the work done by a constant force of half the amount of the extreme force acting through a space equal to the extreme deflection.

53. When force is reckoned in "gravitation measure," resilience per unit of the spring's mass is simply the height that the spring itself, or an equal weight, could be lifted against gravity by an amount of work equal to that given back by the spring returning from the stressed condition.

54. Let the elastic body be a long homogeneous cylinder or prism with flat ends (a bar as we may call it for brevity), and let the stress for which its resilience is reckoned be *positive* normal pressures on its ends. The resilience per unit mass is equal to the greatest height from which the bar can fall with its length vertical, and impinge against a perfectly hard horizontal plane without suffering stress beyond its limits of elasticity. For in this case (as in the case of the direct impact of two equal and similar bars meeting with equal and opposite velocities, discussed in Thomson and Tait's *Natural Philosophy*, section 303), the kinetic energy of the translational motion preceding the impact is, during the first half of the collision, wholly converted into potential energy of elastic force, which during the second half of the collision is wholly reconverted into kinetic energy of translational motion in the reverse direction. During the whole time of the collision the stopped end of the bar experiences a constant pressure, and at the middle of the collision the whole substance of the bar is for an instant at rest in the same state of compression as it would have permanently if in equilibrium under the influence of that pressure and an equal and opposite pressure on the other end. From the beginning to the middle of the collision the compression advances at a uniform rate through the bar from the stopped end to the free end. Every particle of the bar which the compression has not reached continues moving uniformly with the velocity of the whole before the collision until the compression reaches it, when it instantaneously comes to rest. The part of the bar which at any instant is all that is compressed remains at rest till the corresponding instant in the second half of the collision.

55. From our preceding view of a bar impinging against an ideal perfectly rigid plane, we see at once all that takes place in the real case of any rigorously direct longitudinal collision between two equal and similar elastic bars with flat ends. In this case the whole of the kinetic energy which the bodies had before collision reappears as purely translational kinetic energy after collision. The same would be approximately true of any two bars, provided the times taken by a pulse of simple longitudinal stress to run through their lengths are equal. Thus if the two bars be of the same substance, or of different substances having the same value for Young's modulus, the lengths must be equal, but the diameters may be unequal. Or if the Young's modulus be different in the two bars, their lengths must (Math. Theory, chap. xvii.) be inversely as the square roots of its values. To all such cases the laws of "collision between two perfectly elastic bodies," whether of equal or unequal masses, as given in elementary dynamical treatises, are applicable. But in every other case part of the translational energy which the bodies have before collision is left in the shape of vibrations after collision, and the translational energy after collision is accordingly less than before collision. The losses of energy observed in common elementary dynamical experiments on collision between solid globes of the same substance are partly due to this cause. If they were wholly due to it they would be independent of the substance, when two globes of the same substance are used. They would bear the same proportion to the whole energy in every case of collision between two equal globes, or again, in every case of collision between two globes of any stated proportion of diameters, provided in each case the two which collide are of the same substances; but the proportion of translational energy converted into vibrations would not be the same for two equal globes as for two unequal globes. Hence when differences of proportionate losses of energy are found in experiments on different substances, as in Newton's on globes of glass, iron, or compressed wool, this must be due to imperfect elasticity of the material. It is to be expected that careful experiments upon hard well-polished globes striking one another with such gentle forces as not to produce even at the point of contact any stress approaching to the limit of elasticity, will be found to give results in which the observed loss of translational energy can be almost wholly accounted for by vibrations remaining in the globes after collision.

56. *Examples of Resilience.*—*Example* 1.—In respect to simple longitudinal pull, the extreme resilience of steel pianoforte wire of the gauge and quality referred to in section 22 above (calculated by multiplying the breaking weight into half the elongation produced by it according to the experimental data of section 22) is 6060 metre-grammes (gravitation measure) per ten metres of the wire. Or, whatever the length of the wire, its resilience is equal to the work required to lift its weight through 179 metres.

Example 2.—The torsional resilience of the same wire, twisted in either direction as far as it can be without giving it any notable permanent set, was found to be equal to the work required to lift its weight through 1·3 metres.

Example 3.—The extreme resilience of a vulcanised india-rubber band weighing 12·3 grammes was found to be equal to the work required to lift its weight through 1200 metres. This was found by stretching it by gradations of weights up to the breaking weight, representing the results by aid of a curve, and measuring its area to find the integral work given back by the spring after being stretched by a weight just short of the breaking weight.

57. *Flexure of a Beam or Rod.*—In the problem of simple flexure a bar or uniform rod or wire, straight when free from stress, is kept in a circular form by equal opposing couples properly applied to its ends. The parts of the bar on the convex side of the circle must obviously be stretched longitudinally, and those on the concave side contracted longitudinally, by the flexure. It is not obvious, however, what are the conditions affecting the lateral shrinkings and swellings of ideal filaments into which we may imagine the bar divided lengthwise. Earlier writers had assumed without proof that each filament, bent as it is in its actual position in the bar, is elongated or contracted by the same amount as it would be if it were detached, and subjected to the same end pull or end compression with its sides quite free to shrink or

expand, but they had taken no account of the lateral shrinking or swelling which the filament must really experience in the bent bar. The subject first received satisfactory mathematical investigation from St Venant.[1] He proved that the old supposition is substantially correct, with the important practical exception of the flat spring referred to in section 59 below. His theory shows that, in fact, if we imagine the whole rod divided parallel to its length into infinitesimal filaments, each of these shrinks or swells laterally with sensibly the same freedom as if it were separated from the rest of the substance and subjected to end pull or end compression, lengthening or shortening it in a straight line to the same extent as it is really lengthened or shortened in the circular arc which it becomes in the bent rod. He illustrates the distortion of the cross section by which these changes of lateral dimensions are necessarily accompanied ih the annexed diagram (fig. 5), in which either the whole normal section of a rectangular beam, or a rectangular area in the normal section of a beam of any figure, is represented in its strained and unstrained figures, with the central point O common to the two. The flexure is in planes perpendicular to YOY_1, and is concave upwards (or towards X),—G, the centre of curvature, being in the direction indicated, but too far to be included in the diagram. The straight sides AC, BD, and all straight lines parallel to them, of the unstrained rectangular area become concentric arcs of circles concave in the opposite direction, their centre of curvature H being (articles 47, 48) for rods of india-rubber or gelatinous substance, or of glass or metal, from 2 to 4 times as far from O on one side as G is on the other. Thus the originally plane sides AO, BD of a rectangular bar become anticlastic[2] surfaces, of curvatures $\frac{1}{\rho}$ and $\frac{-\sigma}{\rho}$, in the two principal sections, if σ denote the ratio of lateral shrinking to longitudinal extension. A flat rectangular, or a square, rod of india-rubber [for which σ amounts (section 47) to very nearly $\frac{1}{2}$, and which is susceptible of very great amounts of strain without utter loss of corresponding elastic action] exhibits this phenomenon remarkably well.

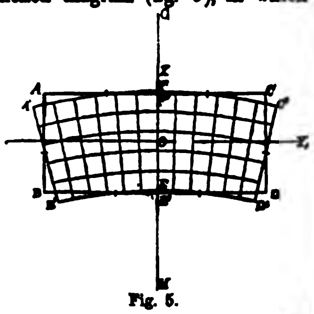

Fig. 5.

58. *Limits to the bending of Rods or Beams of hard solid substance.*—For hard solids, such as metals, stones, glasses, woods, ivory, vulcanite, papier-maché, elongations and contractions to be within the limits of elasticity must generally (section 23) be less than $\frac{1}{100}$. Hence the breadth or thickness of the bar in the plane of curvature must generally be less than $\frac{1}{100}$ of the diameter of curvature in order that the bending may not break it, or give it a permanent bend, or strain it beyond its "limits of elasticity."

59. *Exceptional case of Thin flat Spring, too much bent to fulfil conditions of section* 57.—St Venant's theory shows that a farther condition must be fulfilled if the ideal filaments are to have the freedom to shrink or expand as explained in section 57. For unless the *breadth* AC of the bar (or diameter perpendicular to the plane of flexure) be very small in comparison with the mean proportional between the radius OH and the thickness AB the distances from YY_1 to the corners A′, C′, would fall short of the half thickness, OE, and the distances to B′, D′, would exceed it, by differences comparable with its own amount. This would give rise to sensibly less and greater shortenings and stretchings in the filaments towards the corners than those supposed in the ordinary calculation of flexural rigidity (article 61), and so vitiate the result. Unhappily, mathematicians have not hitherto succeeded in solving, possibly not even tried to solve, the beautiful problem thus presented by the flexure of a broad very thin band (such as a watch spring) into a circle of radius comparable with a third proportional to its thickness and its breadth.

60. But, provided the radius of curvature of the flexure is not only a large multiple of the *greatest* diameter, but also of a third proportional to the diameters in and perpendicular to the plane of flexure; then, however great may be the ratio of the greatest diameter to the least, the preceding solution is applicable; and it is remarkable that the necessary distortion of the normal section (illustrated in the diagram of article 57) does not sensibly impede the free lateral contractions and expansions in the filaments, even in the case of a broad thin lamina (whether of precisely rectangular section, or of unequal thicknesses in different parts).

61. *Flexural Rigidities of a Rod or Beam.*—The couple required to give unit curvature in any plane to a rod or beam is called its flexural rigidity for curvature in that plane. When the beam is of circular cross section and of isotropic material, the flexural rigidity is clearly the same, whatever be the plane of flexure through the axis, and the plane of the bending couple coincides with the plane of flexure. It might be expected that in a round bar of æolotropic material, such as a wooden rod with the annual woody layers sensibly plane and parallel to a plane through its axis, would show different flexural rigidities in different planes,—in the case of wood, for example, different according as the flexure is in a parallel or perpendicular to the annual layers. This is not so, however; on the contrary, it is easy to show, by an extension of St Venant's theory, that in the case of the wooden rod the flexural rigidity is equal in all planes through the axis, and that the plane of flexure always agrees with the plane of the bending couple, and to prove generally that the flexure of a bar of æolotropic substance, and composed it may be of longitudinal filaments of heterogeneous materials, is precisely the same as if it were isotropic, and that its flexural rigidities are calculated by the same rule from its Young's modulus, provided that the æolotropy is not such as (section 81) to give rise to alteration of the angle between the length and any diameter perpendicular to the length when weight is hung on the rod, or on any longitudinal filament cut from it. Excluding then all cases in which there is any such oblique æolotropy, we have a very simple theory for the flexure of bars of any substance, whether isotropic or æolotropic, and whether homogeneous or not homogeneous through the cross section.

62. *Principal Flexural Rigidities and Principal Planes of Flexure of a Beam.*—The flexural rigidity of a rod is generally not equal in different directions, and the plane of flexure does not generally coincide with the plane of the bending couple. Thus a flat ruler is much more easily bent in a plane perpendicular to its breadth than in the plane of its breadth; and if we apply opposing couples to its two ends in any plane through its axis not either perpendicular or parallel to its breadth, it is obvious that the plane in which the flexure takes place will be more inclined to the plane of the breadth than to the plane of the bending couple. Very elementary statical theory, founded on St

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[1] *Mémoires des Savants Étrangers*, 1855, "De la Torsion des Prismes, avec des considérations sur leur Flexion," &c.

[2] See Thomson and Tait's *Natural Philosophy*, vol. i. § 128.

(2.) *Contour lines for St Venant's "étoile à quatre points arrondis."*—This diagram (fig. 8) shows the contour lines, in all respects as in case (1), for the case of a prism having for section the figure indicated. The portions of curve outside the continuous closed curve are merely indications of mathematical extensions irrelevant to the physical problem.

(3.) *Contour lines of normal section of triangular prism, as warped by torsion*, shown as in case (1) (fig. 9.

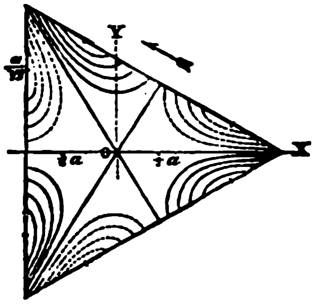

Fig. 9.

(4.) *Contour lines of normal sections of square prisms as warped by torsion* (fig. 10).

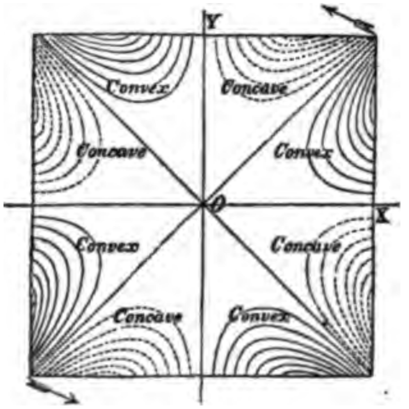

Fig. 10.

(5.) *Diagram of St Venant's curvilineal squares for which torsion problem is algebraically solvable.*—This diagram (fig. 11) shows the series of lines represented by the equation $x^2+y^2-a(x^4-6x^2y^2+y^4)=1-a$, with the indicated values for a. It is remarkable that the values $a=0{\cdot}5$ and $a=\frac{1}{2}(\sqrt{2}-1)$ give similar but not equal curvilineal squares (hollow sides and acute angles), one of them turned through half a right angle relatively to the other.

70. *Torsional Rigidity less in proportion to sum of principal Flexural Rigidities than according to false extension* (section 66) *of Coulomb's Law.*—Inasmuch as the moment of inertia of a plane area about an axis through its centre of inertia perpendicular to its plane is obviously equal to the sum of its moments of inertia round any two axes through the same point at right angles to one another in its plane, the fallacious extension of Coulomb's law, referred to in section 66, would make the torsional rigidity of a bar of any section equal to the product of the ratio of the modulus of rigidity to the Young's modulus into the sum of its flexural rigidities (section 61) in any two planes at right angles to one another through its length. The true theory, as we have seen (section 67), always gives a torsional rigidity less than this. How great the deficiency may be expected to be in cases in which the figure of the section presents projecting angles, or considerable prominences (which may be imagined from the hydrokinetic

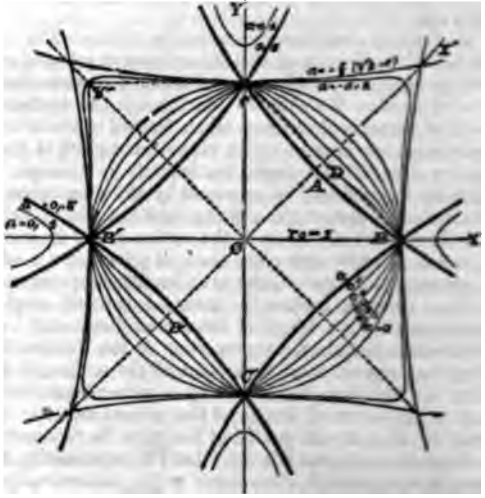

Fig. 11.

analogy given in section 37), has been pointed out by M. de St Venant, with the important practical application, that strengthening ribs, or projections (see, for instance, the second of the annexed diagrams), such as are introduced in engineering to give stiffness to beams, have the reverse of a good effect when *torsional* rigidity or strength is an object, although they are truly of great value in increasing the flexural rigidity, and giving strength to bear ordinary strains, which are always more or less flexural. With remarkable ingenuity and mathematical skill he has drawn beautiful illustrations of this important practical principle from his algebraic and transcendental solutions.

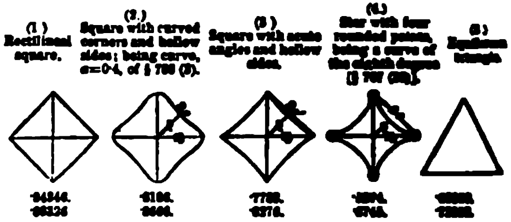
(1.) Rectilineal square.
(2.) Square with curved corners and hollow sides; being curve, a=0·4, of § 706 (3).
(3.) Square with acute angles and hollow sides.
(4.) Star with four rounded points, being a curve of the eighth degree [§ 707 (36)].
(5.) Equilateral triangle.
·84346.
·88326
·6000.
·7255.

Fig. 12.—Diagrams showing torsional rigidities.

Thus, for an equilateral triangle, and for the rectilineal and three curvilineal squares shown in the diagrams (fig. 12), he finds for the torsional rigidities the values stated. The number immediately below the diagram indicates in each case the fraction which the true torsional rigidity is of the old fallacious estimate (section 66),—the latter being the product of the rigidity of the substance into the moment of inertia of the cross section round an axis perpendicular to its plane through its centre of inertia. The second number indicates in each case the fraction which the torsional rigidity is of that of a solid circular cylinder of the same sectional area.

71. *Places of greatest Distortion in Twisted Prisms.*—M. de St Venant also calls attention to a conclusion from his solutions which to many may be startling, that in his simpler cases the places of greatest distortion are those points of the boundary which are nearest to the axis of the twisted prism in each case, and the places of least distortion those farthest from it. Thus in the elliptic cylinder the

substance is most strained at the ends of the smaller principal diameter, and least at the ends of the greater. In the equilateral triangular and square prisms there are longitudinal lines of maximum strain through the middles of the sides. In the oblong rectangular prism there are two lines of greater maximum strain through the middles of the broader pair of sides, and two lines of less maximum strain through the middles of the narrow sides. The strain is, as we may judge from the hydrokinetic analogy, excessively small, but not evanescent, in the projecting ribs of a prism of the figure shown in (2) of section 69. It is quite evanescent infinitely near the angle, in the triangular and rectangular prisms, and in each other case, as (5) of section 69, in which there is a finite angle, whether acute or obtuse, projecting outwards. This reminds us of a general remark we have to make, although consideration of space may oblige us to leave it without formal proof.

72. *Strain at Projecting Angles, evanescent; at Re-entrant Angles, infinite, Liability to Cracks proceeding from Re-entrant Angles, or any places of too sharp concave curvature.*—A solid of any elastic substance, isotropic or aeolotropic, bounded by any surfaces presenting projecting edges or angles, or re-entrant angles or edges, however obtuse, cannot experience any finite stress or strain in the neighbourhood of a *projecting* angle (trihedral, polyhedral, or conical); in the neighbourhood of an edge, can only experience simple longitudinal stress parallel to the neighbouring part of the edge; and generally experiences infinite stress and strain in the neighbourhood of a *re-entrant* edge or angle; when influenced by any distribution of force, exclusive of surface tractions infinitely near the angles or edges in question. An important application of the last part of this statement is the practical rule, well known in mechanics, that every re-entering edge or angle ought to be rounded, to prevent risk of rupture, in solid pieces designed to bear stress. An illustration of these principles is afforded by the concluding example of torsion in Thomson and Tait's section 707; in which we have the complete mathematical solution of the torsion problem for prisms of fan-shaped sections, such as the annexed forms (fig. 13).

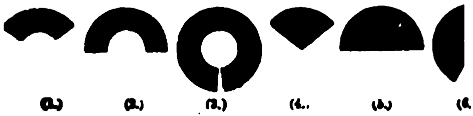

Fig. 13.

The solution shows that when the solid is continuous from the circular cylindrical surface to its axis, as in (4), (5), (6), the strain is zero or infinite according as the angle between the bounding planes of the solid is less than or greater than two right angles as in cases (4) and (6) respectively.

73. *Changes of Temperature produced by Compressions or Dilatations of a Fluid and Stresses of any kind in an Elastic Solid.*—From thermodynamic theory[1] it is concluded that cold is produced whenever a solid is strained by opposing, and heat when it is strained by yielding to, any elastic force of its own, the strength of which would diminish if the temperature were raised; but that, on the contrary, heat is produced when a solid is strained against, and cold when it is strained by yielding to, any elastic force of its own, the strength of which would increase if the temperature were raised. When the strain is a condensation or dilatation, uniform in all directions, a fluid may be included in the statement. Hence the following propositions:—

(1.) A cubical compression of any elastic fluid or solid in an ordinary condition causes an evolution of heat; but, on the contrary, a cubical compression produces cold in any substance, solid or fluid, in such an abnormal state that it would contract if heated while kept under constant pressure. Water below its temperature (3°·9 Cent.) of maximum density is a familiar instance. (See table of section 76.)

(2.) If a wire already twisted be suddenly twisted further, always, however, within its limits of elasticity, cold will be produced; and if it be allowed suddenly to untwist, heat will be evolved from itself (besides heat generated externally by any work allowed to be wasted, which it does in untwisting). It is assumed that the torsional rigidity of the wire is diminished by an elevation of temperature, as the writer of this article had found it to be for copper, iron, platinum, and other metals (compare section 78).

(3.) A spiral spring suddenly drawn out will become lower in temperature, and will rise in temperature when suddenly allowed to draw in. [This result has been experimentally verified by Joule ("Thermodynamic Properties of Solids," *Trans. Roy. Soc.*, 1858) and the amount of the effect found to agree with that calculated, according to the preceding thermodynamic theory, from the amount of the weakening of the spring which he found by experiment.]

(4.) A bar or rod or wire of any substance with or without a weight hung on it, or experiencing any degree of end thrust, to begin with, becomes cooled if suddenly elongated by end pull or by diminution of end thrust, and warmed if suddenly shortened by end thrust or by diminution of end pull; except abnormal cases in which with constant end pull or end thrust elevation of temperature produces shortening; in every such case pull or diminished thrust produces elevation of temperature, thrust or diminished pull lowering of temperature.

(5.) An india-rubber band suddenly drawn out (within its limits of elasticity) becomes warmer; and when allowed to contract, it becomes colder. Any one may easily verify this curious property by placing an india-rubber band in slight contact with the edges of the lips, then suddenly extending it—it becomes very perceptibly warmer: hold it for some time stretched nearly to breaking, and then suddenly allow it to shrink—it becomes quite startingly colder, the cooling effect being sensible not merely to the lips but to the fingers holding the band. The first published statement of this curious observation is due to Gough (*Memoirs of the Literary and Philosophical Society of Manchester*, 2d series, vol. i. p. 288), quoted by Joule in his paper on "Thermodynamic Properties of Solids" (*Transactions of Royal Society*, 1858). The thermodynamic conclusion from it is that an india-rubber band, stretched by a constant weight of sufficient amount hung on it, must, when heated, pull up the weight, and, when cooled, allow the weight to descend: this Gough, independently of thermodynamic theory, had found to be actually the case. The experiment any one can make with the greatest ease by hanging a few pounds weight on a common india-rubber band, and taking a red-hot coal in a pair of tongs, or a red-hot poker, and moving it up and down close to the band. The way in which the weight rises when the red-hot body is near, and falls when it is removed, is quite startling. Joule experimented on the amount of shrinking per degree of elevation of temperature, with different weights hung on a band of vulcanized india-rubber, and found that they closely agreed with the amounts calculated by Thomson's theory from the heating effects of pull, and cooling effects of ceasing to pull, which he had observed in the same piece of india-rubber.

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[1] W. Thomson on "Thermo-elastic Properties of Matter," in *Quarterly Journal of Mathematics*, April 1855 (republished in *Phil. Mag.* 1877, second half year.)

74. The thermodynamic theory gives one formula[1] by which the change of temperature in every such case may be calculated when the other physical properties are known:—

$$\theta = \frac{tep}{\mathrm{JK}\rho};$$

where θ denotes the elevation of temperature produced by the sudden application of a stress p,

t, the temperature of the substance on the absolute thermodynamic scale,[2] the change of temperature θ being supposed to be but a very small fraction of t;

e, the geometrical effect (expansion or other strain) produced by an elevation of temperature of one degree when the body is kept under constant stress;

K, the specific heat of the substance per unit mass under constant stress;

ρ, the density;

and J, Joule's equivalent (taken as 42400 centimetres).

In using the formula for a fluid, p must be normal pressure equal in all directions, or normal pressure on a set of parallel planes, or tangential traction on one or other of the two sets of mutually perpendicular parallel planes which (section 43) experience tangential traction when the body is subjected to a simple distorting stress; or, quite generally, p may be the proper numerical reckoning (Mathematical Theory, chap. x.) of any stress, simple or compound. When p is pressure uniform in all directions, e must be expansion of bulk, whether the body expands equally in all directions or not. When p is pressure perpendicular to a set of parallel planes, e must be expansion in the direction opposed to this pressure, irrespectively of any change of shape not altering the distance between the two planes of the solid perpendicular to the direction of p. When p is a simple tangential stress, reckoned as in section 43, e must be the change, reckoned in fraction of the radian, of the angle, infinitely nearly a right angle, between the two sets of parallel planes in either of which there is the tangential traction denoted by p. In each of these cases p is reckoned simply in units of force per unit of area. Quite generally p may be any stress, simple or compound, and e must be the component (Math. Th., chaps. viii. and ix.) relatively to the type of p, of the strain produced by an elevation of temperature of one degree when the body is kept under constant stress. The constant stress for which K and e are reckoned ought to be the mean of the stresses which the body experiences with and without p. Mathematically speaking, p is to be infinitesimal, but practically it may be of any magnitude moderate enough not to give any sensible difference in the value of either K or e, whether the "constant stress" be with p or without p, or with the mean of the two: thus for air p must be a small fraction of the whole pressure, for instance a small fraction of one atmosphere for air at ordinary pressure; for water or watery solutions of salts or other solids, for mercury, for oil, and for other known liquids p may, for all we know, amount to twenty atmospheres or one hundred atmospheres without transgressing the limits for which the preceding formula is applicable. When the law of variation of K and e with pressure is known, the differential formula is readily integrated to give the integral amount of the change of temperature produced by greater stress than those for which the differential formula is applicable. For air and other permanent gases Boyle's law of compression and Charles's law of thermal expansion supply the requisite data with considerable accuracy up to twenty or thirty atmospheres. The result is expressed by the formula

$$\frac{t+\theta}{t} = \left(\frac{\mathrm{P}+p}{\mathrm{P}}\right)^{k-1} \quad . \quad . \quad . \quad . \quad (1.)$$

where k denotes the ratio of the thermal capacity, pressure constant, to the thermal capacity, volume constant, of the gas, a number which thermodynamic theory proves to be approximately constant for all temperatures and densities, for any fluid approximately fulfilling Boyle's and Charles's laws;

P and t the initial pressure and temperature of the gas;

p the sudden addition to the pressure;

and, as before, θ the elevation of temperature.

For the case of p a small fraction of P the formula gives

$$\theta = (k-1)\frac{p}{\mathrm{P}}\,t \quad . \quad . \quad . \quad . \quad (2.)$$

It is by an integration of this formula that (1) is obtained.

For common air the value of k is very approximately 1·41. Thus if a quantity of air be given at 15° C. (t = 289°) and the ordinary atmospheric pressure, and if it be compressed gradually up to 32 atmospheres, or dilated to $\frac{1}{32}$ of an atmosphere, and perfectly guarded against gain or loss of heat from or to without, its temperature at several different pressures, chosen for example, will be according to the following table of excesses of temperature above the primitive temperature, calculated by (1).

TABLE SHOWING EFFECTS OF PRESSURE ON TEMPERATURE.

Air given at temperature 15° Cent. (289° absolute).

Value of P+p.	Elevation of temperature produced by compression.	Value of P+p.	Lowering of temperature produced by dilatation.
2	95°	$\frac{1}{2}$	71°
4	221	$\frac{1}{4}$	125
8	389	$\frac{1}{8}$	166
16	612	$\frac{1}{16}$	196
32	911	$\frac{1}{32}$	219

But we have no knowledge of the effect of pressures of several thousand atmospheres in altering the expansibility or specific heat in liquids, or in fluids which at less heavy or at ordinary pressures are "gases."

75. When change of temperature, whether in a solid or a fluid is produced by the application of a stress, the corresponding modulus of elasticity will be greater in virtue of the change of temperature than what may be called the static modulus defined as above, on the understanding that the temperature if changed by the stress is brought back to its primitive degree before the measurement of the strain is performed. The modulus calculated on the supposition that the body, neither losing nor gaining heat during the application of the stress and the measurement of its effect, retains the whole change of temperature due to the stress, will be called for want of a better name the kinetic modulus, because it is this which must (as in Laplace's celebrated correction of Newton's calculation of the velocity of sound) be used in reckoning the elastic forces concerned in waves and vibrations in almost all practical cases. To find the ratio of the kinetic to the static modulus remark that $e\theta$, according to the notation of section 74, is the diminution of the strain due to the change of temperature θ. Hence if M denote the static modulus (section 41), the strain actually produced by it when the body is not allowed either to gain or lose heat is $\frac{p}{\mathrm{M}} - e\theta$, or, with θ replaced by its value according to the formula of section 74,

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[1] W. Thomson, "Dynamical Theory of Heat" (§ 49), *Trans. R.S.E.*, March 1851, and "Thermoelastic Properties of Matter," *Quarterly Journal of Mathematics*, April 1855 (republished *Phil. Mag.* 1877, second half year).

[2] Ibid., Part vi. §§ 97, 100, *Trans. R.S.E.*, May 1854. According to the scale there defined on thermodynamic principles, independently of the properties of any particular substance, t is found, by Joule and Thomson's experiments, to agree very approximately with temperature centigrade, with 274° added.

$$\frac{p}{M} - e\frac{tep}{JK\rho}.$$

ing p by this expression we find for the kinetic lus

$$M' = \frac{1}{\frac{1}{M} - \frac{te^2}{JK\rho}}.$$

ence

$$\frac{M'}{M} = \frac{1}{1 - \frac{te^2M}{JK\rho}}.$$

. For any substance, fluid or solid, it is easily proved, out thermodynamic theory, that

$$\frac{M'}{M} = \frac{K}{N};$$

e K denotes the thermal capacity of a stated quantity e substance under constant stress, and N its thermal city under constant strain (or thermal capacity when ody is prevented from change of shape or change of me). For permanent gases, and generally for fluids oximately fulfilling Boyle's and Charles's laws as said e, k is proved by thermodynamic theory to be approxily constant. Its value for all gases for which it has measured differs largely from unity, and probably also iquids generally (except water near its temperature of imum density).

n the other hand, for solids whether the stress coned be uniform compression in all directions or of any r type, the value of $\frac{M'}{M}$ or $\frac{K}{N}$ differs but very little unity; and both for solids and liquids it is far from tant at different temperatures (in the case of water it is at 3°·9 Cent., and varies as the square of the difference e temperature from 3°·9 at all events for moderate rences from this critical temperature, whether above or w it). The following tables show the value of $\frac{M'}{M}$ or $\frac{K}{N}$, the value of θ by the formula of sec. 74, for different and solid substances at the temperature 15° Cent. ° absolute scale). The first table is for compression rm in all directions; the second, necessarily confined lids, is for the stress dealt with in "Young's Modu- that is, normal pressure (positive or negative) on one f parallel planes, with perfect freedom to expand or ract in all directions in these planes. A wire or rod d longitudinally is a practical application of the r.

THERMODYNAMIC TABLE I.

ure equal in all directions—Ratio of Kinetic to Static Bulkdulus. Temperature 15° C. (289° *absolute*) J = 42400 *centitres.*

ance.	Density.	Thermal Capacity per unit mass = K.	Expansibility = e.	Elevation of Temperature produced by a pressure of one gramme per square centimetre $= \frac{te}{JK\rho}$.	Static Bulk-Modulus in grammes per square centimetre = M.	Deduced value of $\frac{M'}{M}$ or $\frac{K}{N}$ $= \left(1 - \frac{te^2M}{JK\rho}\right)^{-1}$
. . .	·001225	·2375	·00346	·0824	1033	1·41
lled ter .	1·000	1·000	·00016	·000011	22·63 × 10⁶	1·0040
hol .	·795	·6148	·00106	·0000148	11·4 × 10⁶	1·22
r . .	·7006	·5157	·00155	·0000292	8·07 × 10⁶	1·577
ury .	13·56	·0330	·00018	·0000274	552·5 × 10⁶	1·375
s, flint	2·942	·1770	·000026	·000000340	423 × 10⁶	1·00375
s, awn .	8·471	·09391	·0000545	·000000466	1063 × 10⁶	1·028
. .	7·677	·1098	·0000395	·000000319	1485 × 10⁶	1·010
er .	8·843	·0949	·0000545	·000000443	1717 × 10⁶	1·043

THERMODYNAMIC TABLE II.

Pressure parallel to one direction in a solid—Ratio of Kinetic to Static Young's Modulus. Temperature 15° C. (289° *absolute*).

Substance.	Density = ρ.	Thermal Capacity per unit mass = K.	Expansibility = e.	Lowering of Temperature produced by a pull of one gramme per square centimetre $= \frac{te}{JK\rho}$.	Static Young's Modulus in grammes per square centimetre = M.	Deduced value of $\frac{M'}{M}$ or $\frac{N}{K}$ $= \left(1 - \frac{te^2M}{JK\rho}\right)^{-1}$.
Zinc .	7·008	·0927	·0000249	·000000308	873 × 10⁶	1·0080
Tin . . .	7·404	·0514	·000022	·000000394	417 × 10⁶	1·00362
Silver . .	10·369	·0557	·000019	·000000224	736 × 10⁶	1·00315
Copper .	8·933	·0949	·000018	·000000145	1245 × 10⁶	1·00325
Lead	11·215	·0293	·000029	·000000602	177 × 10⁶	1·00310
Glass .	2·942	·177	·0000086	·000000113	614·4 × 10⁶	1·000600
Iron . .	7·553	·1098	·000012	·000000107	1861 × 10⁶	1·00259
Platinum .	21·275	·0314	·0000086	·0000000778	1704 × 10⁶	1·00129

77. *Experimental Results.*—The following tables show determinations of moduluses of compression, of Young's modulus, and of moduluses of rigidity by various experimenters and various methods. It will be seen that the Young's moduluses obtained by Wertheim by vibrations, longitudinal or transverse, are generally in excess of those which he found by static extension; but the differences are enormously greater than those due to the heating and cooling effects of elongation and contraction (section 76), and are to be certainly reckoned as errors of observation. It is probable that his moduluses determined by static elongation are minutely accurate; the discrepancies of those found by vibrations are probably due to imperfections of the arrangements for carrying out the vibrational method:—

TABLE OF MODULUSES OF COMPRESSIBILITY.

Substance.	Moduluses of compressibility in grammes per square centimetre.	Temperature.	Authority.
Distilled water . .	22·63 × 10⁶	15°	Amaury and Descamps, *Comptes Rendus*, tome xvii. p. 1564 (1869).
Alcohol . . .	12·4 × 10⁶	0°	
,, . . .	11·4 × 10⁶	15°	
Ether . . .	9·5 × 10⁶	0°	
,, ...	8·07 × 10⁶	14°	
Bisulphide of carbon .	16·3 × 10⁶	14°	
Mercury . .	552·5 × 10⁶	15°	
Glass . . .	423 × 10⁶	...	Everett's *Illustrations of the Centimetre-Gramme-Second System of Units.*
Another specimen . .	354 × 10⁶	...	
Steel	1876 × 10⁶	...	
Iron	1485 × 10⁶	...	
Copper	1717 × 10⁶	...	
Brass, different specimens . . .	Mean 1063 × 10⁶	..	Wertheim, *Ann. de Chim.*, 1848.

TABLE OF MODULUSES OF RIGIDITY.

Substance.	Modulus of Rigidity in grammes per square centimetre.	Authority.
Glass, different specimens .	Mean 150 × 10⁶	Wertheim, *Annales de Chimie*, 1848.
Brass, different specimens .	Mean 350 × 10⁶	
Glass	243 × 10⁶	Everett's *Ill. of the Centimetre-Gramme-Second System of Units.*
Another specimen . .	240 × 10⁶	
Brass, drawn . . .	373 × 10⁶	
Steel . .	834 × 10⁶	
Iron, wrought . . .	785 × 10⁶	
Copper	542 × 10⁶	
	456 × 10⁶	

TABLE OF MODULUSES AND STRENGTHS.

Substance.	Density.	Young's Modulus.		Tenacity in grammes per square centimetre.	Length Modulus of Rupture in centimetres (or Tenacity in terms of Weight of Unit-Bulk.)	Extreme Elastic Elongation.	Resilience per cubic centimetre in centimetre-grammes.	Resilience per Unit Mass in centimetres.	Authority.	Method of Determination.
		Grammes per square centimetre.	Length Modulus.							
Iron or steel	...	Abt 2100×10^6	Abt 9,000,000 ft.	...	...	...	...	...	Dr T. Young	Probably flexure (Young's Works, vol. ii. p. 129).
Wood	...	105×10^6 to 280×10^6	4,000,000 to 10,000,000 ft.	...	...	...	...	...	,,	
Stone	...	Abt 350×10^6	Abt 5,000,000 ft.	...	...	...	...	...	,,	
Slate	...	910×10^6 to 1130×10^6	...	...	...	...	...	...	Rankine's "Rules and Tables."	
Ice	...	...	21,000,000 ft.	...	...	...	...	...	Bevan.	Flexure (see § 42).
Brass, cast	...	645×10^6	...	127×10^4	...	·00198	1264	...	Rankine's "Rules and Tables.	
,, wire	...	1001×10^6	...	343×10^4	...	·00344	5905	...		
Bronze, or gun metal	...	696×10^6	...	253×10^4	...	·00362	4583	...	,,	
Copper, cast	...	...	...	134×10^4	...	...	...	...	,,	
,, sheet	...	...	...	211×10^4	...	...	...	...	,,	
,, bolts	...	...	...	253×10^4	...	...	...	...	,,	
,, wires	...	1195×10^6	...	422×10^4	...	·0036	7480	...	,,	
Iron, cast	...	984×10^6 to 1610×10^6	...	94×10^4 to 204×10^4	...	·00116	879	...	,,	
Iron, wrought, plates	...	...	...	359×10^4	...	...	...	...	,,	
,, ,, bars and bolts	...	2040×10^6	...	422×10^4 to 492×10^4	...	·00224	5130	...	,,	
Steel, plates	...	...	...	563×10^4	...	...	...	...	,,	
,, bars	...	2040×10^6 to 2953×10^6	...	703×10^4 to 914×10^4	...	·00334	1310	...	,,	
Lead, sheet	...	51×10^6	...	23×10^4	...	·00451	518	...	,,	
Tin, cast	...	...	...	32×10^4	...	...	...	...	,,	
Zinc	...	...	...	$(49\text{ to }56)\times10^4$	...	...	...	...	,,	
Ash	...	112×10^6	...	120×10^4	...	·0106	6370	...	,,	
Beech	...	95×10^6	...	81×10^4	...	·00853	3455	...	,,	
Birch	...	116×10^6	...	105×10^4	...	·00905	4753	...	,,	
Cedar of Lebanon	...	34×10^6	...	80×10^4	...	·0235	9410	...	,,	
Fir, red pine	...	118×10^6	...	91×10^4	...	·00771	3510	...	,,	
Spruce	...	113×10^6	...	87×10^4	...	·0077	3347	...	,,	
Fir, larch	...	79×10^6	...	68×10^4	...	·00861	2927	...	,,	
Mahogany	...	88×10^6	...	106×10^4	...	·0120	6365	...	,,	
Oak, European	...	103×10^6	...	105×10^4	...	·0103	5368	...	,,	
Sycamore		73×10^6	...	91×10^4	...	·0125	5670	...	,,	
Teak, Indian		169×10^6	...	105×10^4	...	·00621	3262	...	,,	
Lead, cast	11·215	177×10^6	16×10^6 cms.	22×10^4	...	·0013	...	13	Wertheim.	By direct elong.
,,	...	138×10^6	...	...	...	...	...	...	,,	,, trans. vibr.
,,	...	180×10^6	...	...	...	...	...	...	,,	,, longitud. ,,
Tin, cast	7·404	$417{\cdot}2\times10^6$	56×10^6 cms.	$41{\cdot}6\times10^4$	...	·001	...	28	,,	,, trans. ,,
,,	...	464×10^6	...	...	...	...	...	...	,,	,, longitud. ,,
Cadmium, drawn	8·665	542×10^6	63×10^6 cms.	...	...	...	...	...	,,	,, trans. ,,
,,	...	609×10^6	...	...	...	...	...	...	,,	,, long. ,,
Gold, drawn	18·514	813×10^6	44×10^6 cms.	$(266\text{ to }284)\times10^4$	15×10^4	·0034	...	260	,,	,, direct elong.
,,	...	864×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,,	...	860×10^6	...	...	...	...	...	...	,,	,, long. ,,
Silver, drawn	10·369	736×10^6	71×10^6 cms.	296×10^4	28×10^4	·0041	...	575	,,	,, direct elong.
,,	...	782×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,,	...	758×10^6	...	...	...	...	...	...	,,	,, long. ,,
Zinc, common, drawn	7·008	873×10^6	124×10^6 cms.	156×10^4	22×10^4	·0018	...	198	,,	,, direct elong.
,,	...	879×10^6	...	...	...	...	...	...	,,	,, trans. vibr.
,,	...	955×10^6	...	...	...	...	...	...	,,	,, long. ,,
Palladium	11·35	1175×10^6	104×10^6 cms.	273×10^4	23×10^4	·0023	...	277	,,	,, direct elong.
,,	...	1239×10^6	...	...	...	...	...	...	,,	,, trans. vib.
Copper, drawn	8·933	1245×10^6	139×10^6 cms.	410×10^4	46×10^4	·0033	...	756	,,	,, direct elong.
,, ,,	...	1251×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,, ,,	...	1254×10^6	...	...	...	...	...	...	,,	,, long. ,,
,, annealed	8·933	1052×10^6	118×10^6 cms.	316×10^4	35×10^4	·003	...	531	,,	,, direct elong.
,, ,,	...	1183×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,, ,,	...	1264×10^6	...	...	...	...	...	...	,,	,, long. ,,
Platinum wire, fine	21·166	1558×10^6	73×10^6 cms.	360×10^4	17×10^4	·0022	...	188	,,	,, trans. ,,
,, ,,	...	1618×10^6	...	...	...	...	...	...	,,	,, long. ,,
,, ,, medium	21·275	1704×10^6	...	...	...	...	...	...	,,	,, direct elong.
,, ,,	...	1715×10^6	...	...	...	...	...	...	,,	,, trans. ,,
,, ,,	...	1716×10^6	...	...	...	...	...	...	,,	,, long. ,,
,, ,, thick	21·250	1581×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,, ,,	...	1616×10^6	...	...	...	...	...	...	,,	,, long. ,,
Iron wire, common	7·553	1861×10^6	246×10^6 cms.	$(626\text{ to }661)\times10^4$	86×10^4	·0034	...	1460	,,	,, direct elong.
Steel, cast, drawn	7·717	1955×10^6	...	806×10^4	106×10^4	...	...	...	,,	,, ,, ,,
,, ,,	...	1835×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,, ,,	...	1982×10^6	...	...	...	...	...	...	,,	,, long. ,,
Steel wire, English, drawn	7·718	1881×10^6	244×10^6 cms.	$(860\text{ to }981)\times10^4$	128×10^4	·0035	...	2245	,,	,, direct elong.
	...	2071×10^6	...	...	...	...	...	...	,,	,, trans. vib.
,, ,,	...	1944×10^6	...	...	...	...	...	...	,,	,, long. ,,
Steel wire, common, tempered blue	7·420	1904×10^6	248×10^6 cms.	...	...	...	...	...	,,	,, direct elong.
English steel, pianoforte wire	7·727	2049×10^6	265×10^6 cms.	2363×10^4	306×10^4	·0115	...	17600	D. M'Farlane	,, ,, ,,
Copper wire	8·9	1180×10^6 to 1200×10^6	...	...	...	...	...	...	,,	,, ,, ,,

question of great importance in the physical theory lasticity of solids, "What changes are produced moduluses of elasticity by permanent changes in its ar condition," has occupied the attention, no doubt, y "naturalist" who has studied the subject, and contributions to its answer by experiment had ven by Wertheim and other investigators, but solely erence to Young's modulus. In 1865 an investiga- the effect on the torsional rigidity of wires of t metals, produced by stretching them longitudinally their limits of elasticity, was commenced in the l laboratory of the university of Glasgow in its old gs in 1865. The following description of experi- nd table of results is extracted from the paper by mson "On the Elasticity and Viscosity of Metals," quoted (section 30), with reference to viscosity and of elasticity.

etermine rigidities by torsional vibrations, taking advan- n obvious but most valuable suggestion made to me by e, I used as vibrator in each case a thin cylinder of ss, turned true outside and inside (of which the radius of on must be, to a very close degree of approximation, the ic mean of the radii of the outer and inner cylindrical [1] supported by a thin flat rectangular bar, of which the the radius of gravitation is one-third of the square of the dis- n the centre to the corner. The wire to be tested passed per- rly through a hole in the middle of the bar, and was there ldered. The cylinder was tied to the middle of the bar by thread so as to hang with its axis vertical. Each wire, ing been suspended and stretched with just force enough to as nearly straight as was necessary for accuracy, was Then it was stretched by hand (applied to the cross red to its lower end) and vibrated again, and stretched d so on till it broke." The experiments were performed at care and accuracy by Mr Donald M'Farlane. "The s shown in the accompanying table, were most surprising." ghest and lowest rigidities found for copper in the table lows :—

t rigidity 473 × 10^6, being that of a wire which had been by heating it to redness and plunging it into water, and found to be of density 8·91.

rigidity 393·4 × 10^6, being that of a wire which had been so brittle by heating it to redness surrounded by powdered in a crucible and letting it cool very slowly, that it could e touched without breaking it, and which had been found iced in density by this process to as low as 8·674. The l were all commercial specimens—those of copper being rly all, cut from hanks supplied by the Gutta Percha , having been selected as of high electric conductivity, and echanical quality, for submarine cables.

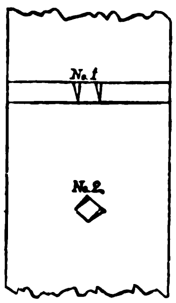

Fig. 14.

it to be remarked that the change of molecular condition by permanently stretching a wire or solid cylinder of ertainly a change from a condition which, if originally becomes æolotropic as to some [2] and that the changed condi- y therefore be presumed to be as to elasticity. If so, the corresponding to the direct and distortions (indicated by No. 1 2 in fig. 14) must in all proba- ome different from one another wire is permanently stretched, f being equal as they must be substance is isotropic. It be- erefore, a question of extreme o find whether rigidity No. 2 reased by this process, which, red by the experiments above diminishes, to a very remark- ee, the rigidity No. 1. The ious experiment, and indeed the ticable experiment, adapted to is question, for a wire or round bar is that of Cagniard- n which an accurate determination of the difference in the *volume* of the substance is made by applying ving longitudinal traction within its limits of elasticity. requisite apparatus, which must be much more accurate than that of Cagniard-Latour, a most important and interesting investigation might be made. The results, along with an accurate determination of the Young's modulus for the particular case, give (sec. 47) the modulus of compression, and the rigidity No. 2. Regnault suggested the use of hollow instead of solid cylinders, to be subjected to longitudinal pull, and (after the manner of the bulb and tube of a thermometer) a capillary tube to aid in measuring changes of volume of the hollow; and Wertheim, adopting this excellent suggestion, obtained seemingly very accurate results for brass and glass which are given in the tables of section 77.

Substance.	Length of Wire in centimetres.	Volume in cubic centimetres.	Density.	Moment of Inertia of Vibrator Wk^2.	Time of Vibration one way or (half period) in seconds. T.	Rigidity in grammes weight per square centimetre $\frac{2\pi^3 l^3 Wk^2}{gT^2V^2}$.
Aluminium [1]	60·3	1·1845	2·764	31771	1·14	241 × 10^6
Zinc [2]	304·9	2·351	7·105	31896	4·31	359·6 × 10^6
Brass	237·7	...	...	..	4·73	410·3 × 10^6
,,	248·3	...	...	...	5·456	354·8 × 10^6
,,	261·9	1·703	8·398	...	5·96	350·1 × 10^6
Copper	2435·0	15·30	8·91	38186	16·375	448·7 × 10^6
,,	,,	,,	,,	61412	20·77	448·4 × 10^6
Copper [3]	214·4	1·348	8·864	31771	5·015	433·0 × 10^6
,,	,,	,,	,,	61412	6·982	431·8 × 10^6
Copper [4]	143·7	·9096	8·674	...	3·381	393·4 × 10^6
Copper [5]	286·8	...	...	20612	4·245	442·9 × 10^6
,,	291	...	..	,,	4·375	435·6 × 10^6
,,	293	...	...	,,	4·417	436·2 × 10^6
,,	296·1	...	...	,,	4·500	433·8 × 10^6
,,	300·0	...	...	,,	4·588	434·0 × 10^6
,,	303·4	...	...	,,	4·646	437·8 × 10^6
,,	309·3	...	...	,,	4·833	428·0 × 10^6
,,	313·2	...	...	,,	4·931	427·5 × 10^6
,,	317·4	1·962	8·835	,,	5·040	425·9 × 10^6
Copper [6]	315·6	...	...	31771	8·155	442·3 × 10^6
,,	235·5	...	...	,,	9·425	432·2 × 10^6
,,	251·9	·827	8·672	,,	10·463	428·6 × 10^6
Copper [7]	253·2	1·580	8·91	. .	5·285	472·9 × 10^6
,,	262·8	...	...	...	5·640	464·3 × 10^6
,,	270·1	..	...	...	5·910	460·4 × 10^6
,,	278·7	...	...	...	6·20	458·5 × 10^6
,,	287·9	....	...	...	6·5325	455·0 × 10^6
,,	297·5	...	...	...	6·8195	451·0 × 10^6
,,	308·8	...	...	...	7·3075	448·9 × 10^6
Copper [8]	256·5	1·6145	8·90	...	4·2226	463·5 × 10^6
,,	267·9	...	...	...	4·5625	453·3 × 10^6
,,	280·1	...	...	..	4·915	446·2 × 10^6
,,	292·2	...	...	...	5·240	445·5 × 10^6
,,	301·9	...	...	...	5·532	438·2 × 10^6
Soft Iron [9]	316·8	...	...	...	6·655	791·4 × 10^6
,,	322·1	...	...	...	6·88	778·8 × 10^6
,,	335·1	...	...	...	7·301	779·0 × 10^6
,,	347·4	...	...	...	7·768	766·6 × 10^6
,,	366·0	1·357	7·657	...	8·455	756·0 × 10^6
Platinum	39·4	·1745	20·805	20612	2·05	622·25 × 10^6
Gold	65·9	·1825	19·8	10902	...	231 × 10^6
Silver	75·7	·1185	10·21	10967	...	270 × 10^6

Remarks.

[1] Only forty vibrations from initial arc of convenient amplitude could be counted. Had been stretched considerably before this experiment.

[2] So viscous that only twenty vibrations could be counted Broke in stretching.

[3] A piece of the preceding stretched.

[4] The preceding made red-hot in a crucible filled with powdered charcoal and allowed to cool slowly, became very brittle: a part of it with difficulty saved for the experiment.

[5] Another piece of the long (2435 centims.) wire; stretched by successive simple tractions.

[6] A finer gauge copper wire; stretched by successive tractions.

[7] A finer gauge copper wire, softened by being heated to redness and plunged in water. A length of 260 centimetres cut from this, suspended, and elongated by successive tractions.

[8] Another length of 260 centimetres cut from the same, and similarily treated.

[9] One piece, successively elongated by simple tractions till it broke.

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[1] actly the square root of the mean of their squares.

[2] ample, see paper "On Electrodynamic Qualities of Metals," *cal Transactions*, 1856, by W. Thomson.

79. The following tables show the effects of differences of temperature on the Young's Modulus, rigidity-modulus, and modulus of compressibility of various substances:—

Substance.	Density.	Young's Modulus in million grms. per square centimetre.		
		15°	100°	200°
Lead	11·232	173	163	..
Gold	18·035	558	531	548
Silver	10·304	715	727	637
Palladium	11·225	979	...	...
Copper	8·936	1052	938	786
Platinum	21·083	1552	1418	1296
Steel, drawn, English	7·622	1728	2129	1928
Cast steel	7·919	1956	1901	1792
Iron, Berry	7·757	2079	2188	1770

The above results are from Wertheim's "Mémoires" on Elasticity, *Ann. de Chim. et Phys.*, tom xii. (1844).

The change in the rigidity-modulus produced by change of temperature was investigated by Kohlrausch. He found that it is expressed by the formula $n = n_0 (1 - \alpha t - \beta t^2)$, where n_0 denotes the value of the rigidity-modulus at 0° C., n its value at temperature t, and α, β coefficients the values of which for iron, copper, and brass are as follows:—

	α	β
Iron	0·000447	0·00000052
Copper	0·000520	0·00000028
Brass	0·000428	0·00000136

Moduluses of Compressibility of Water, Alcohol, and Ether at Different Temperatures.[1]

Temp. Cent.	Modulus of compressibility in grammes per square centimetre.			Authority.
	Water.	Alcohol.	Ether.	
0°	$20·6 \times 10^6$	$12·4 \times 10^6$	$9·5 \times 10^6$	For water, Grassi, *Ann. de Chim.*, tome xxxi. (1851).
1·5	$20·2 \times 10^6$	...	...	
4·1	$20·7 \times 10^6$	...	...	
10·8	$21·5 \times 10^6$	...	...	
13·4	$21·6 \times 10^6$	...	...	
14·0	......	...	$8·07 \times 10^6$	For ether and alcohol, Amaury and Descamp, *Comptes Rendus*, tome xvii. p. 1564 (1869).
15·0	......	$11·4 \times 10^6$	..	
18·0	$22·4 \times 10^6$	...	...	
25·0	$22·6 \times 10^6$	...	...	
34·0	$22·8 \times 10^6$	...	...	
43·0	$23·3 \times 10^6$	...	...	
53·0	$23·5 \times 10^6$	...	...	

80. *Tempering soft iron by long-continued stress.*—Preliminary experiments by Mr J. T. Bottomley towards the investigation promised in section 5 above have discovered a very remarkable property of soft iron wire respecting its ultimate tensile strength. Eight different specimens, tested by the gradual application of more and more weight within ten minutes of time in each case until the wire broke, bore from 43½ to 46 ℔ (average 45·2) just before breaking, with elongations of from 17 per cent to 22 per cent. Another specimen left with 43 ℔ hanging on it for 24 hours, and then tested by the gradual addition of weights during 25 minutes till it broke, bore 49½ ℔ before breaking, with elongation of 15 per cent. Another left for 3 days 11 hours 40 minutes with 43 ℔ hanging on it, and then tested by the gradual addition of weights during 34 minutes till it broke, bore 51½ ℔ just before breaking, with elongation of 14·1 per cent. Another specimen of the same wire was set up with 40 ℔ hanging on it on the 5th of July 1877, on the 6th of July 3 ℔ were added, on the 9th 1½ ℔ more, and on the 10th ¾ ℔ more, making in all on this date 45¼ ℔. Thenceforward day by day, with occasional intervals of two days or three days, the weight was increased first by half a pound at a time, and latterly by a quarter of a pound at a time, until on the 3d of September the wire broke with 57½ ℔ (elongation not recorded). This gradual addition of weight therefore had increased the tensile strength of the metal by 26·7 per cent.!

81. *Experiments made for this article.*—There are many subjects in the theory of elasticity regarding which information to be obtained by experiment only is greatly wanted. Several of these have been pointed out above (section 21), and while this article was being put in type, experiments were made in the physical laboratory of the university of Glasgow with a view of answering some of the questions proposed. Mr Donald M'Farlane, besides making the experiments referred to in sections 3 and 21, investigated the effects of applying different amounts of pull to a steel pianoforte wire which had been twisted to nearly its limits of elasticity, and which was kept twisted by means of a couple. The results proved a deviation from Hooke's law by showing a diminution of the torsional rigidity, of about 1·6 per cent., produced by hanging a weight of 112 ℔ on the wire. Of this 1·2 per cent. is accounted for by elongation and by shrinkage of the diameter, leaving ·4 per cent. of diminution of the rigidity-modulus.

It was also found that when the wire was twisted far beyond its limits of elasticity, and then freed from torsional stress, a weight hung on it caused it to untwist slightly. When the weight was removed and reapplied again and again, the lower end of the wire always turned in the same direction as the permanent twist when the weight was removed, and in the opposite direction when it was applied. This result shows the development of aeolotropic quality in the substance of the wire, according to which a small cube cut from any part of it far out from the axis, with two sides of the cube parallel to the length, and the other two pairs of sides making angles of 45° with the length, would show different compressibilities in the directions perpendicular to the last-mentioned pairs of sides.

Another very interesting result, discovered in the course of these experiments, was that when a length of five metres of the steel wire, with a weight of 39 ℔ hung upon it, was twisted to the extent of 95 turns, it became gradually elongated to the extent of $\frac{1}{1500}$ of the length of the wire; when farther twisted it began to shorten till, when 25 turns had been given (in all 120 turns), the weight had risen from its lowest position through nearly $\frac{1}{5000}$ of the length of the wire, so that the previous elongation had been diminished by about $\frac{1}{3}$ of its amount.

Experiments were also made by Mr Andrew Gray and Mr Thomas Gray for the purpose of determining the effects of various amounts of permanent twist in altering the rigidity-modulus and the Young's modulus of wires of copper, iron, and steel. A copper wire, of 3·15 metres in length and ·154 centimetre diameter, No. 17 B.W.G., which had a rigidity-modulus of 442 million grammes per square centimetre to begin with, was found to have 420 after 10 turns, showing a diminution in the modulus of $\frac{1}{20}$ of its own amount. The diminution went on rapidly until 100 turns of permanent twist had been given, when the modulus was as low as 385. The diminution of the modulus continued with further twist, but very slowly, up to 1225 turns, when the modulus was found to be 371, showing a diminution to the extent of $\frac{1}{6}$ of its original value! There was little farther change until 1400 turns had been given, when the modulus began to increase. At 1525 turns its value was 373, and at 1625 it was 377. Twenty turns more broke the wire before the torsional elasticity had been again determined.

A piece of iron wire of nearly the same length, about three metres, but of smaller diameter (·067 centimetre), showed continued diminution of torsional rigidity as far as

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[1] The modulus seems to be a minimum near the temperature of maximum density

1350 turns of permanent twist, when the diminution had amounted to 14 per cent. of the primitive value, 36 turns more broke the wire before another determination of torsional rigidity had been made.

The steel pianoforte wire also showed a diminution of torsional rigidity with permanent twist, and (as did the copper wire) showed first a diminution and then a slight augmentation. The amount of the diminution in the steel wire was enormously greater than the surprisingly great amount which had been discovered in the copper wire, and the ultimate augmentation was considerably greater in the steel than what it had been in the copper before rupture. Thus after 473 turns of permanent twist the torsional modulus had diminished from 751 million grammes per square centimetre to 414 ! 95 more turns of permanent twist augmented the rigidity from 414 to 430, and when farther twisted the wire broke before another observation had been made. The vibrator used in these experiments was a cylinder of lead weighing 56 lb, which was kept hanging on the wire while it was being twisted, and in fact during the whole of about 100 hours from the beginning of the experiment till the wire broke, except on two occasions for a few minutes, while the top fastening which had given way was being resoldered. The period of vibration was augmented from 39·375 seconds to 51·9 seconds by the twist. The wire took the twist very irregularly, some parts not beginning to show much signs of permanent twist till near the end of the experiment

In two specimens of copper wire of the same length and gauge as those described above, the Young's modulus was found to be increased 10 per cent. by 100 turns of permanent twist.

Five metres of the steel pianoforte wire, bearing a weight of 39 lb, was in one of Mr M'Farlane's experiments twisted 120 turns, and then allowed to untwist, and 38¼ turns came out, leaving the wire in equilibrium with 81¾ turns of permanent twist. Its Young's modulus was then found not to differ as much as ½ per cent. from the value it had before the wire was twisted.

MATHEMATICAL THEORY OF ELASTICITY.[1]

PART I.—ON STRESSES AND STRAINS.[2]

CHAPTER I.—*Initial Definitions and Explanations.*

Def. A stress is an equilibrating application of force to a body.

Cor. The stress on any part of a body in equilibrium will thus signify the force which it experiences from the matter touching that part all round, whether entirely homogeneous with itself, or only so across a portion of its bounding surface.

Def. A strain is any definite alteration of form or dimensions experienced by a solid.

Examples.—Equal and opposite forces acting at the two ends of a wire or rod of any substance constitute a stress upon it. A body pressed equally all round—for instance, any mass touched by air on all sides—experiences a stress. A stone in a building experiences stress if it is pressed upon by other stones, or by any parts of the structure, in contact with it. Any part of a continuous solid mass, simply resting on a fixed base, experiences stress from the surrounding parts in consequence of their weight. The different parts of a ship in a heavy sea experience stresses from which they are exempt when the water is smooth.

If a rod of any substance become either longer or shorter, it is said to experience a strain. If a body be uniformly condensed in all directions it experiences a strain. If a stone, a beam, or a mass of metal in a building, or in a piece of framework, becomes condensed or dilated in any direction, or bent, or twisted, or distorted in any way, it is said to experience a strain, to become strained, or often in common language, simply "to strain." A ship is said to "strain" if in launching, or when working in a heavy sea, the different parts of it experience relative motions.

CHAPTER II.—*Homogeneous Stresses and Homogeneous Strains.*

Def. A stress is said to be homogeneous throughout a body when equal and similar portions of the body, with corresponding lines parallel, experience equal and parallel pressures or tensions on corresponding elements of their surfaces.

Cor. When a body is subjected to any homogeneous stress, the mutual tension or pressure between the parts of it on two sides of any plane amounts to the same per unit of surface as that between the parts on the two sides of any parallel plane; and the former tension or pressure is parallel to the latter.

A strain is said to be homogeneous throughout a body, or the body is said to be homogeneously strained, when equal and similar portions, with corresponding lines parallel, experience equal and similar alterations of dimensions

Cor. All the particles of the body in parallel planes remain in parallel planes, when the body is homogeneously strained in any way.

Examples.—A long uniform rod, if pulled out, or a pillar loaded with a weight, will experience a uniform strain, except near its ends. There will be a sensible heterogeneousness of the strain, because of the end attachments, or other circumstances preventing the ends from expanding laterally to the same extent as the middle does.

A piece of cloth held in a plane, and distorted so that a warp and woof, instead of being perpendicular to one another, become two sets of parallels cutting one another obliquely, experiences a homogeneous strain. The strain is heterogeneous as to intensity, from the axis to the surface of a cylindrical wire under torsion, and heterogeneous as to direction in different positions in a circle round the axis.

CHAPTER III.—*On the Distribution of Force in a Stress.*

Theorem.—In every homogeneous stress there is a system of three rectangular planes, each of which is perpendicular to the direction of the mutual force between the parts of the body on its two sides.

For let P(X), P(Y), P(Z) denote the components, parallel to X, Y, Z, any three rectangular lines of reference, of the force experienced per unit of surface at any portion of the solid bounded by a plane parallel to (Y, Z); Q(X), Q(Y), Q(Z), the corresponding components of the force experienced by any surface of the solid parallel to (Z, X); and R(X), R(Y), R(Z), those of the force at a surface parallel to (X, Y). Now, by considering the equilibrium of a cube of the solid with faces parallel to the planes of reference (fig. 15), we see that the couple of forces Q(Z) on its two faces perpendicular to Y is balanced by the couple of forces R(Y) on the faces perpendicular to Z. Hence we must have

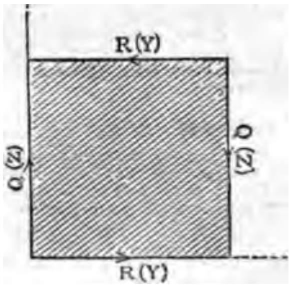

Fig. 15.

$$Q(Z) = R(Y).$$

Similarly it is seen that

$$R(X) = P(Z)$$

and

$$P(Y) = Q(X).$$

For the sake of brevity, these pairs of equal quantities (being tangential forces respectively perpendicular to X, Y, Z) may be denoted by T(X), T(Y), T(Z).

Consider a tetrahedral portion of the body (surrounded it may be with continuous solid) contained within three planes A, B, C, through a point O parallel to the planes of the pairs of lines of reference, and a third plane K cutting these at angles α, β, γ respectively; so that as regards the areas of the different sides we shall have

$$A = K\cos\alpha,\quad B = K\cos\beta,\quad C = K\cos\gamma.$$

The forces actually experienced by the sides A, B, C have nothing to balance them except the force actually experienced by K. Hence those three forces must have a single resultant, and the force on K must be equal and opposite to it. If, therefore, the force on K per unit of surface be denoted by F, and its direction cosines by l, m, n, we have

$$\begin{aligned} F.K.l &= P(X)A+T(Z)B+T(Y)C,\\ F.K.m &= T(Z)A+Q(Y)B+T(X)C,\\ F.K.n &= T(Y)A+T(X)B+R(Z)C; \end{aligned}$$

and, by the relations between the cases stated above, we deduce

$$\begin{aligned} Fl &= P(X)\cos\alpha+T(Z)\cos\beta+T(Y)\cos\gamma\\ Fm &= T(Z)\cos\alpha+Q(Y)\cos\beta+T(X)\cos\gamma\\ Fn &= T(Y)\cos\alpha+T(X)\cos\beta+R(Z)\cos\gamma \end{aligned}$$

Hence the problem of finding (α, β, γ), so that the force F (l, m, n) may be perpendicular to it, will be solved by substituting $\cos\alpha$, $\cos\beta$, $\cos\gamma$ for l, m, n in these equations. By the elimination of $\cos\alpha$, $\cos\beta$, $\cos\gamma$ from the three equations thus obtained, we have the well-known cubic determinantal equation, of which the roots, necessarily real, lead, when no two of them are equal, to one and only one system of three rectangular axes having the stated property.

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[1] The substance of Chap. I.–XVI. of this part of the present article was read before the Royal Society by Prof. Wm. Thomson, M.A., F.R.S., April 24, 1856, and published in the *Transactions*. Chap. XVII., containing the mathematical theory of Waves in an eolotropic or isotropic elastic solid, is new.

[2] These terms were first definitively introduced into the Theory of Elasticity by Rankine, and have been found very valuable in writing on the subject. It will be seen that there is a slight deviation from Rankine's definition of the word "stress." It is here applied to the direct action experienced by a body from the matter around it, and not, as proposed by him, to the elastic reaction of the body equal and opposite to that action.

Def. The three lines thus proved to exist for every possible homogeneous stress are called its axes. The planes of their pairs are called its normal planes; the mutual forces between parts of the body separated by these planes, or the forces on portions of the bounding surface parallel to them, are called the principal tensions.

Cor. 1. The Principal Tensions of the stress are the roots of the determinant cubic referred to in the demonstration.

Cor. 2. If a stress be specified by the notation P(X) &c., as explained above, its normal planes are the principal planes of the surface of the second degree whose equation is

$$P(X)X^2+Q(Y)Y^2+R(Z)Z^2+2T(X)YZ+2T(Y)ZX$$

and its principal tensions are equal to the reciprocals of the squares of the lengths of the semi-principal-axes of the same surface (quantities which are negative of course for the principal axis or axes which do not cut the surface when the surface is a hyperboloid of one or of two sheets).

Cor. 3. The ellipsoid whose equation, referred to the rectangular axes of a stress, is

$$(1-2eF)X^2+(1-2eG)Y^2+(1-2eH)Z^2=1,$$

where F, G, H denote the principal tensions, and e any infinitely small quantity, *represents the stress*, in the following manner:—

From any point P in the surface of the ellipsoid draw a line in the tangent plane half-way to the point where this plane is cut by a perpendicular to it through the centre; and from the end of the first-mentioned line draw a radial line to meet the surface of a sphere of unit radius concentric with the ellipsoid. The tension at this point of the surface of a sphere of the solid is in the line from it to the point P; and its amount per unit of surface is equal to the length of that infinitely small line, divided by e.

Cor. 4. Any stress is fully specified by six quantities, viz., its three principal tensions (F, G, H), and three angles (θ, ϕ, ψ) or three numerical quantities equivalent to the nine direction cosines specifying its axes.

CHAPTER IV.—*On the Distribution of Displacement in a Strain.*

Prop. In every homogeneous strain any part of the solid bounded by an ellipsoid remains bounded by an ellipsoid.

For all particles of the solid in a plane remain in a plane, and two parallel planes remain parallel. Consequently every system of conjugate diametral planes of an ellipsoid of the solid retain the property of conjugate diametral planes with reference to the altered curve surface containing the same particles. This altered surface is therefore an ellipsoid.

Prop. There is a single system (and only a single system, except in the cases of symmetry) of three rectangular planes for every homogeneous strain, which remain at right angles to one another in the altered solid.

Def. 1. These three planes are called the normal planes of the strain, or simply the strain-normals. Their lines of intersection are called the axes of the strain. The elongations of the solid per unit of length along these axes or perpendicular to these planes are called the Principal Elongations of the strain.

Remark. The preceding propositions and definitions are not limited to infinitely small strains, but are applicable to whatever extent the body may be strained.

Prop. If a body, while experiencing an infinitely small strain, be held with one point fixed and the normal planes of the strain parallel to three fixed rectangular planes through the point O, a sphere of the solid of unit radius having this point for its centre becomes, when strained, an ellipsoid, whose equation, referred to the strain-normals through O, is

$$(1-2x)X^2+(1-2y)Y^2+(1-2z)Z^2=1,$$

if x, y, z denote the elongations of the solid per unit of length, in the directions respectively perpendicular to these three planes; and the position, on the surface of this ellipsoid, attained by any particular point of the solid, is such that if a line be drawn in the tangent plane, half-way to the point of intersection of this plane with a perpendicular from the centre, a radial line drawn through its extremity cuts the primitive spherical surface in the primitive position of that point.

Cor. 1. For every stress, there is a certain infinitely small strain, and conversely, for every infinitely small strain, there is a certain stress, so related that if, while the strain is being acquired, the centre and the strain-normals through it are unmoved, the absolute displacements of particles belonging to a spherical surface of the solid represent, in intensity (according to a definite convention as to units for the representation of force by lines) and in direction, the force (reckoned as to intensity, in amount per unit of area) experienced by the enclosed sphere of the solid, at the different parts of its surface, when subjected to the stress.

Cor. 2. Any strain is fully specified by six quantities, viz., its three principal elongations, and three angles (θ, ϕ, ψ), or nine direction cosines, equivalent to three independent quantities specifying its axes.

Def. 2. A stress and an infinitely small strain related in the manner defined in Cor. 1, are said to be of the same type. The ellipsoid by means of which the distribution of force over the surface of a sphere of unit radius is represented in one case, and by means of which the displacements of particles from the spherical surface are shown in the other, may be called the geometrical type of either.

Cor. Any stress- or-strain-type is fully specified by *five* quantities, viz., two ratios between its principal strains or elongations and three quantities specifying the angular position of its axes.

CHAPTER V.—*Conditions of Perfect Concurrence between Stresses and Strains.*

Def. 1. Two stresses are said to be coincident in direction, or to be perfectly concurrent, when they only differ in absolute magnitude. The same relative designations are applied to two strains differing from one another only in absolute magnitude.

Cor. If two stresses or two strains differ by one being reverse to the other, they may be said to be negatively coincident in direction, or to be directly opposed or directly contrary to one another.

Def. 2. When a homogeneous stress is such that the normal component of the mutual force between the parts of the body on the two sides of any plane whatever through it is proportional to the augmentation of distance between the same plane and another parallel to it and initially at unity of distance, due to a certain strain experienced by the same body, the stress and the strain are said to be perfectly concurrent; also to be coincident in direction. The body is said to be yielding directly to a stress applied to it, when it is acquiring a strain thus related to the stress; and in the same circumstances, the stress is said to be working directly on the body, or to be acting in the same direction as the strain.

Cor. 1. Perfectly concurrent stresses and strains are of the same type.

Cor. 2. If a strain is of the same type as the stress, its reverse will be said to be negatively of the same type, or to be directly opposed to the strain. A body is said to be working directly against a stress applied to it when it is acquiring a strain directly opposed to the stress; and in the same circumstances, the matter round the body is said to be yielding directly to the reactive stress of the body upon it.

CHAPTER VI.—*Orthogonal Stresses and Strains.*

Def. 1. A stress is said to act right across a strain, or to act orthogonally to a strain, or to be orthogonal to a strain, if work is neither done upon nor by the body in virtue of the action of the stress upon it while it is acquiring the strain.

Def. 2. Two stresses are said to be orthogonal when either coincides in direction with a strain orthogonal to the other.

Def. 3. Two strains are said to be orthogonal when either coincides in direction with a stress orthogonal to the other.

Examples.—(1) A uniform cubical compression, and any strain involving no alteration of volume, are orthogonal to one another.

(2) A simple extension or contraction in parallel lines unaccompanied by any transverse extension or contraction, that is, "a simple longitudinal strain," is orthogonal to any similar strain in lines at right angles to these parallels.

(3) A simple longitudinal strain is orthogonal to a "simple tangential strain"[1] in which the sliding is parallel to its direction or at right angles to it.

(4) Two infinitely small simple tangential strains in the same plane,[2] with their directions of sliding mutually inclined at an angle of 45°, are orthogonal to one another.

(5) An infinitely small simple tangential strain is orthogonal to every infinitely small simple tangential strain, in a plane either parallel to its plane of sliding or perpendicular to its line of sliding.

CHAPTER VII.—*Composition and Resolution of Stresses and of Strains.*

Any number of simultaneously applied homogeneous stresses are equivalent to a single homogeneous stress which is called their resultant. Any number of superimposed homogeneous strains are equivalent to a single homogeneous resultant strain. Infinitely small strains may be independently superimposed; and in what follows it will be uniformly understood that the strains spoken of are infinitely small, unless the contrary is stated.

Examples.—(1) A strain consisting simply of elongation in one set of parallel lines, and a strain consisting of equal contraction in a direction at right angles to it, applied together, constitute a single strain, of the kind which that described in Example (3) of the preceding chapter is when infinitely small, and is called a plane distortion, or a simple distortion. It is also sometimes called a simple tangential strain, and when so considered, its plane of sliding may be regarded as either of the planes bisecting the angles between planes normal to the lines of the component longitudinal strains.

(2) Any two simple distortions in one plane may be reduced to a single simple distortion in the same plane.

(3) Two simple distortions not in the same plane have for their resultant a strain which is a distortion unaccompanied by change of volume, and which may be called a compound distortion.

(4) Three equal longitudinal elongations or condensations in three directions

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[1] That is, a homogeneous strain in which all the particles in one plane remain fixed, and other particles are displaced parallel to this plane.

[2] "The plane of a simple tangential strain," or the plane of distortion in a simple tangential strain, is a plane perpendicular to that of the particles supposed to be held fixed, and parallel to the lines of displacement of the others.

at right angles to one another are equivalent to a single dilatation or condensation equal in all directions. The single stress equivalent to three equal tensions or pressures in directions at right angles to one another is a negative or positive pressure equal in all directions.

(5) If a certain stress or infinitely small strain be defined (Chapter III. Cor. 2, or Chapter IV.) by the ellipsoid

$$(1+A)X^2+(1+B)Y^2+(1+C)Z^2+DYZ+EZX+FXY=1,$$

and another stress or infinitely small strain by the ellipsoid

$$(1+A')X^2+(1+B')Y^2+(1+C')Z^2+D'YZ+E'ZX+F'XY=1.$$

where A, B, C, D, E, F, &c., are all infinitely small, their resultant stress or strain is that represented by the ellipsoid

$$(1+A+A')X^2+(1+B+B')Y^2+(1+C+C')Z^2+(D+D')YZ+(E+E')ZX$$
$$+(F+F')XY=1.$$

CHAPTER VIII.—*Specification of Strains and Stresses by their Components according to chosen Types.*

Prop. Six stresses or six strains of six distinct arbitrarily chosen types may be determined to fulfil the condition of having a given stress or a given strain for their resultant, provided those six types are so chosen that a strain belonging to any one of them cannot be the resultant of any strains whatever belonging to the others.

For, just six independent parameters being required to express any stress or strain whatever, the resultant of any set of stresses or strains may be made identical with a given stress or strain by fulfilling six equations among the parameters which they involve; and therefore the magnitudes of six stresses or strains belonging to the six arbitarily chosen types may be determined, if their resultant be assumed to be identical with the given stress or strain.

Cor. Any stress or strain may be numerically specified in terms of numbers expressing the amounts of six stresses or strains of six arbitrarily chosen types which have it for their resultant.

Types arbitrarily chosen for this purpose will be called types of reference. The specifying elements of a stress or strain will be called its components according to types of reference. The specifying elements of a strain may also be called its coordinates, with reference to the chosen types.

Examples.—(1) Six strains in each of which one of the six edges of a tetrahedron of the solid is elongated while the others remain unchanged, may be used as types of reference for the specification of any kind of strain or stress. The ellipsoid representing any one of those six types will have its two circular sections parallel to the faces of the tetrahedron which do not contain the stretched side.

(2) Six strains consisting, any one of them, of an infinitely small alteration either of one of the three edges, or of one of the three angles between the faces, of a parallelepiped of the solid, while the other five angles and edges remain unchanged, may be taken as types of reference, for the specification of either stresses or strains. In some cases, as for instance in expressing the probable elastic properties of a crystal of Iceland spar, it might possibly be convenient to use an oblique parallelepiped for such a system of types of reference; but more frequently it will be convenient to adopt a system of types related to the deformations of a cube of the solid.

CHAPTER IX.—*Orthogonal Types of Reference.*

Def. A normal system of types of reference is one in which the strains or stresses of the different types are all six mutually orthogonal (fifteen conditions). A normal system of types of reference may also be called an orthogonal system. The elements specifying, with reference to such a system, any stress or strain, will be called orthogonal components or orthogonal coordinates.

Examples.—(1) The six types described in Example (2) of Chapter VIII. are clearly orthogonal, if the parallelepiped referred to is rectangular. Three of these are simple longitudinal extensions, parallel to the three sets of rectangular edges of the parallelepiped. The remaining three are plane distortions parallel to the faces, their axes bisecting the angles between the edges. They constitute the system of types of reference uniformly used hitherto by writers on the theory of elasticity.

(2) The six strains in which a spherical portion of the solid is changed into ellipsoids having the following equations—

$$(1+A)X^2+Y^2+Z^2=1$$
$$X^2+(1+B)Y^2+Z^2=1$$
$$X^2+Y^2+(1+C)Z^2=1$$
$$X^2+Y^2+Z^2+DYZ=1$$
$$X^2+Y^2+Z^2+EZX=1$$
$$X^2+Y^2+Z^2+FXY=1,$$

are of the same kind as those considered in the preceding example, and therefore constitute a normal system of types of reference. The resultant of the strains specified according to those equations, by the elements A, B, C, D, E, F, is a strain in which the sphere becomes an ellipsoid whose equation—see above, Chapter VII. Ex. (5)—is

$$(1+A)X^2+(1+B)Y^2+(1+C)Z^2+DYZ+EZX+FXY=1.$$

(3)[1] A compression equal in all directions (I.), three simple distortions having their planes at right angles to one another and their axes[2] bisecting the angles between the lines of intersection of these planes (II.) (III.) (IV.), any simple or compound distortion consisting of a combination of longitudinal strains parallel to those lines of intersections (V.), and the distortion (VI.), constituted from the same elements which is orthogonal to the last, afford a system of six mutually orthogonal types which will be used as types of reference below in expressing the elasticity of cubically isotropic solids. (Compare Chapter X. Example 7 below.)

CHAPTER X.—*On the Measurement of Strains and Stresses.*

Def. Strains of any types are said to be to one another in the same ratios as stresses of the same types respectively, when any particular plane of the solid acquires, relatively to another plane parallel to it, motions in virtue of those strains which are to one another in the same ratios as the normal components of the forces between the parts of the solid on the two sides of either plane due to the respective stresses.

Def. The magnitude of a stress and of a strain of the same type are quantities which, multiplied one by the other, give the work done on unity of volume of a body acted on by the stress while acquiring the strain.

Cor. 1. If x, y, z, ξ, η, ζ denote orthogonal components of a certain strain, and if P, Q, R, S, T, U denote components, of the same type respectively, of a stress applied to a body while acquiring that strain, the work done upon it per unit of its volume will be

$$Px+Qy+Rz+S\xi+T\eta+U\zeta.$$

Cor. 2. The condition that two strains or stresses specified by $(x, y, z, \xi, \eta, \zeta)$ and $(x', y', z', \xi', \eta', \zeta')$, in terms of a normal system of types of reference, may be orthogonal to one another is

$$xx'+yy'+zz'+\xi\xi'+\eta\eta'+\zeta\zeta'=0.$$

Cor. 3. The magnitude of the resultant of two, three, four, five, or six mutually orthogonal strains or stresses is equal to the square root of the sum of their squares. For if P, Q, &c., denote several orthogonal stresses, and F the magnitude of their resultant; and x, y, &c., a set of proportional strains of the same types respectively, and r the magnitude of the single equivalent strain, the resultant stress and strain will be of one type, and therefore the work done by the resultant stress will be Fr. But the amounts done by the several components will be Px, Qy, &c., and therefore

$$Fr=Px+Qy+\&c.$$

Now we have, to express the proportionality of the stresses and strains,

$$\frac{P}{x}=\frac{Q}{y}=\&c.=\frac{F}{r}.$$

Each member must be equal to

$$\frac{P^2+Q^2+\&c.}{Px+Qy+\&c.};$$

and also equal to

$$\frac{Px+Qy+\&c.}{x^2+y^2+\&c.}.$$

Hence $\quad \frac{F}{r}=\frac{P^2+Q^2+\&c.}{Fr}$, which gives $F^2=P^2+Q^2+\&c.$

and $\quad \frac{F}{r}=\frac{Fr}{x^2+y^2+\&c.}$, which gives $r^2=x^2+y^2+\&c.$

Cor. 4. A definite stress of some particular type chosen arbitrarily may be called unity; and then the numerical reckoning of all strains and stresses becomes perfectly definite.

Def. A uniform pressure or tension in parallel lines, amounting in intensity to the unit of force per unit of area normal to it, will be called a stress of unit magnitude, and will be reckoned as positive when it is tension, and negative when pressure.

Examples.—(1) Hence the magnitude of a simple longitudinal strain, in which lines of the body parallel to a certain direction experience elongation to an extent bearing the ratio κ to their original dimensions, must be called κ.

(2) The magnitude of the single stress equivalent to three simple pressures in directions at right angles to one another each unity is $-\sqrt{3}$; a uniform compression in all directions of unity per unit of surface is a negative stress equal to $\sqrt{3}$ in absolute value.

(3) A uniform dilatation in all directions, in which lineal dimensions are augmented in the ratio $1:1+x$, is a strain equal in magnitude to $x\sqrt{3}$; or a uniform "cubic expansion" E is a strain equal to $\frac{E}{\sqrt{3}}$.

(4) A stress compounded of unit pressure in one direction and an equal tension in a direction at right angles to it, or which is the same thing, a stress compounded of two balancing couples of unit tangential tensions in planes at angles of 45° to the direction of those forces, and at right angles to one another amounts in magnitude to $\sqrt{2}$.

(5) A strain compounded of a simple longitudinal extension x, and a simple longitudinal condensation of equal absolute value, in a direction perpendicular to it, is a strain of magnitude $x\sqrt{2}$; or, which is the same thing (if $\sigma=2x$), a simple distortion such that the relative motion of two planes at unit distances parallel to either of the planes bisecting the angles between the two planes mentioned above is a motion σ parallel to themselves, is a strain amounting in magnitude to $\frac{\sigma}{\sqrt{2}}$.

(6) If a strain be such that a sphere of unit radius in the body becomes an ellipsoid whose equation is

$$(1-A)X^2+(1-B)Y^2+(1-C)Z^2-DYZ-EZX-FXY=1,$$

the values of the component strains corresponding, as explained in Example (3) of Chap. IX., to the different coefficients respectively, are

$$\tfrac{1}{2}A,\ \tfrac{1}{2}B,\ \tfrac{1}{2}C,\ \frac{D}{2\sqrt{2}},\ \frac{E}{2\sqrt{2}},\ \frac{F}{2\sqrt{2}}.$$

For the components corresponding to A, B, C are simple longitudinal strains, in which diameters of the sphere along the axes of coordinates become elongated from 2 to 2 + A, 2 + B, 2 + C respectively; D is a distortion in which diameters in the plane YOZ, bisecting the angles YOZ and Y'OZ, become respectively elongated and contracted from 2 to 2 + ½D, and from 2 to 2 − ½D; and so for the others. Hence, if we take x, y, z, ξ, η, ζ to denote the magnitudes of six component strains, according to the orthogonal system of types described in Examples (1) and (2) of Chap. IX. the resultant strain equivalent to them will be one in which a sphere of radius 1 in the solid becomes an ellipsoid whose equation is

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[1] This example, as well as (7) of Chapter X., (5) of XI., and the example of Chapter XII., are intended to prepare for the application of the theory of Principal Elasticities to cubically and spherically isotropic bodies, in Part II. Chapter XV.

[2] The "axes of a simple distortion" are the lines of its two component longitudinal strains.

$$(1-2x)X^2+(1-2y)Y^2+(1-2z)Z^2-2\sqrt{2}(\xi YZ+\eta ZX+\zeta XY)=1,$$

and its magnitude will be

$$\sqrt{(x^2+y^2+z^2+\xi^2+\eta^2+\zeta^2)}.$$

(7) The specifications, according to the system of reference used in the preceding Example, of the unit strains of the six orthogonal types defined in Example (3) of Chap. IX. are respectively as follows:—

	x	y	z	ξ	η	ζ
(I.)	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{3}}$	$\frac{1}{\sqrt{3}}$	0	0	0
(II.)	0	0	0	1	0	0
(III.)	0	0	0	0	1	0
(IV.)	0	0	0	0	0	1
(V.)	l	m	n	0	0	0
(VI.)	l'	m'	n'	0	0	0

where l, m, n, l', m', n' denote quantities fulfilling the following conditions:—

$$l^2+m^2+n^2=1,$$
$$l+m+n=0,$$
$$ll'+mm'+nn'=0,$$
$$l'^2+m'^2+n'^2=1,$$
$$l'+m'+n'=0.$$

(8) If $(1-2eP)X^2+(1-2eQ)Y^2+(1-2eR)Z^2-2e\sqrt{2}(SYZ+TZX+UXY)=1$ be the equation of the ellipsoid representing a certain stress, the amount of work done by this stress, if applied to a body while acquiring the strain represented by the equation in the preceding example, will be

$$Px+Qy+Rz+S\xi+T\eta+U\zeta.$$

Cor. Hence, if variables X, Y, Z be transformed to any other set (X′, Y′, Z′) fulfilling the condition of being the coordinates of the same point, referred to another system of rectangular axes, the coefficients x, y, z, &c., $x_,$, $y_,$, $z_,$, &c., in two homogeneous quadratic functions of three variables,

$$(1-2x)X^2+(1-2y)Y^2+(1-2z)Z^2-2\sqrt{2}(\xi YZ+\eta ZX+\zeta XY)$$

and

$$(1-2x_,)X^2+(1-2y_,)Y^2+(1-2z_,)Z^2-2\sqrt{2}(\xi_,YZ+\eta_,ZX+\zeta_,XY),$$

and the corresponding coefficients x', y', z', &c., $x'_,$, $y'_,$, $z'_,$, &c., in these functions transformed to x', y', z', will be so related that

$$x'x'_,+y'y'_,+z'z'_,+\xi'\xi'_,+\eta'\eta'_,+\zeta'\zeta'_,=xx_,+yy_,+zz_,+\xi\xi_,+\eta\eta_,+\zeta\zeta_,;$$

or the function $xx_,+yy_,+zz_,+\xi\xi_,+\eta\eta_,+\zeta\zeta_,$ of the coefficients is an "invariant" for linear transformations fulfilling the conditions of transformation from one to another set of rectangular axes. Since $x+y+z$ and $x_,+y_,+z_,$ are clearly invariants also, it follows that $AA_,+BB_,+CC_,+2DD_,+2EE_,+2FF_,$ is an invariant function of the coefficients of the two quadratics

$$AX^2+BY^2+CZ^2+2DYZ+2EZX+2FXY$$

and

$$A_,X^2+B_,Y^2+C_,Z^2+2D_,YZ+2E_,ZX+2F_,XY,$$

which it is easily proved to be by direct transformation.

This is the simplest form of the algebraic theorem of invariance with which we are concerned.

CHAPTER XI.—*On Imperfect Concurrences of two Stress or Strain Types.*

Def. The concurrence of any stresses or strains of two stated types is the proportion which the work done when a body of unit volume experiences a stress of either type, while acquiring a strain of the other, bears to the product of the numbers measuring the stress and strain respectively.

Cor. 1. In orthogonal resolution of a stress or strain, its component of any stated type is equal to its own amount multiplied by its concurrence with that type; or the stress or strain of a stated type which, along with another or others orthogonal to it, have a given stress or strain for their resultant, is equal to the amount of the given stress or strain reduced in the ratio of its concurrence with that stated type.

Cor. 2. The concurrence of two coincident stresses or strains is unity; or a perfect concurrence is numerically equal to unity.

Cor. 3. The concurrence of two orthogonal stresses and strains is zero.

Cor. 4. The concurrence of two directly opposite stresses or strains is −1.

Cor. 5. If x, y, z, ξ, η, ζ, are orthogonal components of any strain or stress r, its concurrences with the types of reference are respectively

$$\frac{x}{r},\ \frac{y}{r},\ \frac{z}{r},\ \frac{\xi}{r},\ \frac{\eta}{r},\ \frac{\zeta}{r},$$

where

$$r=(x^2+y^2+z^2+\xi^2+\eta^2+\zeta^2)^{\frac{1}{2}}.$$

Cor. 6. The mutual concurrence of two stresses or strains is

$$ll'+mm'+nn'+\lambda\lambda'+\mu\mu'+\nu\nu',$$

if l, m, n, λ, μ, ν denote the concurrences of one of them with six orthogonal types of reference, and l', m', n', λ', μ', ν' those of the other.

Cor. 7. The most convenient *specification of a type* for strains or stresses, being in general a statement of the components, according to the types of reference, of a unit strain or stress of the type to be specified, becomes a statement of its concurrences with the types of reference when these are orthogonal.

Examples.—(1) The mutual concurrence of two simple longitudinal strains or stresses, inclined to one another at an angle θ, is $\cos^2\theta$.

(2) The mutual concurrence of two simple distortions in the same plane, whose axes are inclined at an angle θ to one another, is $\cos^2\theta-\sin^2\theta$, or $2\sin(45^\circ-\theta)\cos(45^\circ-\theta)$.

Hence the components of a simple distortion δ along two rectangular axes in its plane, and two others bisecting the angles between these taken as axes of component simple distortions, are

$$\delta(\cos^2\theta-\sin^2\theta) \text{ and } \delta.2\sin\theta\cos\theta$$

respectively, if θ be the angle between the axis of elongation in the given distortion and in the first component type.

(3) The mutual concurrence of a simple longitudinal strain and a simple distortion is

$$\sqrt{2}.\cos\alpha\cos\beta,$$

if α and β be the angles at which the direction of the longitudinal strain is inclined to the line bisecting the angles between the axes of the distortion, it is also equal to

$$\frac{1}{\sqrt{2}}(\cos^2\phi-\cos^2\psi),$$

if ϕ and ψ denote the angles at which the direction of the longitudinal strain is inclined to the axis of the distortion.

(4) The mutual concurrence of a simple longitudinal strain and of a uniform dilatation is $\frac{1}{\sqrt{3}}$.

(5) The specifying elements exhibited in Example (7) of the preceding Chapter are the concurrences of the new system of orthogonal types described in Example (3) of Chap. IX. with the ordinary system, Examples (1) and (2) Chap. IX.

CHAPTER XII.—*On the Transformation of Types of Reference for Stresses or Strains.*

To transform the specification (x, y, z, ξ, η, ζ) of a stress or strain with reference to one system of types into (x_1, x_2, x_3, x_4, x_5, x_6) with reference to another system of types. Let (a_1, b_1, c_1, e_1, f_1, g_1) be the components, according to the original system, of a unit strain of the first type of the new system; let (a_2, b_2, c_2, e_2, f_2, g_2) be the corresponding specification of the second type of the new system; and so on. Then we have, for the required formulæ of transformation—

$$x=a_1x_1+a_2x_2+a_3x_3+a_4x_4+a_5x_5+a_6x_6,$$
$$y=b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6,$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$\cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot\ \cdot$$
$$\zeta=g_1x_1+g_2x_2+g_3x_3+g_4x_4+g_5x_5+g_6x_6.$$

Example.—The transforming equations to pass from a specification (x, y, z, ξ, η, ζ) in terms of the system of reference used in Examples (6) and (7), Chapter X., to a specification (σ, ξ, η, ζ, ϖ, ω) in terms of the new system described in Example (3) of Chapter IX., and specified in Example (7) of Chapter X., are as follows:—

$$x=\frac{1}{\sqrt{3}}\sigma+l\varpi+l'\omega,$$
$$y=\frac{1}{\sqrt{3}}\sigma+m\varpi+m'\omega$$
$$z=\frac{1}{\sqrt{3}}\sigma+n\varpi+n'\omega,$$
$$\xi=\xi,\ \eta=\eta,\ \zeta=\zeta;$$

where, as before stated, l, m, n, l', m', n' are by quantities fulfilling the conditions

$$l^2+m^2+n^2=1,$$
$$l+m+n=0,$$
$$l'^2+m'^2+n'^2=1$$
$$l'+m'+n'=0,$$
$$ll'+mm'+nn'=0,$$

PART II.—ON THE DYNAMICAL RELATIONS BETWEEN STRESSES AND STRAINS EXPERIENCED BY AN ELASTIC SOLID.

CHAPTER XIII.—*Interpretation of the Differential Equation of Energy.*

In a paper on the Thermo-elastic Properties of Matter, published in the first number of the *Quarterly Mathematical Journal*, April 1855, and republished in the *Philosophical Magazine*, 1877, second half year, it was proved, from general principles in the theory of the Transformation of Energy, that the amount of work (w) required to reduce an elastic solid, kept at a constant temperature, from one stated condition of internal strain to another depends solely on these two conditions, and not at all on the cycle of varied states through which the body may have been made to pass in effecting the change, provided always there has been no failure in ity under any of the strains it has experienced. Thus geneous solid homogeneously strained, it appears that *w* m of six independent variables *x*, *y*, *z*, *ξ*, *η*, *ζ*, by which ion of the solid as to strain is specified. Hence to strain o the infinitely small extent expressed by the variation z, ξ, η, ζ) to ($x+dx$, $y+dy$, $z+dz$, $\xi+d\xi$, $\eta+d\eta$, $\zeta+d\zeta$), equired to be done upon it is

$$\frac{dw}{dx}dx+\frac{dw}{dy}dy+\frac{dw}{dz}dz+\frac{dw}{d\xi}d\xi+\frac{dw}{d\eta}d\eta+\frac{dw}{d\zeta}d\zeta.$$

which must be applied to its surface to keep the body in n in the state (x, y, z, ξ, η, ζ) must therefore be such ild do this amount of work if the body, under its action, uire the arbitrary strain dx, dy, dz, $d\xi$, $d\eta$, $d\zeta$; that is, the resultant of six stresses:—one orthogonal to the five dz, $d\xi$, $d\eta$, $d\zeta$, and of such a magnitude as to do the

dx when the body acquires the strain dx; a second or-

to dx, dz, $d\xi$, $d\eta$, $d\zeta$, and of such a magnitude as to do $\frac{dw}{dy}dy$ when the body acquires the strain dy; and so on. *f*, *g*, *h* denote the respective concurrences of these six ith the types of reference used in the specification (x, y, z, the strains, the amounts of the six stresses which fulfil litions will (Chapter XI.) be given by the equations

$$P=\frac{1}{a}\frac{dw}{dx},\quad Q=\frac{1}{b}\frac{dw}{dy},\quad R=\frac{1}{c}\frac{dw}{dz},$$

$$S=\frac{1}{f}\frac{dw}{d\xi},\quad T=\frac{1}{g}\frac{dw}{d\eta},\quad U=\frac{1}{h}\frac{dw}{d\zeta};$$

pes of these component stresses are determined by being to the fives of the six strain-types, wanting the first, , &c., respectively.

the types of reference used in expressing the strain of the itute an orthogonal system, the types of the component ill coincide with them, and each of the concurrences will Hence the equations of equilibrium of an elastic solid six orthogonal types are simply

$$P=\frac{dw}{dx},\quad Q=\frac{dw}{dy},\quad R=\frac{dw}{dz}$$

$$S=\frac{dw}{d\xi},\quad T=\frac{dw}{d\eta},\quad U=\frac{dw}{d\zeta}.$$

XIV.—*Reduction of the Potential Function, and of the ns of Equilibrium, of an Elastic Solid to their simplest*

ondition of the body from which the work denoted by *w* l be that of equilibrium under no stress from without. /, z, ξ, η, ζ be chosen each zero for this condition, we , by Maclaurin's theorem,

$$w=H_2(x,y,z,\xi,\eta,\zeta)+H_3(x,y,z,\xi,\eta,\zeta)+\&c.,$$

H_3, &c., denote homogeneous functions of the second d order, &c., respectively. Hence $\frac{dw}{dx}$, $\frac{dw}{dy}$, &c., will each function of the strain coordinates, together with funcgher orders derived from H_3, &c. But experience shows 7 above) that, within the elastic limits, the stresses are y if not quite proportional to the strains they are capable ing; and therefore H_3, &c., may be neglected, and we ly

$$w=H_2(x,y,z,\xi,\eta,\zeta).$$

general there will be twenty-one terms, with independent , in this function; but by a choice of types of reference, a linear transformation of the independent variables, we infinite variety of ways, reduce it to the form

$$w=\tfrac{1}{2}(Ax^2+By^2+Cz^2+F\xi^2+G\eta^2+H\zeta^2).$$

ions of equilibrium then become

$$P=\frac{A}{a}x,\quad Q=\frac{B}{b}y,\quad R=\frac{C}{c}z,$$

$$S=\frac{F}{f}\xi,\quad T=\frac{G}{g}\eta,\quad U=\frac{H}{h}\xi,$$

st possible form under which they can be presented. retation can be expressed as follows.

n infinite number of systems of six types of strains or ist in any given elastic solid such that, if a strain of any e types be impressed on the body, the elastic reaction is y a stress orthogonal to the five others of the same

XV.—*On the Six Principal Strains of an Elastic Solid.*

ce the twenty-one coefficients of the quadratic terms in sion for the potential energy to six by a linear transformation, we have only fifteen equations to satisfy; while we have thirty disposable transforming coefficients, there being five independent elements to specify a type, and six types to be changed. Any further condition expressible by just fifteen independent equations may be satisfied, and makes the transformation determinate. Now the condition that six strains may be mutually orthogonal is expressible by just as many equations as there are different pairs of six things, that is, fifteen. The well-known algebraic theory of the linear transformation of quadratic functions shows for the case of six variables—(1) that the six coefficients in the reduced form are the roots of a "determinant" of the sixth degree necessarily real; (2) that this multiplicity of roots leads determinately to one, and only one system of six types fulfilling the prescribed conditions, unless two or more of the roots are equal to one another, when there will be an infinite number of solutions and definite degrees of isotropy among them; and (3) that there is no equality between any of the six roots of the determinant in general, when there are twenty-one independent coefficients in the given quadratic.

Prop. Hence a single system of six mutually orthogonal types may be determined for any homogeneous elastic solid, so that its potential energy when homogeneously strained in any way is expressed by the sum of the products of the squares of the components of the strain, according to those types, respectively multiplied by six determinate coefficients.

Def. The six strain-types thus determined are called the Six Principal Strain-types of the body.

The concurrences of the stress-components used in interpreting the differential equation of energy with the types of the strain-coordinates in terms of which the potential of elasticity is expressed, being perfect when these constitute an orthogonal system, each of the quantities denoted above by *a*, *b*, *c*, *f*, *g*, *h*, is unity when the six principal strain-types are chosen for the coordinates. The equations of equilibrium of an elastic solid may therefore be expressed as follows:—

$$P=Ax,\quad Q=By,\quad R=Cz,$$

$$S=F\xi,\quad T=G\eta,\quad U=H\zeta,$$

where x, y, z, ξ, η, ζ denote strains belonging to the six Principal Types, and P, Q, R, S, T, U the components according to the same types, of the stress required to hold the body in equilibrium when in the condition of having those strains. The amount of work that must be spent upon it per unit of its volume, to bring it to this state from an unconstrained condition, is given by the equation

$$w=\tfrac{1}{2}(Ax^2+By^2+Cz^2+F\xi^2+G\eta^2+H\zeta^2)$$

Def. The coefficients A, B, C, F, G, H are called the six Principal Elasticities of the body.

The equations of equilibrium express the following propositions:—

Prop. If a body be strained according to any one of its six Principal Types, the stress required to hold it so is directly concurrent with the strain.

Examples.—(1) If a solid be cubically isotropic in its elastic properties, as crystals of the cubical class probably are, any portion of it will, when subject to a uniform positive or negative normal pressure all round its surface, experience a uniform condensation or dilation in all directions. Hence a uniform condensation is one of its six principal strains. Three plane distortions with axes bisecting the angles between the edges of the cube of symmetry are clearly also principal strains, and since the three corresponding principal elasticities are equal to one another, any strain whatever compounded of these three is a principal strain. Lastly, a plane distortion whose axes coincide with any two edges of the cube, being clearly a principal distortion, and the principal elasticities corresponding to the three distortions of this kind being equal to one another, any distortion compounded of them is also a principal distortion.

Hence the system of orthogonal types treated of in Examples (3) Chap. IX., and (7) Chap. X., or any system in which, for (II.), (III.), and (IV.), any three orthogonal strains compounded of them are substituted, constitutes a system of six Principal Strains in a solid cubically isotropic. There are only three distinct Principal Elasticities for such a body, and these are—(A) its modulus of compressibility, (B) its rigidity against diagonal distortion in any of its principal planes (three equal elasticities), and (C) its rigidity against rectangular distortions of a cube of symmetry (two equal elasticities).

(2) In a perfectly isotropic solid, the rigidity against all distortions is equal. Hence the rigidity (B) against diagonal distortion must be equal to the rigidity (C) against rectangular distortion, in a cube; and it is easily seen that if this condition is fulfilled for one set of three rectangular planes for which a substance is isotropic, the isotropy must be complete. The conditions of perfect or spherical isotropy are therefore expressed in terms of the conditions referred to in the preceding example, with the farther condition B = C.

A uniform condensation in all directions, and any system whatever of five orthogonal distortions, constitute a system of six Principal Strains in a spherically isotropic solid. Its Principal Elasticities are simply its Modulus of Compressibility and its Rigidity.

Prop. Unless some of the six Principal Elasticities be equal to one another, the stress required to keep the body strained otherwise than according to one or other of six distinct types is oblique to the strain.

Prop. The stress required to maintain a given amount of strain is a maximum or a maximum-minimum, or a minimum, if it is of one of the six Principal Types.

Cor. If A be the greatest and H the least of the six quantities A, B, C, F, G, H, the principal type to which the first corresponds is that of a strain *requiring a greater stress to maintain it* than any other strain of equal amount; and the principal type to which the last corresponds is that of a strain which *is maintained by a less stress* than any other strain of equal amount in the same body. The stresses corresponding to the four other principal strain-types have each the maximum-minimum property in a determinate way.

Prop. If a body be strained in the direction of which the concurrences with the principal strain-types are $l, m, n, \lambda, \mu, \nu$, and to an amount equal to r, the stress required to maintain it in this state will be equal to Ωr, where

$$\Omega = (A^2l^2 + B^2m^2 + C^2n^2 + F^2\lambda^2 + G^2\mu^2 + H^2\nu^2)^{\frac{1}{2}}.$$

and will be of a type of which the concurrences with the principal types are respectively

$$\frac{Al}{\Omega},\ \frac{Bm}{\Omega},\ \frac{Cn}{\Omega},\ \frac{F\lambda}{\Omega},\ \frac{G\mu}{\Omega},\ \frac{H\nu}{\Omega}.$$

Prop. A homogeneous elastic solid, crystalline or non-crystalline, subject to magnetic force or free from magnetic force, has neither any right-handed or left-handed, nor any dipolar, properties dependent on elastic forces simply proportional to strains.

Cor. The elastic forces concerned in the luminiferous vibrations of a solid or fluid medium possessing the right- or left-handed property, whether axial or rotatory, such as quartz crystal, or tartaric acid, or solution of sugar, either depend on the heterogeneousness or on the magnitude of the strains experienced.

Hence as they *do not depend on the magnitude of the strain*, they *do depend on its heterogeneousness through the portion of a medium containing a wave.*

Cor. There cannot possibly be any characteristic of elastic forces simply proportional to the strains in a homogeneous body, corresponding to certain peculiarities of crystalline form which have been observed,—for instance corresponding to the plagiedral faces discovered by Sir John Herschel to indicate the optical character, whether right-handed or left-handed, in different specimens of quartz crystal, or corresponding to the distinguishing characteristics of the crystals of the right-handed and left-handed tartaric acids obtained by M. Pasteur from racemic acid, or corresponding to the dipolar characteristics of form said to have been discovered in electric crystals.

CHAPTER XVI.—*Application of Conclusions to Natural Crystals.*

It is easy to demonstrate that a body, homogeneous when regarded on a large scale, may be constructed to have twenty-one arbitrarily prescribed values for the coefficients in the expression for its potential energy in terms of any prescribed system of strain coordinates. This proposition was first enunciated in the paper on the Thermo-elastic Properties of Solids, published April 1855, in the *Quarterly Mathematical Journal* alluded to above. We may infer the following.

Prop. A solid may be constructed to have arbitrarily prescribed values for its six Principal Elasticities and an arbitrary orthogonal system of six strain-types, specified by fifteen independent elements, for its principal strains: for instance, five arbitrarily chosen systems of three rectangular axes, for the normal axes of five of the Principal Types; those of the sixth consequently in general distinct from all the others, and determinate; and the six times two ratios between the three stresses or strains of each type, also determinate. The fifteen equations expressing (Chap. VI.) the mutual orthogonality of the six types determine the twelve ratios for the six types, and the three quantities specifying the axes of the sixth type in the particular case here suggested: or generally the fifteen equations determine fifteen out of the thirty quantities (viz. twelve ratios and eighteen angular coordinates) specifying six Principal Types.

Cor. There is no reason for believing that natural crystals do not exist for which there are six unequal Principal Elasticities, and six distinct strain-types for which the three normal axes constitute six distinct sets of three principal rectangular axes of elasticity.

It is easy to give arbitrary illustrative examples regarding Principal Elasticities: also, to investigate the principal strain-types and the equations of elastic force referred to them or to other natural types, for a body possessing the kind of symmetry as to elastic forces that is possessed by a crystal of Iceland spar, or by a crystal of the "tesseral class," or of the included "cubical class." Such illustrations and developments, though proper for a students' text book of the subject, are unnecessary here.

For applications of the Mathematical Theory of Elasticity to the question of the earth's rigidity and elasticity as a whole, and to the equilibrium of elastic solids in general, which are beyond the scope of the present article, the reader is referred to Thomson and Tait's *Natural Philosophy*, §§ [illegible], 740, 832, 849, and Appendix C.

CHAPTER XVII.—*Plane Waves in a Homogeneous Æolotropic Solid.*

A plane wave in a homogeneous elastic solid is a motion in which every line of particles in a plane parallel to one fixed plane experiences simply a motion of translation—but a motion differing from the motions of particles in planes parallel to the same. Let OX, OY, OZ be three fixed rectangular axes; OX perpendicular to the wave front (as any of the parallel planes of moving particles referred to in the definition is called), and OY, OZ in the wave front. Let $x+u$, $y+v$, $z+w$ be the coordinates at time t of a particle which, if the solid were free from strain, would be at (x, y, z). The definition of wave motion amounts simply to this, that u, v, w are functions of x and t.

The *strain* of the solid (Chap. VII. above) is the resultant of a simple longitudinal strain in the direction OX, equal to $\frac{du}{dx}$, and two differential slips $\frac{dv}{dx}$, $\frac{dw}{dx}$, parallel to OY and OZ, constituting simple distortions of which the numerical magnitudes (Chap. X.) are

$$\frac{dv}{dx}\sqrt{2}, \quad \text{and} \quad \frac{dw}{dx}\sqrt{2}.$$

Put then

$$\frac{du}{dx} = \xi, \quad \frac{dv}{dx}\sqrt{2} = \eta, \quad \frac{dw}{dx}\sqrt{2} = \zeta \quad \dots\dots (1):$$

and let W denote the work per unit of bulk required to produce the strain represented by this notation. We have (Chap. XV.)

$$W = \tfrac{1}{2}(A\xi^2 + B\eta^2 + C\zeta^2 + 2D\eta\zeta + 2E\zeta\xi + 2F\xi\eta) \quad \dots (2).$$

where A, B, C, D, E, F denote moduluses of elasticity of the solid. Let p, q, r denote the three components of the traction per unit area of the wave front. We have (Chap. XV.)

$$\left.\begin{aligned} p &= A\xi + F\eta + E\zeta \\ q\sqrt{2} &= F\xi + B\eta + D\zeta \\ r\sqrt{2} &= E\xi + D\eta + C\zeta \end{aligned}\right\} \quad \dots\dots$$

Now let ξ, η, ζ be taken such that

$$\left.\begin{aligned} A\xi + F\eta + E\zeta &= M\xi \\ F\xi + B\eta + D\zeta &= M\eta \\ E\xi + D\eta + C\zeta &= M\zeta \end{aligned}\right\} \quad \dots\dots\dots (4)$$

the determinantal cubic gives three real positive values for M, and with M equal to any one of these values, (4) determine the ratios $\xi : \eta : \zeta$. Hence when the solid is strained in any one of the three ways thus determined we have

$$p = M\frac{du}{dx}, \quad q = M\frac{dv}{dx}, \quad r = M\frac{dw}{dx} \quad \dots\dots (5).$$

The three components of the whole force due to the tractions on the sides of an infinitely small parallelepiped δx, δy, δz of the solid are clearly

$$\frac{dp}{dx}\delta x.\delta y\delta z, \quad \frac{dq}{dx}\delta x.\delta y\delta z, \quad \text{and} \quad \frac{dr}{dx}\delta x.\delta y\delta z \quad \dots\dots (6).$$

and therefore, if ρ be its density, and consequently $\rho\delta x\,\delta y\,\delta z$ its mean, the equations of its motion are

$$\rho\frac{d^2u}{dt^2} = \frac{dp}{dx}, \quad \rho\frac{d^2v}{dt^2} = \frac{dq}{dx}, \quad \rho\frac{d^2w}{dt^2} = \frac{dr}{dx} \qquad (7).$$

These, putting for p, q, r their values by (5), become

$$\rho\frac{d^2u}{dt^2} = M\frac{d^2u}{dx^2}, \quad \rho\frac{d^2v}{dt^2} = M\frac{d^2v}{dx^2}, \quad \rho\frac{d^2w}{dt^2} = M\frac{d^2w}{dx^2} \qquad (8).$$

And by (4) and (1) we have

$$\left.\begin{aligned} Au + (Fv + Ew)\sqrt{2} &= Mu \\ Fu + (Bv + Dw)\sqrt{2} &= Mv\sqrt{2} \\ Eu + (Dv + Cw)\sqrt{2} &= Mw\sqrt{2} \end{aligned}\right\} \quad \dots\dots (9)$$

Let M_1, M_2, M_3 be the three roots of the determinantal cubic, and b_1, c_1; b_2, c_2; b_3, c_3, the corresponding values of the ratios $\frac{v}{u}$, $\frac{w}{u}$ determined by (9). The complete solution of (8), subject to (9), is

$$\left.\begin{aligned} u &= u_1 + u_2 + u_3 \\ v &= b_1u_1 + b_2u_2 + b_3u_3 \\ w &= c_1u_1 + c_2u_2 + c_3u_3 \\ \text{where} \quad u_1 &= f_1\left(x + t\sqrt{\frac{M_1}{\rho}}\right) + F_1\left(x - t\sqrt{\frac{M_1}{\rho}}\right) \\ u_2 &= f_2\left(x + t\sqrt{\frac{M_2}{\rho}}\right) + F_2\left(x - t\sqrt{\frac{M_2}{\rho}}\right) \\ u_3 &= f_3\left(x + t\sqrt{\frac{M_3}{\rho}}\right) + F_3\left(x - t\sqrt{\frac{M_3}{\rho}}\right) \end{aligned}\right\} \qquad (10)$$

f_1, F_1, f_2, F_2, f_3, F_3 denoting arbitrary functions. Hence we conclude that there are three different wave-velocities,

$$\sqrt{\frac{M_1}{\rho}}, \quad \sqrt{\frac{M_2}{\rho}}, \quad \sqrt{\frac{M_3}{\rho}}$$

and three different modes of waves, determined by equations (9).

Waves in an Isotropic Solid.—If the solid be isotropic, we have

$$\left.\begin{aligned} B &= C \\ D &= E = F = 0 \\ M_1 &= A, \quad M_2 = M_3 = B \end{aligned}\right\} \qquad (11)$$

Hence, instead of three different waves with different velocities, we have just two,—a wave (like that of sound in air or other elastic fluid) in which the motions are perpendicular to the wave front, and the other (like the waves of light in an isotropic medium) in which the motions are parallel to the wave front.

Waves in an Incompressible Solid (Æolotropic or Isotropic).—If the solid be incompressible, we have $A=\infty$, and u must be zero.

Hence
$$W=B\eta^2+C\zeta^2+2D\eta\zeta$$

and by a determinantal quadratic, instead of cubic, we find two wave-velocities and two wave-modes, in each of which the motion is parallel to the wave front. In the case of isotropy the two wave velocities are equal.

It is to be noticed that M_1, M_2, M_3 in the preceding investigation are not generally true "principal moduluses," but special moduluses corresponding to the particular plane chosen for the wave front. In the particular case of isotropy, however, the equal moduluses M_2, M_3 of (11) are principal moduluses, being each equal to *the* modulus of rigidity, but M_1 is a mixed modulus of compressibility and rigidity—not a principal modulus. In the case of incompressibility, the two moduluses found from the determinantal quadratic by the process indicated above are not principal moduluses generally, because the distortions by the differential motions of planes of particles parallel to the wave front must generally give rise to tangential stresses orthogonal to them, which do not influence the wave motion. (W. TH.)

ELATERIUM, a drug consisting of a sediment deposited by the juice of the fruit of *Ecbalium Elaterium*, the squirting cucumber (see vol. vi. p. 688.) To prepare it, the fruit is sliced lengthwise and slightly pressed; the greenish and slightly turbid juice thus obtained is strained and set aside; and the deposit of elaterium formed after a few hours is collected on a linen filter, rapidly drained, and dried on porous tiles at a gentle heat. Elaterium is met with in commerce in light, thin, friable, flat or slightly incurved opaque cakes, of a greyish-green colour, bitter taste, and tea-like smell. The best kind is the English, prepared at Hitchin, Market Deeping, Mitcham, and elsewhere; the Maltese is generally very inferior. Elaterium is an exceedingly powerful hydragogue and drastic purgative, and not unfrequently produces vomiting. Its active principal is *elaterin*, a crystallizable body of the formula $C_{20}H_{28}O_5$.

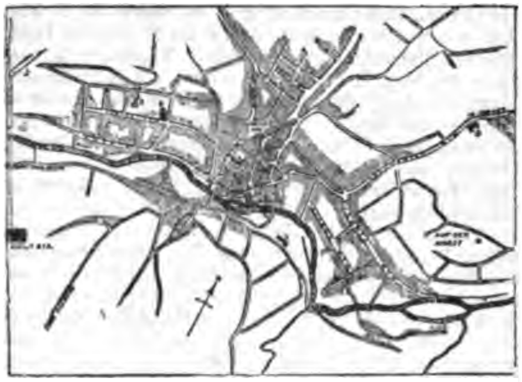
ELBA, the Αἰθαλία of the Greeks, and Ilva of the Romans, is an island in the Mediterranean Sea, forming part of the Italian province of Livorno, and lying about 6 miles from the mainland of Italy, from which it is separated by the channel of Piombino, and about 34 miles E. of Corsica. It has a very irregular coast outline, is 18 miles long and 2¼ to 10½ miles broad, and has a total area of nearly 90 square miles. It is throughout mountainous, and the highest point, Monte Capanne, is 2925 feet above sea-level. The western portion of the island is granitic, the eastern consists mainly of the sandstone locally known as *verrucano*, which in some places passes into a talc slate. In the vicinity of Porto Ferrajo the hills are cretaceous. The climate is mild, and, except at some spots on the coast, healthy. Springs are numerous, and the soil is not infertile; but agriculture and cattle-rearing are neglected, and there are no manufactures. Wine, wheat, aloes, dyer's lichen, and olives and other fruits are produced. The sardine and tunny fisheries, and the manufacture of sea-salt are of some importance; but the principal industry is mining. The iron mines are mostly in the vicinity of Rio Inferiore, and yield abundance of ore, chiefly hematite, of excellent quality. On account of the lack of fuel the ore is not smelted on the island, but is shipped direct to Follonica on the neighbouring coast of Italy, and to the ports of France and England. Marble, alabaster, sulphur, and ores of tin, lead, and silver are among the other mineral products. The principal places in Elba are the chief town Porto Ferrajo, with about 5000 inhabitants, the residence of Napoleon from May 4, 1814, to February 26, 1815, Rio Ferrajo, San Pietro, Porto Longone, and the village of Capoliveri. The population of the island in 1871 was 21,755.

The Argonauts, in quest of Circe, are said to have loaded at Portus Argous (Ἀργῷος λιμήν), now Porto Ferrajo, in Elba. The island was early famous for the richness of its mines, alluded to by Virgil (*Æn.* x. 173). It was attacked by Phayllus with a Syracusan fleet, 453 B.C., and subsequently by Apelles, who is stated to have subjugated it. In the 10th century it became a possession of the Pisans, from whom it was taken by the Genoese in 1290. It fell eventually into Spanish hands, came in 1736 under the jurisdiction of Naples, and in 1801 was ceded to the king of Etruria by the treaty of Lunéville. It was united to France in 1808, made over to Napoleon by the Treaty of Paris in 1814, restored to Tuscany in the following year, and in 1860 annexed to Italy.

ELBE, the Albis of the Romans and the Labe of the Bohemians, a large river of Germany, with a total length of 705 miles, and a drainage area of about 55,000 square miles. It rises in Bohemia not far from the frontiers of Silesia, on the southern side of the Riesengebirge or Giants' Mountains, in 50° 46′ N. lat. and 15° 32′ E. long. Of the numerous small streams (Seifen or Flessen, as they are named in the district) whose confluent waters compose the infant river, the most important are the Weisswasser, or White Water, and the Elbseifen; the former rises to the S.W. of the Schneekuppe in the White Meadow, and the latter in a stone fountain in the Elb Meadow. Augmented successively by the Adler, the Iser, the Moldau, and the Eger, it cuts its way through the Mittelgebirge of Bohemia, traverses the sandstone mountains of Saxon Switzerland, and with a general N.W. direction continues to meander through Saxony, Anhalt, and Hanover, until at length it falls into the German Ocean about 53° 5′ N. lat. and 8° 50′ E. long. The principal towns on its banks are Leitmeritz, Pirna, Dresden, Meissen, Torgau, Wittenberg, Magdeburg, Wittenberge, Harburg, Hamburg, and Altona. A short distance above Hamburg the stream divides into a number of branches, but they all reunite before reaching the ocean. At its source the Elbe is about 4600 feet above the level of the sea; after the first 40 miles of its course it is still 658 feet; but at Dresden it is only 279, and at Arneburg in Brandenburg only 176. At Königgrätz the width is about 100 feet, at the mouth of the Moldau about 300, at Dresden 960, and at Magdeburg over 1000. The tide is perceptible as far up as Geesthacht. Of the fifty and more tributaries belonging to the system the most important are the Moldau, the Eger, the Mulde, and the Saale,—the Moldau having a course of 267 miles, the Eger of 235, the Mulde of 185, and the Saale of 220. Though the channel in some places, and especially in the estuary, is encumbered with sandbanks and shallows, the Elbe is of great importance as a means of communication, steamboats being able to ascend the main stream as far as Melnick, and to reach Prague by means of the Moldau. Some idea of the extent of its traffic may be obtained from the statement that in 1870 at Schandau 489 passenger-steamers and 2658 vessels and barges of various kinds passed up the stream, and 489 passenger steamers, 2865 ships, and 1505 rafts down the stream. By one line of canal it communicates with Lübeck, by another with Bremen, and by others with the great network of Mecklenburg and Brandenburg; and several new lines are projected, by which a direct way will be opened up to Hanover, Leipsic, and various other important cities.—For details see Dr Th. H. Schunke's "Die Schiffahrts-Kanäle im Deutschen Reiche," in Petermann's *Mittheil.*, 1877.

Formerly 3 entrepots (Pirna, Dresden, and Magdeburg), 35 tolls, and numerous corporations of privileged watermen, opposed almost insurmountable obstacles to the navigation; the Austrians and the Saxons alone could navigate the Upper Elbe, that is, from Magdeburg to where it ceases to be navigable, and the Prussians and Hamburgers had the sole privilege of navigating the Lower Elbe. But new regulations were introduced by a convention concluded on the 13th June 1821 between all the bordering states, viz., Austria, Saxony, Prussia, Hanover, Denmark (for Holstein and Lauenburg), the grand duchy of Mecklenburg-Schwerin, and the three principalities of Anhalt. Every merchant, to whatever bordering state he might belong, was allowed with his own vessel and crew to navigate the whole course of the river without interruption; the 35 tolls were reduced to 14; the heavy dues which were levied upon goods of the first necessity were reduced to one for the cargo (*Elbe Toll*) and another for the ship (*Recognitionsgebühren*); and each state was bound to watch over the portion of river which passed through their territories, and to preserve it from everything injurious to commerce or navigation. It was also arranged that a commission should meet from time to time for the revision of the tariff, &c., and the investigation of all matters connected with the utilization of the river. By the second of these commissions, which met at Dresden in 1842, an additional Navigation Act was published in 1844; in the third, at Magdeburg in 1850, it was proposed by Austria to remove the Elbe tolls altogether, but Hanover and some other states refused; in the fourth, at Hamburg, 1858, the same objections still carried the day; but in 1861 the fifth commission decided that only one common toll for all the riparian states should be left at Wittenberge; and after numerous difficulties, the federative council of the German empire succeeded in securing the complete freedom of the river in 1870. A compensation of 1,000,000 thalers was granted to Mecklenburg-Schwerin, and of 85,000 to Anhalt.

ELBERFELD, a manufacturing town of Rhenish Prussia in the government of Düsseldorf, situated in the narrow valley of the Wupper, about 19 miles E. of the town of Düsseldorf on the Berg and Mark railway. Though for the most part of modern erection, it has a large number of irregular and narrow streets, and altogether presents rather an unprepossessing appearance; the very river, polluted as it is with the refuse of dye-works and factories, rather increasing the unseemliness. The newer quarters, however, must be excepted from this description, and many of the public buildings are large and handsome. Of these the most important are the town-house, in the modern Romanesque style, the provincial court, the exchange, the post office, the orphanage, the lunatic asylum, St Joseph's hospital, the infirmary, the Female Society's hospital, the railway company's offices, the gymnasium, and the technical school. The educational institutions include 27 popular schools where no fees are paid, and the whole system of relief for the poor is so well arranged that it has excited imitation in several towns in Germany. A great variety of textile fabrics in cotton, wool, and silk are manufactured on an extensive scale; and besides dye-works and chemical works of proportionate importance, there may be mentioned button-factories, lace-factories, a brewery, a foundry, and soap-works. The town is the seat of a considerable number of industrial, philanthropic, intellectual, and religious institutions, among which the most noticeable are the public library, the museum, and the Berg Bible Society. The inhabitants are mainly Protestants, with a strong tendency towards pietism; but the Roman Catholics number upwards of 14,000, and the Jewish community has recently erected a new synagogue. The *Elberfelder Zeitung* and several other newspapers are published in the town. In 1840 the population was 31,514; in 1864, 63,300; and in 1875, 80,599.



Plan of Elberfeld.

1 Post Office.
2 Townhouse.
3 Evangel. Luth. Church.
4 Evangel. Reformed Church.
5 Barracks.
6 Catholic Church.
7 Hospital.
8 Gasworks.
9 Poorhouse.
10 Old Market.

The site of Elberfeld was marked in the 12th century by a castle belonging to the lords of Elverfeld, which was afterwards united with the Berg possessions, and held by the family of Nesselrode; but it was not till the 16th century that the nucleus of the present industrial development was formed by the establishment on the banks of the Wupper of a number of bleachers, who obtained a monopoly in 1532. Municipal rights were granted in 1610, a great increase of the manufactures effected in the beginning of the 18th century, silk-weaving introduced in 1760, and the dyeing of Turkey red commenced in 1780.

See Coutelle, *Elberfeld, topographisch-statistische Darstellung*, Elberfeld, [illegible]; Langewiesche, *Elberfeld und Barmen*, Barmen, 1863.

ELBEUF, a town of France in the department of Seine Inférieure, 13 miles S. of Rouen, on the left bank of the Seine, with a station on the railway between Oissel and Serquigny. It has three parish churches, a Protestant place of worship, a town-house with a natural history museum, a public library, a hospital, an industrial society, an archæological society, and a chamber of arts and sciences. The churches of St Étienne and St Jean are both of some antiquity, and preserve stained glass of the 15th and 16th centuries. The town is one of the principal seats of the woollen manufacture in France: more than half of the inhabitants are directly maintained by the staple industry, and numbers more by the auxiliary crafts. As a river-port it has a brisk trade in the produce of the surrounding district as well as in the raw materials of its manufactures. A suspension bridge communicates with St Aubin, and steam-boats ply regularly to Rouen. The population, which was only about 4600 in the end of last century, amounted in 1831 to 10,258, and in 1872 to 22,563. If the quasi-suburban towns of Caudebec-lès-Elbeuf, Saint-Pierre-lès-Elbeuf, and St Aubin-jouxte-Boulleng be included, this great industrial congeries will comprise upwards of 39,000 inhabitants.

Elbeuf is an old town, and the site was probably occupied during the Roman period. In the 14th century it was made a countship, and in 1554 it passed by marriage to Duke René of Lorraine. By King Henry III. it was raised to the rank of a duchy in favour of Charles, grandson of Claude of Lorraine, but the dukes of Elbeuf made no figure in history, and in 1763 the title passed to the house of Harcourt. The town and its industries were greatly patronized by Colbert; but the revocation of the Edict of Nantes soon after neutralized the beneficial effects of his regulations, and it was not till 1814 that the removal of Belgian competition gave the new impetus which is still at work. In that year there were 80 factories producing goods to the value of 25 millions of francs; in 1840 the factories numbered 200, and the value of the goods amounted to 40 or 45 millions.

ELBING, a seaport town of Prussia, at the head of a circle in the government of Dantzig, 36 miles E.S.E. of the city of that name, on the Elbing, a small river which flows into the Frische Haff about four miles from the town, and is united with the Nogat or eastern arm of the Vistula by means of the Kraffohl canal. The old town was formerly surrounded by fortifications, but of these only a few fragments remain. There are seven Evangelical, one Roman Catholic, and two Mennonite churches, a synagogue, a gymnasium founded in 1536, with a public library of

n-asylum, several hospitals, and
itions. Of these last a number
e bequests of an Englishman,
l in the town in 1810 and died
he manufacturing industry is
ducing, among the rest, iron
inery, sail-cloth, woollen cloth.
rch, vitriol, and vinegar; and
ed a considerable increase by the
nal (1846–1861).

e to a colony of Lübeck traders who
the castle of the Teutonic Knights
e Lübeck rights, and afterwards
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came at last to Prussia in 1772—
its present prosperity is of quite
75, 33,572.

iu, in the province of Alicante,
he river Vinalapo. It has three
c buildings, a hospital, barracks,
ace; but there is nothing of
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hysiognomy of the inhabitants,
oofed white-washed houses, and
ls of palm-trees in its gardens
strikingly Oriental aspect, and
cities of Spain. The cultivation
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se of Barbary, the annual value
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s for the processions of Palm-
ve received the blessing of the
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cient Ilici or Illici of the Contestani,
ined the rank of a colony with the
attacked by the Moors of Granada,
n balls through fire." Population

, also surnamed Ha-Dani, Abu-
e Danite, a Jewish traveller of
istian era, chiefly interesting on
kness) which his writings throw
Tribes. The date and place of
known; but he was a native
f Media. About 860 he set out
his Jewish brethren in Africa
wrecked, and they fell into the
lad was saved from the inhuman
his leanness and afterwards by
neighbouring tribe. He spent
tors, was ransomed by a fellow-
journey as far, according to one
as China, spent several years at
on a visit to Cordova in Spain.
his name is written in Hebrew,
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tive. It was first printed at
d the same recension afterwards
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le of *Eldad Danius de Judæis
a imperio*, and was afterwards
r's *Chronographia Hebræorum*;
at Prague in 1695, and another
8 M. Carmoly edited and trans-
hich he had found in a MS.
Ben Hasan, forwarded to him by Daud Zabach of Morocco. Both forms are printed by Dr Jellinek in his *Beth-Ha-Midrash*, vols. ii. and iii.. Leipsic, 1853–55. One of the most curious passages in the work is the account of the Levites, who, says the author, were miraculously guided to the land of Havila, and are there protected from their enemies by the mystic river Sabbation, which on the Sabbath is calm and involved in delusive mists, and on the other days of the week runs with a fierce and fordless current.

See Bartolocci, *Bibliotheca Magna Rabbinica*, vol. i.; Fürst, *Bibliotheca Judaica*; Graetz, *Geschichte der Juden*, vol. v.; Rossi, *Dizionario degli Ebrei*; and Kitto's *Biblical Cyclopædia*, 3d edition, *sub nomine*.

ELDER, the name of an office both in the Jewish and in the Christian church, which is used in modern times only by Presbyterians. As first applied, among the ancient Jews, for example, it had no doubt a literal fitness, indicating the responsibility and authority that naturally accrue in any community to those advanced in age. As the office gradually came to be fixed in its character and limited in the number of its occupants, the name lost something of its literal fitness, the responsibility and authority becoming attached to it without regard to the age of the occupant. In this respect the kindred terms alderman, senator, &c., have had a similar history. In the Old Testament usage of the word it is impossible to fix any exact point of time at which it passed from its primary or etymological to its secondary or official sense, as the process was a gradual one, and old age continued to be a leading qualification for the office long after it had ceased to be essential. In Exodus iii. 16 elders are mentioned as a recognized official body among the Israelites, and in subsequent notices (Ex. xix. 7; Ex. xxiv. 1; Deut. xxxi. 9) they appear as the representatives of the whole body of the people. In Numbers xi. 16, 17, seventy elders, to be chosen out of the entire body, were set apart "to bear the burden of the people" along with Moses. It is unnecessary to enter here into any discussion of the moot question of the connection of this Mosaic council of seventy with large though undefined legislative and executive powers with the Sanhedrim as it existed at the time of Christ. From the time of the institution of the Mosaic council the elders are mentioned at each successive stage of Jewish history. After the settlement in Canaan they acted as the administrators of the laws in every city (Deut. xix. 11–12; xxi. 3–9, 19; xxii. 15–21); and references to them are frequent during the period of the judges and the kings, during the captivity, and after the restoration. In the New Testament the word is used to denote both an order of the Jewish economy and an office of the Christian church. Its precise significance in the latter usage is the main subject in the standing controversy between Episcopalians and Presbyterians, and a statement of the arguments on either side belongs properly to the articles on Episcopacy and Presbytery respectively. Reference must also be made to the article on Presbytery for a full statement of the qualifications, duties, and powers of elders in a presbyterian church. It may be noted here that while the New Testament word *presbyteros* denotes, according to the admission of the adherents of all forms of church government, those especially set apart to the pastoral office, whatever else it may be held to include, its English equivalent *elder* is used as an official designation only in the presbyterian church. According to the presbyterian theory of church government there are two classes of elders, *teaching* elders, or those set apart specially to the pastoral office, and *ruling* elders, who are laymen, chosen generally by the congregation, and set apart by ordination to be associated with the pastor in the oversight and government of the church. When the word is used without any qualification, it is understood to apply to the latter class alone.

ELDER (Ang.-Sax. *ellarn;* Ger. *Holunder;* Fr. *sureau*), the popular designation of the deciduous shrubs and trees constituting the genus *Sambucus* of the natural order *Caprifoliaceæ*. The Black-berried or Common Elder, *S. nigra*, the bourtree of Scotland, is found in Europe, the north of Africa, Western Asia, the Caucasus, and Southern Siberia; in sheltered spots it attains a height of over 20 feet. The bark is smooth; the shoots are stout and angular, and the leaves glabrous, pinnate, and generally oval or elliptical. The flowers, which form corymbose cymes, with five main branches, have a cream-coloured, gamopetalous, five-lobed corolla, five stamens, and three sessile stigmas; the berries are purplish-black, globular, and three- or four-seeded, and ripen about September. The elder thrives best in moist, well-drained situations, but can be grown in a great diversity of soils. It is propagated by young shoots, which after a year are fit for transplantation. It is found useful for making screen-fences in bleak, exposed situations, and also as a shelter for other shrubs in the outskirts of plantations. By clipping two or three times a year, it may be made close and compact in growth. The young trees furnish a brittle wood, containing much pith; the wood of old trees is white, hard, and close-grained, and polishes well, and is employed for shoemakers' pegs, combs, skewers, mathematical instruments, and turned articles. Young elder twigs deprived of pith have from very early times been in request for making whistles, popguns, and other toys.

The elder was known to the ancients for its medicinal properties, and in England the inner bark was formerly administered as a cathartic. The flowers (*sambuci flores*) contain a volatile oil, and are reputed to be diaphoretic in properties; they serve for the preparation of an ointment (*unguentum sambuci*), and for the distillation of elder-flower water (*aqua sambuci*), used in confectionery, perfumes, and lotions. The leaves of the elder are employed to impart a green colour to fat and oil (*unguentum sambuci foliorum* and *oleum viride*), and the berries for making wine, a common adulterant of port. The leaves and bark emit a sickly odour, believed to be repugnant to insects. Christopher Gullet (*Phil. Trans.*, 1772, lxii. p. 348) recommends that cabbages, turnips, wheat, and fruit trees, to preserve them from caterpillars, flies, and blight, should be whipped with twigs of young elder. According to German folk-lore, the hat must be doffed in the presence of the elder-tree; and in certain of the English midland counties a belief was once prevalent that the cross of Christ was made from its wood, which should therefore never be used as fuel, or treated with disrespect (see *Quart. Rev.*, cxiv. 233). It was, however, a common mediæval tradition, alluded to by Ben Jonson, Shakespeare, and other writers, that the elder was the tree on which Judas hanged himself; and on this account, probably, to be crowned with elder was in olden times accounted a disgrace. In Cymbeline (act iv. s. 2) "the stinking elder" is mentioned as a symbol of grief. In Denmark the tree is supposed by the superstitious to be under the protection of the "Elder-mother:" its flowers may not be gathered without her leave; its wood must not be employed for any household furniture; and a child sleeping in an elder-wood cradle would certainly be strangled by the Elder-mother.

S. nigra virescens is a variety of *S. nigra* having white bark and green-coloured berries; some ornamental varieties have blotched leaves. The Scarlet-berried Elder, *S. racemosa*, is the handsomest species of its genus. It is a native of various parts of Europe, growing in Britain to a height of over 15 feet, but often producing no fruit. The Dwarf Elder or Danewort, *S. Ebulus*, a common European species, reaches a height of about 6 feet. Its cyme is hairy, has three principal branches, and is smaller than that of *S. nigra*; the flowers are of a dull purplish hue. All parts of the plant are cathartic and emetic.

ELDON, JOHN SCOTT, BARON, and afterwards EARL OF (1751–1838), lord high chancellor of England, was born at Newcastle on the 4th June 1751. His grandfather, William Scott, of Sandgate, a suburb of Newcastle, was clerk to a "fitter"—a sort of water-carrier and broker of coals. His father, whose name also was William, began life as an apprentice to a fitter, in which service he obtained the freedom of Newcastle, becoming a member of the guild of Hoastmen; later in life he became a principal in the business, and attained a respectable position as a merchant in Newcastle, accumulating property worth nearly £20,000. He was twice married; his second wife, the mother of John Scott, says Lord Campbell (*Lord Chancellors*, vol. vii. p. 4), "was a woman of such superior understanding, that to her is traced the extraordinary talent which distinguished her two sons, William and John—Lord Stowell and Lord Eldon." It may be mentioned that William and John had each of them a twin sister.

The boys were educated at the grammar school of their native town, where, however, they scarcely gave promise of the splendid careers which they were destined to run. John Scott was not remarkable at school for application to his studies, though his wonderful memory enabled him to make good progress in them; he frequently played truant, and was whipped for it, robbed orchards, and indulged in other questionable school-boy freaks; nor did he always come out of his scrapes with honour and a character for truthfulness. When John had finished his education at the grammar school, his father thought of apprenticing him to his own business, to which an elder brother Henry had already devoted himself; and it was only through the interference of William, who had already obtained a fellowship at University College, Oxford, that it was ultimately resolved that he should continue the prosecution of his studies. Accordingly, on the 15th May 1766, John Scott entered University College as a commoner, with the view of entering the church, and obtaining a college living. In the year following he obtained a fellowship, graduated B.A. in 1770, and in 1771 won the prize for the English essay, the only university prize open in his time for general competition. It does not appear, however, that he distinguished himself at college any more than he had done at school by any severe application to study. It was not till after his marriage that he first concentrated his energies on the congenial study of law.

His wife was the eldest daughter of Mr Aubone Surtees, a Newcastle banker. John Scott first met her at Sedgefield Church, in the county of Durham, and a strong attachment sprang up between them. The Surtees family objected to the match, and attempted to prevent it; but the fire once kindled was not to be put out. On the 18th November 1772, Scott, with the aid of a ladder and an old friend, carried off the lady from her father's house in the Sandhill, across the border to Blackshiels, in Scotland, where they were married. The father of the bridegroom objected not to his son's choice, but to the time he chose to marry; for it was a blight on his son's prospects, depriving him of his fellowship and his chance of church preferment. But while the bride's family refused to hold intercourse with the pair, Mr Scott, like a prudent man and an affectionate father, set himself to make the best of a bad matter, and received them kindly, settling on his son £2000. John returned with his wife to Oxford, and continued to hold his fellowship for what is called the year of grace given after marriage, and added to his income by acting as a private tutor. After a time Mr Surtees was reconciled with his daughter, and made a liberal settlement on her. John Scott's year of grace closed without any college living falling vacant; and with his fellowship he gave up the church, and turned to the study of law. He became a student at the Middle Temple in January 1773, and in February took his degree of M.A. at Oxford. In 1776 he was called to the bar, intending at first to establish himself as an advocate in his native town, a scheme which his early success led him to abandon, and he soon settled to the practice of his profession in London, and on the Northern Circuit. Thus, at last, had he started on the high road to the chancellorship, having narrowly escaped becoming a coal-fitter, a country parson, a provincial barrister, and, according to one account, a retailer of figs and raisins.

In the autumn of the year in which he was called to the bar his father died, leaving him a legacy of £1000 over and above the £2000 previously settled on him. He was already an excellent lawyer, and succeeded fairly well on his first circuit, though not so well as to satisfy him of the safety of attempting a London career. He therefore took a house in Newcastle, with the view of establishing himself there, but still delayed to leave London; and his prospects there suddenly improving, he assigned the Newcastle house to his brother Henry. In his second year at the bar his prospects began to brighten. His brother William, who by this time held the Camden professorship of ancient history, and enjoyed an extensive acquaintance with men of eminence in London, was in a position materially to advance his interests. Among his friends was the notorious Bowes of Gibside, to the patronage of whose house the rise of the Scott family was largely owing. Bowes having contested Newcastle and lost it, presented an election petition against the return of his opponent. Young Scott was retained as junior counsel in the case, and though he lost the petition he did not fail to improve the opportunity which it afforded for displaying his talents. This engagement, in the commencement of his second year at the bar, and the dropping in of occasional fees, must have raised his hopes; and he now abandoned the scheme of becoming a provincial barrister. A year or two of dull drudgery and few fees followed, and he began to be much depressed. But in 1780 we find his prospects suddenly improved, by his appearance in the case of Ackroyd *v.* Smithson, which became a leading case settling a rule of law; and young Scott, having lost his point in the inferior court, insisted on arguing it, on appeal, against the opinion of his clients, and carried it before Lord Thurlow, whose favourable consideration he won by his able argument. The same year Bowes again retained him in an election petition; and in the year following Scott greatly increased his reputation by his appearance as leading counsel in the Clitheroe election petition. From this time his success was certain. In two years he obtained a silk gown, and was so far cured of his early modesty that he declined accepting the king's counselship if precedence over him were given to his junior, Mr Erskine, though the latter was the son of a peer and a most accomplished orator. He was now on the high way to fortune. His health, which had hitherto been but indifferent, strengthened with the demands made upon it; his talents, his power of endurance, and his ambition all expanded together. He enjoyed a considerable practice in the northern part of his circuit, before parliamentary committees, and at the Chancery bar, and was in sight of the honours and emoluments of the solicitor and attorney generalships. By 1787 his practice at the Equity bar had so far increased that he was obliged to give up the eastern half of his circuit (which embraced six counties), and attend it only at Lancaster.

Shortly after taking the silk gown, he entered Parliament for Lord Weymouth's close borough of Weobley, which Lord Thurlow obtained for him without solicitation. In Parliament he gave a general and independent support to Pitt. His first parliamentary speeches were directed against Fox's India Bill. They were unsuccessful. In one he aimed at being brilliant; and becoming merely laboured and pedantic, he was covered with ridicule by Sheridan, from whom he received a lesson which he did not fail to turn to account. In 1788 Pitt conferred upon him the honour of knighthood and the office of solicitor-general; and at the close of this year he attracted attention by his speeches in support of Pitt's resolutions on the state of the king (George III., who then laboured under a mental malady) and the delegation of his authority. It is said that he drew the Regency Bill, which was introduced in 1789. In 1793 Sir John Scott was promoted to the office of attorney-general, in which it fell to him to conduct the memorable prosecutions for high treason against British sympathizers with French republicanism,—amongst others, against the celebrated Horne Tooke. These prosecutions, in most cases, were no doubt instigated by Sir John Scott, and were the most important proceedings in which he was ever professionally engaged. He has left on record, in his *Anecdote Book*, a defence of his conduct in regard to them. A full account of the principal trials, and of the various legislative measures for repressing the expressions of popular opinion for which he was more or less responsible, will be found in Twiss's *Public and Private Life of the Lord Chancellor Eldon*, and in the *Lives of the Lord Chancellors*, by Lord Campbell. In 1799 the office of chief-justice of the Court of Common Pleas falling vacant, Sir John Scott's claim to it was not overlooked; and after seventeen years' service in the Lower House, he entered the House of Peers as Baron Eldon. In February 1801, the ministry of Pitt was succeeded by that of Addington, and the chief-justice now ascended the woolsack. The chancellorship was given to him professedly on account of his notorious anti-Catholic zeal. From the Peace of Amiens (1801) till 1804, Lord Eldon appears to have interfered little in politics. In the latter year we find him conducting the negotiations which resulted in the dismissal of Addington and the recall of Pitt to office as prime minister. Lord Eldon was continued in office as chancellor under Pitt; but the new administration was of short duration, for on the 23d of January 1806 Pitt died, worn out with the anxieties of office, and his ministry was succeeded by a coalition, under Lord Grenville. The death of Fox, who became foreign secretary and leader of the House of Commons, soon, however, broke up the Grenville administration; and in the spring of 1807, Lord Eldon once more, under Lord Liverpool's administration, returned to the woolsack, which, from that time, he continued to occupy for about twenty years, swaying the Cabinet, and being in all but name prime minister of England. It was not till April 1827, when the premiership, vacant through the paralysis of Lord Liverpool, fell to Mr Canning, the chief advocate of Roman Catholic emancipation, that Lord Eldon, in the seventy-sixth year of his age, finally resigned the chancellorship. When, after the two short administrations of Canning and Goderich, it fell to the duke of Wellington to construct a Cabinet, Lord Eldon expected to be included, if not as chancellor, at least in some important office, but he was overlooked, at which he was much chagrined. Notwithstanding his frequent protests that he did not covet power, but longed for retirement, we find him again, so late as 1835, within three years of his death, in hopes of office under Peel. He spoke in Parliament for the last time in July 1834.

In 1821 Lord Eldon had been created earl by George IV., whom he managed to conciliate, partly, no doubt, by espousing his cause against his wife, whose advocate he had formerly been, and partly through his reputation for zeal against the Roman Catholics. In the same year, his brother William, who from 1798 had filled the office of judge of the High Court of Admiralty, was raised to the peerage under the title of Lord Stowell.

Lord Eldon's wife, his dear "Bessy," his love for whom is a beautiful feature in his life, died before him, on the 28th June 1831. By nature she was of simple character, and by habits acquired during the early portion of her husband's career almost a recluse. Two of their sons reached maturity,—John, who died in 1805, and William Henry John, who died unmarried in 1832. Lord Eldon himself survived almost all his immediate relations. His brother William died in 1836 He him self died, in London, in his eighty-seventh year, on the 13th January 1838, leaving behind him two daughters, Lady Frances Bankes and Lady Elizabeth Repton, and his grandson, who succeeded him. "When his remains lay in state in Hamilton Place," says Lord Campbell, "large numbers of all classes went to see the solemn scene; and when the funeral procession, attended by the carriages of the princes of the blood, many members of the peerage, and all the dignitaries of the law, blackened the way, dense crowds stood uncovered, respectfully gazing at it as it passed." His remains were interred in the family vault in the chapel of Kingston, in Dorsetshire. The fortune which he left behind him exceeded in amount half a million of money.

Lord Eldon was no legislator,—his one aim in politics was to keep in office, and maintain things as he found them; and almost the only laws he helped to pass were laws for popular coercion. For nearly forty years he fought against every improvement in law, or in the constitution,—calling God to witness, on the smallest proposal of reform, that he foresaw from it the downfall of his country. Without any political principles, properly so called, and without interest in or knowledge of foreign affairs, he maintained himself and his party in power for an unprecedented period by his great tact, and in virtue of his two great political properties—of zeal against every species of reform, and zeal against the Roman Catholics. To pass from his political to his judicial character is to shift to ground on which his greatness is universally acknowledged. His judgments, which have received as much praise for their accuracy as abuse for their clumsiness and uncouthness, fill a small library. But though intimately acquainted with every nook and cranny of the English law, he never carried his studies into foreign fields, from which to enrich our legal literature; and it must be added that against the excellence of his judgments, in too many cases, must be set off the hardships, worse than injustice, that arose from his protracted delays in pronouncing them. A consummate judge and the narrowest of politicians, he was Doubt on the bench and Promptness itself in the political arena. For literature, as for art, he had no feeling. What intervals of leisure he enjoyed from the cares of office he filled up with newspapers and the gossip of old cronies. Nor were his intimate associates men of refinement and taste; they were rather good fellows who quietly enjoyed a good bottle and a joke; he uniformly avoided encounters of wit with his equals. He is said to have been parsimonious, and certainly he was quicker to receive than to reciprocate hospitalities; but his mean establishment and mode of life are explained by the retired habits of his wife, and her dislike of company. His manners were very winning and courtly, and in the circle of his immediate relatives he is said to have always been lovable and beloved. "He is one," says Miss Martineau, "that after times will not venerate; but fortunately for the fame of the larger num-
ber of the great ones of the earth, there is a vast
ground between veneration and contempt."

"In his person," says Lord Campbell, "Lord Eld
about the middle size, his figure light and athletic,
features regular and handsome, his eye bright and full
smile remarkably benevolent, and his whole appearance
possessing. The advance of years rather increased
detracted from these personal advantages. As he s
the judgment-seat, 'the deep thought betrayed in his
rowed brow,—the large eyebrows, overhanging eyes
seemed to regard more what was taking place within
around him,—his calmness, that would have assu
character of sternness but for its perfect placidity,
dignity, repose, and venerable age, tended at once to
confidence and to inspire respect' (Townsend). He
a voice both sweet and deep-toned, and its effect wa
injured by his Northumbrian burr, which, though st
was entirely free from harshness and vulgarity."

EL DORADO, that is, in Spanish, "The Gold
mythical country long believed to exist in the no
part of South America. The origin of the legend has
variously explained, some supposing that the mi
quartz in the valley of the Essequibo was mistaken fo
ore, while others find the nucleus of the story in th
that the high-priest of Bogotà was accustomed to
himself with gold dust, which was afterwards washed
a neighbouring lake. It hardly seems necessary, ho
to accept either or indeed any theory of explanatio
minds of the Spanish explorers had been dazzled
wealth of their earlier conquests, and the most brilliant
nation seemed to have a possibility of fulfilment. Mar
Spaniard, who had been set adrift on the sea, assert
he was flung on the coast of Guiana, and conducted
to a city called Manoa, which was governed by a
alliance with the Incas, and lavished the precious
on its roofs and walls. Orellana, who passed down
Napo to the valley of the Amazon in 1540, also
back an account of a land of fabulous wealth; and
von Hutten, who led an exploring party from Coro,
coast of Caracas, during the period from 1541 to
believed he had caught sight of the golden splend
the city of his search. In spite of the failure of ex
after expedition, and notably of that undertaken in
Gonzalo Ximenez de Quesada from Santa Fé de
the fable continued a potent allurement for adve
spirits, and even in the beginning of the 17th
exerted a master-influence on the schemes of Sir
Raleigh. Traces of the pseudo-discoveries of Marti
his compeers disfigured our maps till the time of Hu
who proved that the great lake of Parima to the
Manoa was almost as fabulous as the city itself;
name of El Dorado remains a permanent gain
metaphorical vocabulary. Allusions more or less d
the legend abound in European literatures, one of t
detailed being the well-known chapter in Voltaire's *C*

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